Phase 1

GHANA GREEN FINANCE TAXONOMY

GUIDING INVESTMENTS TOWARDS A SUSTAINABLE AND CLIMATE-RESILIENT ECONOMY

MINISTRY OF FINANCE

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Foreword

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As we stand at the threshold of a new era in Ghana's development, we find ourselves facing unprecedented challenges and opportunities. The twin imperatives of fostering economic growth and ensuring environmental sustainability have never been more closely intertwined. The increasing impacts of climate change and environmental degradation remind us daily of the urgent need to chart a course towards a more sustainable and resilient future.

It is in this context that I am proud to present Ghana's Green Finance Taxonomy – a landmark initiative that represents a critical step in realizing our vision of a prosperous, sustainable, and climate-resilient Ghana.

This taxonomy is more than just a classification system; it is a blueprint for our nation's sustainable development. By establishing a clear framework for identifying and classifying environmentally sustainable economic activities, we are providing our financial institutions, investors, and policymakers with an invaluable tool to direct capital towards green projects and initiatives.

As West Africa's first national green finance taxonomy, this document not only aligns Ghana's development objectives with global commitments such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs) but also positions us as a regional leader in sustainable finance. It is designed to enhance transparency, promote investor confidence, and accelerate the flow of capital into sustainable investments – all crucial elements in our transition to a green economy.

The development of this taxonomy has been a journey of collaboration and innovation. It is the product of extensive cooperation between government agencies, industry experts, civil society organizations, and our development partners. Their collective expertise and insights have been instrumental in shaping its objectives and methodology.

Recognizing the complexity of this transition, we have adopted a phased approach in the taxonomy's development and implementation:

1. In this first phase, we introduce qualitative screening criteria to guide green investments across key sectors such as energy, agriculture, and transportation.
2. By 2025, we will enhance the taxonomy with quantitative criteria and introduce tax exemptions and sector-specific incentives to further stimulate green investments.
3. Finally, by 2026, we will develop a transitional framework for carbon-intensive sectors like oil, gas, and mining, facilitating their shift toward more sustainable practices.

This phased rollout ensures that we can address high-priority sectors immediately while also providing the flexibility to refine and adapt the taxonomy as we progress. It allows us to tackle the urgent needs in areas such as energy, transportation, agriculture, and water and waste management, while also paving the way for sustainable industrial growth and resilient infrastructure development.

As we embark on this journey, I call upon all stakeholders – from financial institutions to businesses, from policymakers to individual citizens – to embrace this taxonomy. It is a tool for change, a catalyst for innovation, and a pathway to a more sustainable future. By aligning our investments with the principles outlined in this document, we can ensure that Ghana's economic growth goes hand in hand with environmental stewardship.

Together, we have the power to build a greener, more resilient Ghana – one that will serve as a model for the region and the world. Let us seize this opportunity to create lasting positive change for our nation and for generations to come.

Acknowledgement

Ms. Eva Mends)
Chief Director,
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Government Ministries and Agencies

- Ministry of Environment, Science, Technology, and Innovation (MESTI)
- Ministry of Energy (MoEn)
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- Ministry of Gender, Children, and Social Protection (MoGCSP)
- Ministry of Sanitation and Water Resources (MSWR)
- Ministry of Roads and Highways (MRH)
- Ministry of Fisheries and Aquaculture
- Ministry of Chieftaincy and Religious Affairs
- Bank of Ghana (BoG)
- Environmental Protection Agency (EPA)
- Energy Commission (EC)
- Forestry Commission (FC)
- Development Bank Ghana (DBG)

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Other Contributors

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The Ministry of Finance expresses particular appreciation to the Ghana Green Finance Taxonomy Steering Committee for their guidance and oversight throughout this project.

Finally, we commend the dedicated project team at the Ministry of Finance for their tireless efforts in coordinating and bringing this initiative to fruition.

The collective expertise, commitment, and collaboration of all these entities have been instrumental in creating a robust and comprehensive Green Finance Taxonomy for Ghana.

Executive Summary

The Ghana Green Finance Taxonomy is a strategic framework designed to guide investments toward a sustainable and climate-resilient economy. As West Africa's first green taxonomy, it establishes clear criteria for identifying environmentally sustainable economic activities, providing financial institutions, investors, businesses, and policymakers with a structured approach to direct capital toward projects aligned with Ghana's environmental, social, and economic objectives.

Aligned with commitments under the Paris Agreement and the Sustainable Development Goals (SDGs), the taxonomy initially focuses on key sectors, including energy, transportation, agriculture, forestry, aquaculture, water and waste management, and building and construction. These priority sectors are chosen for their potential to significantly reduce greenhouse gas emissions, strengthen climate resilience, and promote sustainable resource use.

A critical component of the taxonomy is its technical screening criteria, which encompass five main pillars: climate change mitigation, climate change adaptation, environmental protection, resource efficiency, and pollution prevention. These criteria ensure that all classified activities are scientifically grounded, contribute positively to sustainability goals, and meet both national priorities and international standards such as ISIC and ISO certifications. The principles of "Do No Significant Harm" (DNSH) and minimum social safeguards further guarantee that green activities do not result in adverse social or environmental impacts and promote social inclusion and equity.

The taxonomy is governed by a diverse stakeholder committee, ensuring it remains dynamic, transparent, and responsive to evolving environmental challenges. It will be rolled out in phases: beginning with qualitative criteria development for the selected sectors (Phase 1), followed by the introduction of quantitative thresholds, tax exemptions and sector-based incentives by May 2025 (Phase 2), and the development of a transitional taxonomy thereafter to include carbon-intensive sectors like oil, gas, and mining (Phase 3).

This framework aims to unlock critical financing for sustainable investments, support Ghana's climate goals, and enhance transparency and investor confidence while reducing the risk of greenwashing.

In summary, the Ghana Green Finance Taxonomy is a pioneering initiative that is intended to strengthen Ghana's position as a leader in sustainable finance in Africa. By promoting environmentally sustainable activities, it ensures alignment of investments with both national and global sustainability targets, fostering long-term economic growth, climate resilience, and social equity.

Abbreviations

BoG	Bank of Ghana
CSRI	Corporate Social Responsibility Initiative
DNSH	Do No Significant Harm
DPs	Development Partners
EPA	Environmental Protection Agency
ESG	Environmental, Social and Governance
EV	Electric Vehicle
FI	Financial Institutions
GAB	Ghana Association of Banks
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GLRSSMP	Ghana Landscape Restoration and Small Scale Mining Project
GoG	Government of Ghana
GRA	Ghana Revenue Authority
GRESB	Global Real Estate Sustainability Benchmark
GRI	Global Reporting Initiative
GS-IEC	Ghana Standard International Electrotechnical Commission
GSE	Ghana Stock Exchange
ICAG	Institute of Chartered Accountants Ghana
ICMA	International Capital Market Association
IFRS	International Financial Reporting Standards
ISIC	International Standard Industrial Classification
ISO	International Organisation for Standardisation
ISSER	Institute of Statistical, Social, and Economic Research

Abbreviations

LEED	Leadership in Energy and Environmental Design
MESTI	Ministry of Environment, Science, Technology and Innovation
MoF	Ministry of Finance
MRE	Monitoring, Reporting and Evaluation
NDC	Nationally Determined Contributions
REDD+	Reducing Emissions from Deforestation and forest Degradation Plus
SASB	Sustainability Accounting Standards Board
SDGs	Sustainable Development Goals
SEC	Securities and Exchange Commission
SPR	Sustainable Procurement Reporting
UNFCCC	United Nations Framework Conventions for Climate Change

Chapter 1

Introduction

Chapter 1: Introduction

1.1: Background and Rationale

Pursuant to the implementation of the Paris Agreement on Climate Change and the United Nations Sustainable Development Goals (SDGs), which cover climate change mitigation, adaptation, and finance, the world has witnessed increasing narratives on sustainable financing for investments. Sustainable finance covers environmental, social, and governance criteria in investment decisions . Essentially, this leads to more investment in sustainable projects, environmental and social benefits, and ensuring financial returns in the long-term. To ensure the implementation of standardised approaches to sustainable financing, Green Taxonomy Frameworks have been adopted globally. The Ghana Green Finance Taxonomy is the first in West Africa and the fourth on the African Continent.

In line with Ghana's commitment to promoting and strengthening climate and environmental practices towards achievement of the Sustainable Development Goals (SDGs) by 2030 and beyond, the Green Finance Taxonomy Framework represents a key milestone in this journey. It aligns Ghana's economic growth with sustainable environmental practices, outlining priority investment areas for consideration by investors and programme/project designers.

The Ghana Green Finance Taxonomy aims to establish a clear and consistent classification system for identifying environmentally sustainable economic activities and what constitutes a green investment. This framework serves as a guide for investors, businesses, financial institutions, and policymakers to channel investments towards projects that contribute to environmental sustainability and climate resilience. The Green Finance Taxonomy is a critical component of Ghana's broader strategy to transition to an orderly and just low-carbon, climate-resilient, and sustainable economy.

Through this initiative, Ghana aims to position itself as a leader in sustainable finance within the African Continent, setting a benchmark for how developing nations can integrate environmental considerations into financing of environmentally and economically viable projects in key sectors of the economy.

1.2: Definition and Scope of Green Taxonomy

A Green Taxonomy is a classification system that identifies and categorises activities, investments, and assets that contribute to environmental sustainability. According to the International Capital Market Association (ICMA), such a taxonomy serves as a framework for directing capital towards activities that align with specific environmental objectives, thus supporting a country in achieving its sustainability targets.

Ghana's Green Finance Taxonomy is designed to support interventions that address climate change, environmental protection, resource efficiency and promote sustainable development. This framework will serve as a critical tool for translating Ghana's environmental and climate policy objectives into actionable criteria for investment and business decisions.

1.2.1 Rationale

Through extensive stakeholder engagements between the Ministry of Finance and the business community, it became evident that while there was a strong willingness to partner with the government in building an environmentally sustainable and climate-resilient economy, the business community faced challenges in translating government policies into tangible commercial actions. This gap highlighted the need for a Green Taxonomy to provide greater clarity and direction.

The Ghana Green Finance Taxonomy is a compendium of economic activities and standards that investors and businesses can easily engage with when designing projects eligible for green and sustainable financing. This therefore provides investors with a clear pathway in identifying eligible green projects across prioritised economic activities.

This taxonomy prioritises sustainable economic activities aligned with Ghana's Nationally Determined Contributions, and consistent with the country's vision for low-carbon development and responsible industrialisation. Additionally, it aims to accelerate progress towards the Sustainable Development Goals (SDGs) within the 2030 timeline. By supporting the transition to a low-carbon economy, the Ghana Green Finance Taxonomy will align financial flows with environmental objectives, guide investment towards sustainable activities, help financial institutions and investors manage climate-related risks, and reduce the risk of greenwashing by providing transparency.

1.2.2 Objectives for the Taxonomy

- Standardisation: Provide a standardised definition of green activities and projects to ensure consistency across the financial system.
- Transparency and Accountability: Enhance transparency and accountability in green finance by setting clear and consistent criteria.
- Comparability: Ensure the comparability of green investments, allowing investors to make informed decisions.
- Green Finance Development: Support the development of green finance instruments, such as green bonds and sustainable financial products.
- International Alignment: Align Ghana's financial system with international standards and best practices in green finance, facilitating environmental sustainability.
- Sustainable Development: Promote sustainable development, climate resilience, and prosperity in Ghana.
- Job Creation: Accelerate the transition to a sustainable and climate-resilient economy, and generate more green jobs.

1.2.3 Scope and Coverage

The Green Finance Taxonomy will be implemented in a phased approach, prioritising sectors and activities based on their environmental impact, economic significance, and alignment with national priorities. Initially, the taxonomy will focus on sectors such as renewable energy, sustainable transportation, agriculture, forestry, water and waste management, aquaculture, the blue economy, and building and construction. Over time, additional sectors and economic activities will be incorporated as the framework evolves.

The taxonomy follows a hybrid model that will be rolled out in two phases. In the first phase, a whitelist of sustainable activities will be established, each defined by specific technical screening criteria. The second phase will introduce a transitional taxonomy that targets carbon-intensive sectors like energy, oil and gas, heavy industry, and mining. This phased approach ensures the integrity of the taxonomy by preventing greenwashing while addressing the unique challenges posed by high-emission sectors.

The hybrid model is designed to align with both local economic realities and global sustainability standards. It offers a tailored approach to managing carbon-intensive subsectors, reinforcing the government's commitment to the mitigation goals outlined in the nationally determined contributions (NDCs). While these sectors play a critical economic role, their high environmental impact necessitates gradual decarbonization strategies, incentives for cleaner technologies, and customised transition plans.

Separating these high-emission sectors from the sustainable whitelist also brings clarity for investors, who may be cautious about regulatory risks and potential stranded assets in these industries. By managing these sectors within a transitional taxonomy, the government mitigates investor uncertainty, attracts capital to sustainable sectors, and outlines a strategic, managed transition for carbon-intensive industries.

Environmental and social safeguards will be integral throughout this process, ensuring that projects not only advance environmental sustainability but also uphold social responsibilities.

1.2.4 Key Principles

- Scientific Basis: The taxonomy's criteria is grounded in scientific evidence and developed with input from experts in relevant fields.
- Transparency: The classification process is transparent, with opportunities for stakeholder input and public consultation.
- Dynamic and Flexible: The taxonomy will be regularly reviewed and updated to reflect technological advancements and evolving environmental challenges.
- Alignment with International Standards: The final taxonomy will be aligned with international green finance standards and best practices, such as taxonomies on the African continent.
- Social Inclusion: The taxonomy ensures that all activities classified as green also promote social inclusion and do not adversely affect vulnerable populations ensuring that "No One is Left Behind".
- Do No Significant Harm (DNSH): Activities included in the taxonomy must not significantly harm other social and environmental objectives and comply with minimum social safeguards. For example, a climate change mitigation project must not negatively impact biodiversity or water resources, and reforestation projects must avoid displacing local communities or disrupting ecosystems.
- Compliance with Minimum Social Safeguards: Beyond the environmental criteria, all activities classified under the Ghana Green Finance Taxonomy must comply with minimum social safeguards. This includes adherence to labour rights, human rights, and good governance standards. Projects should avoid causing social harm, such as community displacement or inequitable resource distribution, and should aim to promote social inclusion and equitable economic development. Compliance with these safeguards ensures that green activities also contribute to the broader goals of sustainable development, encompassing Environmental, Social, and Governance (ESG) aspects.
- Governance and Ethics: The framework reflects strong governance and ethical standards in reporting and accountability, ensuring that the classification system maintains its integrity and credibility.

This comprehensive framework guides the mobilisation of and access to green and sustainable financing, reducing risk of greenwashing. This will ensure that investments contribute to Ghana's environmental and climate goals while promoting sustainable development.

1.3: Alignment with National and International Policies and Practices

In preparing a Green Finance Taxonomy Framework, Ghana seeks to harmonise its national policies with international best practices, ensuring that the country not only meets its global environmental obligations but also leverages green investments for economic growth. To this end, relevant national and international policy and legal frameworks were considered in the determination of the priority investment areas, reflecting a multi-sectoral approach. The Framework is strongly linked to the Nationally Determined Contributions (NDCs) towards the implementation and achievement of the Paris Agreement on Climate Change.

1.4: Key Stakeholders

The Ghana Green Finance Taxonomy is designed to serve a wide range of stakeholders, including financial institutions, policymakers, businesses, investors, civil society, multilateral development banks, international organisations, and project promoters. By providing a clear and standardised system to identify and promote environmentally sustainable activities, the taxonomy guides decision-making processes across various sectors. Below is a (non-exhaustive) summary of the different types of users and their potential applications of the Ghana Green Finance Taxonomy:

Table 1: Stakeholders

User	Application
Financial Institutions	Use the taxonomy to assess, classify and finance green projects and help raising investments, develop green financial products (e.g., green bonds, loans), contribute to the broader development of green finance debt market and the whole sustainable finance ecosystem, improve disclosure and data collection and to manage climate-related risks.
Policymakers	Apply the taxonomy to design and implement environmental policies, set regulatory standards, facilitate the development and green financing options, help improve the investment-flow towards sustainable-finance activities and align national strategies with international sustainability goals.
Businesses	Utilise the taxonomy to develop and/or identify eligible green projects, secure sustainable financing, and seek compliance with environmental regulations and standards.
Investors	Use the taxonomy to determine, evaluate and invest in sustainable opportunities, ensure portfolio alignment with environmental objectives, and minimize greenwashing risks.
Civil Society	Leverage the taxonomy to advocate for environmental sustainability, monitor government and corporate alignment, and engage in public consultations.
Multilateral Development Banks	Apply the taxonomy to allocate funding towards green projects, support sustainable development initiatives, and align lending practices with environmental goals.
International Organisations	Provide technical assistance to improve the taxonomy and align with international best practices, provide linkage to MDBs for low cost financing to de-risk projects, build capacity to improve the alignment with sustainable finance standards.
Project Promoters	Use the taxonomy to design and implement environmentally sustainable projects, secure funding, and ensure projects meet required green criteria.

1.5 Criteria for Classification

This Taxonomy should outline the national environmental objectives and criteria for its classification. The sections below should specify the specific criteria of substantial contributions, including the DNSH-aspects. This principle aims to ensure that any sustainable activity, while it contributes positively to one area, it does not create negative externalities in another, such as, for example, biodiversity or water resources.

1.5.1 Climate Mitigation

Economic activities classified under this criterion must demonstrably contribute to the reduction of greenhouse gas (GHG) emissions in line with the Paris Agreement, limiting the global warming well below 2 degrees and pursuing efforts to get close to 1.5 degrees celsius above pre-industrial level.. This includes but is not limited to activities in sectors such as renewable energy, energy efficiency, and low-carbon transportation. For instance, renewable energy projects must show significant reductions in carbon intensity compared to baseline measurements, and energy efficiency improvements in buildings, or industrial processes must meet or exceed specified thresholds for reducing energy consumption. Activities under this category should also consider the long-term sustainability of their impact, ensuring that they contribute to a net reduction in emissions throughout their lifecycle.

1.5.2 Climate Adaptation

Activities that enhance resilience to climate change impacts are critical under this criterion. This includes infrastructure projects that incorporate resilience into their design against climate hazards, such as flood defences, climate-resilient buildings, and sustainable water management systems. These activities must demonstrate an ability to withstand future climate scenarios, providing ongoing protection and adaptation benefits to communities and ecosystems. Metrics for classification under climate adaptation might include the degree to which infrastructure can resist extreme weather events or the effectiveness of water management systems in drought conditions.

1.5.3 Environmental Protection

Activities must actively contribute to the protection or restoration of biodiversity, ecosystems, and natural resources. This includes projects focused on reforestation, conservation of natural habitats, and the sustainable management of water and land resources. To qualify, projects must meet specific environmental standards, such as maintaining or improving biodiversity levels, protecting endangered species, or enhancing ecosystem services like pollination or water purification.

1.5.4 Resource Efficiency

Activities classified as resource-efficient must promote the sustainable use of natural resources, including energy, water, and raw materials. This can involve circular economy practices, such as recycling, reusing, or refurbishing materials to minimise waste. Projects in this category must actively promote sustainable development by demonstrating a substantial improvement in resource efficiency compared to conventional methods. Additionally, these activities should contribute to reducing the overall environmental footprint of these sectors they are part of, ensuring that resource efficiency translates into economic viability and tangible environmental benefits.

1.5.5 Pollution prevention

Pollution prevention in a sustainable finance taxonomy involves establishing criteria that guide investments and financial activities toward activities that minimise environmental harm. Key criteria include:

1. Emission Reduction Targets: Establish specific emissions reduction targets related to greenhouse gases (GHGs) and other pollutants, requiring investments to demonstrate how they contribute to achieving these goals.

2. Resource Efficiency: Promote projects that utilise resources (energy, water, raw materials) more efficiently, leading to less waste and lower pollution levels. This can include the adoption of cleaner technologies and practices.

3. Waste Minimization Strategies: Encourage practices that prioritise reducing waste generation at the source, promoting recycling and reusing materials, and adopting circular economy principles.

4. Use of Best Available Technologies (BAT): Investments should adopt technologies and practices that are recognized as the best available for minimising pollution and environmental impact.

5. Compliance with Environmental Standards: Ensure adherence to national and international environmental regulations and standards for air, water, and soil quality.

6. Life Cycle Assessment (LCA): Require a life cycle assessment of products or projects to evaluate the environmental impacts from extraction through to disposal, ensuring pollution prevention is factored at every stage.

7. Sustainable Land Use Practices: Promote investments in land use that prevent pollution from agricultural runoff, deforestation, and urban sprawl, such as organic farming and sustainable forestry practices.

8. Community and Stakeholder Engagement: Encourage entities to engage with local communities and stakeholders in pollution prevention efforts, ensuring transparency and consideration of local environmental impacts.

9. Management of Hazardous Substances: Implement strict controls and preventive measures related to the use of hazardous substances, ensuring they are effectively managed to reduce the risk of pollution.

10. Monitoring and Reporting: Require ongoing monitoring and reporting of environmental impacts related to pollution, allowing for accountability and adjustments in practices to improve outcomes.

11. Education and Training: Support programs that provide education and training on pollution prevention methods and sustainable practices for workers and management in relevant sectors.

Chapter 2

Sectors

Chapter 2: Sectors

The development of this Taxonomy, which is at the end supposed to be in line with best practices established in Europe and the African Continent, evaluated and prioritised the sectors for consideration. The process also led to a further categorisation and inclusion of the prioritised sectors applying a phased approach, based on the immediate potential impacts on Ghana's broader economic and environmental objectives and in line with Ghana's revised Nationally Determined Contributions, meaning the some (sub-)sectors might be included sooner (or later...) than others, depending on the expected implications on the national economic development.

By appreciating the sectoral breakdown, market participants can better navigate the opportunities and responsibilities that come with participating in Ghana's green economy. The identified sectors therefore provide the fundamental basis for identifying, classifying, and supporting economic activities that contribute to environmental objectives such as climate mitigation, biodiversity conservation, sustainable water management, and pollution prevention, to facilitate the flow of capital into sustainable projects, but also ensures that Ghana's growth trajectory remains firmly rooted in environmental stewardship.

Table 2: Prioritised sectors

No.	Sector	Description
Phase 1		
1	Energy	Ghana's power supply sources are from hydroelectricity, thermal fueled by crude oil, natural gas and diesel and, solar PV energy. The energy sector in Ghana is a critical driver of the nation's economic development and a focal point for its transition to a sustainable, low-carbon future. Ghana's commitment to industrialization and its rapid urbanisation creates increased demand for energy. This is expected to grow significantly, making it imperative to develop an energy sector that is not only reliable and affordable but also environmentally sustainable. According to the Energy Commission of Ghana, the country has an installed electricity generation capacity of about 5,610MW, with 28.2% coming from hydroelectric power, 69.8% from thermal power plants, and about 0.29% from renewable energy sources like solar as at 2022 found here. A growing diversification of the energy landscape including hydro, natural, gas, solar, wind-farms and tidal-wave technologies (renewable energy sources) provides the platform for green financing towards sustainable energy production and economic growth. Ghana's Green Taxonomy Framework places the energy sector at the forefront of its sustainability agenda, recognizing the sector's potential to significantly reduce greenhouse gas emissions and mitigate climate change. Ghana's energy sector faces numerous challenges such as ageing infrastructure, limited renewable energy integration, transmission & distribution losses, financial constraints within the power sector, among others. It is estimated that technical losses and inefficiencies in Ghana's energy distribution system result in annual losses exceeding hundreds of millions of kwh. These losses are attributed to outdated infrastructure, energy wastage in transmission lines, inefficient appliances, and the reliance on diesel generators during power outages, which are not only costly but also environmentally damaging.

		These challenges can unlock opportunities aimed at ensuring energy resilience. Investing in solar energy projects and upgrading the transmission and distribution infrastructure could result in significant economic and environmental benefits. There are also opportunities for research and development in smart grid technologies and energy storage solutions, which would enhance the integration of renewable energy into the national grid and improve overall energy efficiency. There is also opportunity for private sector participation in the power distribution space. Major government initiatives, such as the Renewable Energy Act and the National Energy Policy, provide a framework for advancing renewable energy development, enhancing energy efficiency, and encouraging private sector investment in the energy sector, on-grid as well as off-grid..
2	Transportation	Ghana has a vibrant transport network comprising roads and highways, railways, aviation, and water and inland ports. The network has experienced remarkable expansion and progress, driven by the government's strategic investments in infrastructure development and connectivity enhancements. Ghana's transportation system is heavily reliant on fossil fuels, with almost all vehicles running on diesel fuel (28%), petrol (61%), and Liquefied Petroleum Gas (11%). Vehicles fitted with internal combustion engines are a global source of greenhouse gas emissions, source of air pollutants including nitrogen oxide, carbon monoxide, hydrocarbons, and particulate matter, and noise pollution. Ghana's transportation sector is its biggest GHG-emitter.The ssystem contributes to 47.7% of energy-related emissions . The Greenhouse Gas emissions are projected to reach 74 MtCO_2e by 2050 in the business-as-usual scenario compared to approximately 43 MtCO_2e in 2016. The Taxonomy focuses on various economic activities and standards to achieve operational efficiency in the following transportation modes: urban public transport, interurban public transport (including freight and passenger), personal vehicles, and micromobility. The transition from fossil fuel-based transport to sustainable, low-, and zero-emission fleets will lead to climate savings (CO_2 mitigation) and environmental benefits (reductions in emissions of Particulate Matter, Nitrogen Oxide, and other pollutants). The government's medium-term targets for monitoring hazardous substances emitters , aiming for PM10 and PM2.5 concentrations of less than 50 μg/m^3 and less than 25 μg/m^3, respectively, are expected to be attained by the period 2027-2047. The cumulative CO_2 mitigation for public transport using electric buses is estimated at 90 Mt CO_2 over the 2020-2050 period. Additionally, the cumulative CO_2 mitigation for personal electric vehicles is estimated at 27 Mt CO_2 over the same period. A clean transport system will contribute to the Government's goal of achieving a 50% reduction in greenhouse gas emissions by 2047 compared to 2022 data.

3	Agriculture (including Forestry, Aquaculture, and Blue Economy)	**Agriculture** In line with Article 4 of the Paris Agreement and UNFCCC decisions, Ghana updated its NDCs from 2020 to 2030. Ghana's NDCs emphasise the importance of sustainable agriculture, climate resilience, and gender inclusion. Ghana aims to secure the long-term ecological viability of its agriculture sector, ensuring that it transforms the agricultural value chains for Food security and resilience, Job creation, Food Price stability/inflation control, import substitution, Agro produce export and overall economic growth while protecting the natural environment for future generations. Ghana's agricultural sector encompassing forestry and aquaculture, is a cornerstone of Ghana's economy, providing livelihoods for a significant portion of the population, and with over 20% contributing substantially to the nation's Gross Domestic Product (GDP) . Agriculture in Ghana is diverse, ranging from tree and food crops production to livestock farming, forestry, and aquaculture. According to the Food and Agricultural Organization, Ghana has about 8 million hectares of forested land, with 7.7 million hectares being primary forest (naturally generating forest) and 290,000 hectares being planted forests. Also 15,722,500 hectares agricultural lands out of which 4,709,900 hectares is arable land for the cultivation of crops and livestock rearing. These arable lands are amenable to varied irrigation systems, and coupled with relatively significant water resources which could facilitate all year-round food production. Despite the sector's economic significance and opportunities, Ghana's agriculture faces a myriad of obstacles such as climate change, post-harvest losses, low value-added processing, lack of modern machinery, land degradation, deforestation, diseases and overfishing, which threaten its long-term sustainability and productivity. Ghana's population is growing, and climate change poses additional threats to food security. For example, most arable crops and some major cash crops for export, suffer from low yields. The stagnating crop yields have led to agricultural land use expansion which culminates in deforestation. And smallholders struggle to achieve economies of scale due to fragmented land holdings and un-mechanised practices. A compilation of independent surveys (carried out by MOFA, World Bank, Danish Embassy) indicates that Ghana experienced substantial post-harvest losses in 2023. Most fields of cash crops, vegetables, grains, roots and tubers and other indigenous staples (eg. mangoes, cassava, yams, plantains, garden eggs, and tomatoes are abundant but not reaching their full potential owing to postharvest losses.

Relevant to this survey, postharvest losses in Ghana have been estimated at 20%-50% and on average loses about 16 million dollars each year. Poor postharvest handling has been identified as one of the main causes. It occurs in various forms, from bruises during harvesting, rough packaging material such as wooden boxes, dense packing of some crops into single large wooden boxes and the poor road network. Also, during periods of glut, losses reach unprecedented levels as the lack of storage facilities and the short shelf life of the produce leave the producers with very few options other than to sell to wholesalers directly after harvest.

Notwithstanding, by applying climate-smart agriculture, green cattle farming, leveraging on technology, improving extension services, and promoting sustainable practices, the country can overcome these challenges and unlock its opportunities aimed at ensuring agricultural resilience. Investing in solar-powered cold storage for value chains like mangoes, yams, plantains, garden eggs, and tomatoes could result in revenue accretion of over $2 million and $8 million for solution providers, and marketers of agricultural products, respectively. There are also opportunities for research and development towards delivering climate resilient smart varieties in the arable crop space and thus help in addressing the issue of low productivity.

Major government initiatives such as the Planting for Food and Jobs , provides farmers with inputs, technical backstopping on crop and livestock production including linkages to markets; The Ghana Landscape Restoration and Small Scale Mining Project (GLRSSMP) , addresses environmental degradation, promoting sustainable land use, and enhancing the livelihoods of communities involved in small-scale mining in Ghana. In addition, several farmer info-technologies have been deployed enhancing early warning systems (EWS) to help farmers prepare for extreme weather events including information on input and market prices. The EWS include a suite of agri-tech platforms like Farmerline, ESOKO, GMet Let's talk Weather. The proliferation of these platforms aligns with Ghana's NDCs policy action of utilising EWS to attain climate adaptation and benefit over 500,000 persons.

Again embracing modern agricultural practices and machine-intensive technologies such as precision agriculture, mechanisation through contiguous land development for farmers would contribute meaningfully to food security and environmental sustainability whilst building climate resilience. Participatory Scenario Planning and other sustainable land use practices are essential to addressing deforestation and land use change. There are also opportunities for expanding processing activities related to agricultural commodities to enhance economic diversification.

Forestry

In recent years Ghana has experienced a depletion of its tree cover. Data from 2001 to 2022 reveals that Ghana lost a total of 1.41 million hectares of tree cover, which is equivalent to a 20 percent decrease in forest cover. The causal events are illegal logging, firewood exploitation and forest fires, expansion of land for cash crop plantations and mining.

These activities have resulted in the loss of Ghana’s rich biodiversity, leading to the depletion of ecosystems and habitats, including wetlands and forests. This, in turn, has compromised the efficient sequestration of greenhouse gas emissions, exacerbating climate change.

Under the Ghana Forest Plantation Strategy (GFPS, 2016 - 2040), forest restoration interventions are being implemented under the three main components namely forest plantation development, enrichment planting and farm forestry. In line with this strategy, Ghana’s Green Finance Taxonomy outlined key thematic areas for agroforestry and reforestation projects aimed at promoting sustainability, biodiversity, and community engagement. The aim is to achieve sequestration of carbon thereby achieving Ghana’s emission targets in the NDCs.

These initiatives, which include commercial plantation establishment, timber and non-timber forest products (NTFPs), and tree crop agroforestry, are designed to address various environmental, social, and economic goals critical for the country’s development and ecological health. Biodiversity Conservation is a primary focus, with efforts directed toward establishing diverse, native species-rich systems that enhance biodiversity. Activities include planting native trees, restoring habitats, creating wildlife corridors, and integrating wildlife conservation and habitat restoration efforts. Metrics such as species diversity and habitat restoration area are used to measure success. Additionally, Restoration of Degraded Ecosystems involves rehabilitating lands through agroforestry, reforestation, and commercial plantation establishment. This includes soil restoration, water conservation, and vegetation replanting to prevent erosion and improve soil fertility, with metrics including the area of land restored and improvements in soil quality.

Thus, Climate Change Adaptation and Mitigation emphasise enhancing resilience and contributing to climate mitigation through carbon sequestration. Agroforestry systems, including tree crops and commercial plantations (except some mono-cultures like pines or eucalyptus), absorb carbon dioxide, improve microclimates, and reduce the vulnerability of agriculture to climate extremes. Carbon credits and trading are explored as innovative mechanisms to monetize these environmental benefits, with key metrics including carbon sequestration rates and reductions in greenhouse gas emissions.

	In furtherance to this, the principle of Do No Significant Harm (DNSH) contributes that activities, including the establishment of agroforestry enterprises, eco-tourism, and sustainable recreation, do not negatively impact the environment or society. This involves implementing safeguards against biodiversity loss, water resource depletion, and harm to local communities, with metrics such as environmental impact assessments and compliance with DNSH principles. Also, Community and Stakeholder Engagement is emphasised to ensure local participation in planning, implementing, and managing projects. This involves consultations, incorporating traditional knowledge, and providing education and training through forest management and training services, with metrics including the number of stakeholders engaged and community participation levels. In addition, Monitoring and Reporting is essential for tracking progress and impact. This involves developing frameworks to monitor ecological, social, and economic outcomes, with metrics such as the frequency of reports and data accuracy. Ensuring Legal Compliance and Standards is crucial, with activities aligned to Ghana’s legal frameworks and international standards like the UNFCCC and CBD. Compliance audits and certifications serve as key metrics. Alignment with Specific Government Policy and Compliance is also critical. Projects must comply with national strategies and obtain necessary certifications, with metrics including policy compliance and alignment with strategic goals. Finally, identifying and collaborating with Responsible Agencies/Regulators ensures that projects meet regulatory requirements and benefit from the expertise of bodies like the Environmental Protection Agency and Forestry Commission. Metrics include the level of collaboration and compliance with guidelines. The government has developed a public-private participation model to attract private sector investment in afforestation and reafforestation projects.

4	Water and Waste Management	Access to clean water and effective waste management are fundamental to the wellbeing of Ghana's population. However, less than 40% of urban residents are inadequately served with solid waste collection services. The Ghana Green Finance Taxonomy identifies the Water and Waste Management sector as a priority area for sustainable transformation, presenting a significant opportunity for green investment. Given the country's pressing challenges, such as outdated infrastructure, limited financial resources, and inefficient waste disposal systems, there is a critical need for a realistic business plan to resolve the situation, which can serve as a base for developing innovative financial solutions to drive improvements in this sector. While organic waste constitutes the largest component of waste in Ghana, making up about 50-60% of the total waste generated, plastic significantly contributes around 10-15%, with paper waste making up about 5-10% of the total waste. Metal waste accounts for approximately 3-5%, glass and textiles contribute about 2-4% each. With an estimated 12,710 metric tons of solid waste generated daily and only 10% properly managed, investments aligned with the taxonomy can target initiatives that enhance waste collection, recycling, and water management, fostering environmental sustainability, improving public health, and stimulating economic growth. The sector's diverse waste composition, including a high percentage of organic and plastic waste, offers avenues for developing circular economy projects, such as organic waste-to-energy initiatives, plastic recycling programs, and waste gas capture, which are essential for reducing pollution and supporting Ghana's climate resilience goals. Additionally, and with significant potential for utilising organic waste as feedstock for bioenergy production and composting, this taxonomy also opens avenues for integrating alternative technologies for waste management, which can significantly enhance the efficiency and sustainability of waste processing in-country.

5	Eco-Tourism	The Eco-tourism sector in Ghana is a key component of the country's sustainable development strategy, combining environmental conservation with economic growth. This nature-based tourism model emphasizes responsible travel to natural areas, supporting biodiversity conservation, cultural preservation, and sustainable resource use. Eco-tourism aligns with several Sustainable Development Goals (SDGs), particularly Goals 8 (Decent Work and Economic Growth), 11 (Sustainable Cities and Communities), and 15 (Life on Land). Economic activities related to eco-tourism include the development of eco-lodges, conservation-driven tourism programs, community-based tourism initiatives, guided wildlife tours, and nature conservation parks. Projects in this sector are required to meet specific environmental and social criteria, including sustainable operations, conservation of natural and cultural resources, community engagement, and education on responsible travel. These activities should minimize environmental impact, promote local employment, and support community-based development. Opportunities for sustainable financing in eco-tourism include accessing green bonds, impact investment funds, and development finance that support eco-tourism projects aligned with environmental sustainability. Additionally, tax exemptions and grants are available for projects that meet the Ghana Green Finance Taxonomy criteria. Specific project development opportunities in eco-tourism include the establishment of eco-friendly resorts using renewable energy, the rehabilitation of protected areas to enhance biodiversity, sustainable tourism infrastructure that minimizes resource use, and partnerships with local communities to create cultural and eco-tourism enterprises. These projects not only attract sustainable investment but also offer pathways for preserving Ghana's natural and cultural heritage while generating sustainable economic opportunities, particularly in rural areas.

6	Building and Construction	**Buildings** Ghana's building sector encompasses real estate, institutional and industrial buildings. Rapid population growth is putting excessive pressure on buildings and other infrastructure in Ghana. The current Ghana population density increased to 151 from 103 people per square kilometre compared to the 2020 census. The increment is excessively high in cities due to rapid urbanisation. In Accra, the population density is 1,681, among the highest in Sub-Saharan Africa. The population increment coupled with insufficient investment and maintenance has led to huge deficits in housing and other infrastructure in Ghana. Ghana Investment Promotion Center in 2022 estimated the housing deficit as 1.8million. The building sector offers numerous opportunities, particularly in addressing Ghana's housing deficit of 1.8 million, which creates a pressing need for affordable housing solutions. Additionally, the rapid urbanization in major cities generates strong demand for residential, retail, and industrial spaces. Moreover, the shortage of hostel facilities on tertiary education campuses presents a lucrative investment prospect for real estate developers. Buildings in Ghana also face threats from excessive temperatures and high precipitation caused by climate change, due to a lack of climate-smart and resilient building designs. These threats affect the efficient utilisation of buildings and the comfort of occupants. The "Vision 2057" by Ghana's NDPC imagines accelerated socio-economic growth and a diversified economy coupled with rapid urbanisation, requiring modern infrastructure development to support growth in industrial and commercial activities. The Green Taxonomy focuses on the reductions of greenhouse gas emissions, achieving energy efficiency and water usage efficiency, and indoor environmental air quality of buildings in Ghana. This requires building world-class infrastructure assets that are smart, efficient, accessible, inclusive, and affordable. The Council for Scientific and Industrial Research - Building and Road Research Institute has made significant strides in this area by designing sustainable, eco-friendly, and cost-effective building materials using locally sourced resources. Government has undertaken a number initiatives to provide an enabling environment to attract investments in buildings which include provision for tax holidays and rebates for the real estate sector, provision of industrial parks, mortgage free interest tax relief for first time owners, enactment of legislations of Real Estate Agency Act (Act 1047) and Land Act 2020 (Act 1036) to ensure efficient operations of real estate industry, and administration of lands, respectively. Investing in green and smart buildings will not only reduce the existing housing deficits but substantially contribute to the attainment of Ghana's climate mitigation goals as provided in the updated Nationally Determined Contributions under the Paris Agreement (2020 – 2030).

		Construction Ghana faces a heightened risk of climate-related disasters, such as flooding and droughts, due to climate change, which could undermine its socio-economic progress and development goals. Limited investment in the provision of infrastructure has led to infrastructure deficits. The issues of climate change have affected the efficient utilisation of available infrastructure. In recent years, floods have led to the inundation of communities and transport infrastructure, droughts have led to water shortages in cities, and the efficiency in generation of power by the hydroelectric dam, etc. Construction activities in the Green Taxonomy focus on designing, constructing, and managing infrastructure to withstand climate shocks and stresses such as floods, rising sea levels, droughts, and high temperatures. Investments in climate resilient infrastructure projects will ensure optimal and efficient usage of the infrastructure during its lifetime, minimise disruptions in the events of extreme climate events, and avoid losses. Investment in resilient infrastructure also leads to positive environmental, social, and economic co-benefits. The Taxonomy provides various economic activities and standards to achieve resilience in the provision of transport infrastructure (roads, ports, and railways), water infrastructure, energy infrastructure, waste management infrastructure, and building infrastructure. Providing resilient infrastructure will contribute to Ghana achieving its National Adaptation Plan goals and United Nations Sustainable Development goals 6 (Clean water and sanitation), 7 (Affordable and clean energy) and, 9 (Industry, innovation and Infrastructure).
Phase 2		
1	Industry/ Manufacturing	Ghana has a large and very active consumer and industrial products and services sector that provides products and services to the Ghanaian economy and the West African sub-region. This sector is poised for significant growth over the next few years and new policies have been put in place by the Government to create an enabling environment, with an emphasis on manufacturing and exports . Historically centred around the processing of primary commodities such as cocoa, timber, and gold, Ghana's manufacturing sector has been gradually expanding into more diverse industries, including textiles, food and beverages, pharmaceuticals, and construction materials. However, the sector faces challenges related to energy costs, infrastructure deficits, and competition from imported goods, which have hindered its full potential. The consistent application of the taxonomy, coupled with a relatively stable economic environment could potentially make Ghana a destination of choice for foreign investors within the sub-region. (Support with numbers...does it mean raising FDI?) With a commitment to fostering a greener manufacturing sector, Ghana aims to not only enhance the competitiveness and resilience of its industries but also to ensure that industrial growth contributes positively to environmental sustainability and the wellbeing of its population.

Chapter 2: Sectors

The dataset for the Technical Screening Criteria for economic activities across various sectors can be accessed in the Annexes.

Cross Cutting Themes

Green Jobs and Entrepreneurship l Circular Economy l Technology l Climate information system service l Insurance l Risk Management l Social Inclusion (gender, disability, etc) l Climate-Resilient Infrastructure l Conservation and Nature-Based Solutions l Carbon Finance

Chapter 3

Methodology

The development of the Ghana Green Finance Taxonomy is a strategic initiative designed to align the country's environmental, social, and economic goals with the principles of sustainable finance. This Taxonomy not only supports the mobilisation of green financing at below-market and concessional rates but also ensures that investment flows are directed towards sectors that will have the most significant positive impact on Ghana's sustainable development. The methodology outlined below provides a detailed, step-by-step approach to identifying, prioritising, and implementing the taxonomy, ensuring that it meets both national and international objectives.

3.1 Alignment with National Environmental, Social and Economic Goals

The alignment of sectors with national development plans and international commitments is a key consideration in the prioritisation process.The foundation of Ghana's Green Taxonomy lies in its alignment with the country's broader environmental, social, and economic objectives. The criteria for the taxonomy are closely integrated with Ghana's national priorities, including commitments under the Nationally Determined Contributions, the National Adaptation Plan, Energy Transition Plan, Ghana REDD+ Strategy, National Climate Smart Agriculture and Food Security Plan, Ghana Strategic Investment Framework (GSIF) for Sustainable Land Management and the Climate Prosperity Plan. These criteria are also informed by international agreements such as the Paris Agreement and the Sustainable Development Goals (SDGs), ensuring that the taxonomy supports Ghana's global commitments while fostering sustainable development domestically.

3.2 Facilitating Access to Green Financing

A key objective of the Green Taxonomy is to facilitate the mobilisation of green financing, particularly at below-market and concessional rates, including grants. The taxonomy's eligibility criteria are carefully aligned with existing financial frameworks, including the Ministry of Finance's Sustainable Financing Framework, the Green Bond Guidelines by the Securities and Exchange Commission (SEC), and the Sustainable Banking Principles developed by the Bank of Ghana in collaboration with the Ghana Association of Banks (GAB) and Environmental Protection Agency (EPA). This alignment ensures that projects categorised under the taxonomy are well-positioned to access favourable financing terms, thereby incentivising greater investment in sustainable initiatives across the country.

3.3. Assessing Social and Environmental Impact - Do No Significant Harm

The principle of Do No Significant Harm (DNSH) is central to the prioritisation of sectors within the Green Taxonomy. This principle ensures that economic activities and sectors not only contribute positively to sustainability goals but also avoid causing any adverse social or environmental impacts. Sectors are carefully evaluated based on their carbon footprint, resource use, and pollution levels to determine their alignment with the DNSH principle. High-priority sectors are those that offer substantial opportunities to reduce greenhouse gas emissions, enhance energy and resource efficiency, and support the transition to a circular economy without compromising environmental integrity.

Moreover, sectors with significant pollution impacts, such as waste management and transportation, are closely scrutinised to ensure that necessary pollution control measures are implemented, thereby upholding the DNSH principle. Social impacts are also a critical consideration, with the taxonomy emphasising sectors that support large populations or vulnerable communities. The DNSH principle guarantees that green initiatives in these sectors promote social well-being and economic inclusiveness, ensuring that no harm is done to the environment or society as they contribute to Ghana's sustainable development goals.

3.4. Evaluating Economic Significance

The economic significance of each sector is assessed by examining its contribution to Ghana's GDP and its potential for job creation. Sectors with a high potential for creating green jobs are prioritised, as these sectors are vital for supporting sustainable economic development and enhancing social equity.

3.5. Feasibility of Implementation

The feasibility of implementing sustainable practices within each sector is another important criterion. Sectors are prioritised based on the availability of green technologies and the existence of well-defined technical standards. For example, sub-sectors like renewable energy and energy efficiency are given higher priority due to the widespread availability of technologies and established standards, making them more feasible for immediate implementation.

3.6. Engaging Stakeholders and Assessing Readiness

Stakeholder support and readiness for green transitions are vital components of the sector prioritisation process. Sectors where government agencies and the private sector are prepared to support green initiatives are prioritised. This ensures that there is strong policy and regulatory backing, as well as active private sector engagement, which is essential for the successful implementation of the taxonomy.

3.7. Leveraging Cross-Sectoral Synergies

The Green Taxonomy also considers the potential for cross-sectoral synergies, where actions in one sector can complement or enhance outcomes in another. For example, linking sustainable agriculture practices with water management projects or integrating energy efficiency measures with green building practices can lead to more comprehensive and impactful sustainability outcomes. These synergies are leveraged to maximise the environmental and economic benefits of the taxonomy.

3.8. Implementing the Green Taxonomy

The implementation of the Green Taxonomy is planned in phases to ensure a structured and manageable rollout across different sectors. The implementation of the first phase, spanning four years, focuses on high-priority sectors such as energy and transportation, agriculture, forestry, aquaculture, blue economy, water, waste management, pollution prevention and building and construction. During this phase, key milestones include the establishment of governance and technical committees, the development of sector-specific criteria, and the publication of the first version of the taxonomy. The development of the second phase, which begins in the second year, expands the taxonomy to include medium-priority sectors including Green/ Eco-Tourism, Sustainable Mining of Critical Minerals, Industry/Manufacturing, Sustainable Mining .

Roles and responsibilities are clearly defined for each stakeholder group involved in the implementation. The Ministry of Finance leads the overall governance and strategic oversight, while technical committees develop the criteria and conduct consultations. Regulatory bodies such as the GSE, SEC, and BoG ensure regulatory alignment and compliance. The private sector is engaged in consultations and adopts the taxonomy criteria in project design, while civil society and academia provide feedback and support capacity building.

3.9. Managing Risks

Risk management is an integral part of the methodology, with strategies to be further refined in order to identify and mitigate potential risks associated with the implementation and application of the Green Taxonomy. These risks include market acceptance challenges, regulatory hurdles, and social impact risks. Contingency plans will be developed in the second phase to address these risks, with regular stakeholder consultations, flexibility in criteria adjustments, and targeted communication strategies ensuring that the taxonomy remains robust and effective.

Resilience reduces the sensitivity of assets to climate hazards and increases their adaptive capacity. Resilient infrastructure leads to avoided losses from disasters, significant reductions in loss of life, injury, and affected people, and minimized disruption of social services, including critical health, transportation, and education facilities. Investing in climate-resilient infrastructure is an efficient means of managing disasters and risks.

3.10. Identification of Economic Activities and Technical Screening

The identification of economic activities eligible for classification under Ghana's Green Taxonomy is based on specific criteria that ensure these activities significantly contribute to environmental sustainability while minimising negative impacts. Key criteria include: avoiding significant harm to environmental objectives (Do No Significant Harm), prioritising activities that reduce greenhouse gas emissions (Climate Change Mitigation), enhancing resilience to climate impacts (Climate Change Adaptation), protecting and restoring ecosystems and biodiversity (Environmental Protection), and promoting efficient use of resources like energy, water, and raw materials (Resource Efficiency). These criteria collectively guide the selection of activities that support Ghana's sustainable development goals.

Standard Framework: The ISIC Codes (International Standard Industrial Classification of All Economic Activities) are used as one of the primary frameworks for establishing technical criteria within the Green Taxonomy. This ensures consistency and alignment with internationally recognised classification systems, allowing the Green Taxonomy to integrate seamlessly into global sustainability initiatives. In addition to ISIC codes, the Taxonomy incorporates ISO (International Organisation for Standardisation) standards, which provide a rigorous framework for screening and classifying green finance instruments, thereby ensuring their environmental integrity and impact. International standards, such as ISO, are often adopted nationally alongside local standards and regulations to support full climate transition and sustainability. For example, standards set by the Ghana Standards Authority (GSA) include testing air conditioners according to ISO 5151:2017 and refrigerators according to IEC 62552:2015, as adopted by the GSA in GS IEC 62552:2015.

The national thresholds and performance metrics will be reviewed and updated periodically to ensure alignment with international best practices and Ghana's sustainable development goals as well as national environmental policies. This would inform the progressive development and update of the taxonomy, and aid in identifying additional activities and projects for future inclusion. This periodic criteria review will be transparent and communicated well in advance to ensure a predictable review cycle for the technical criteria of the taxonomy.

3.11. Exclusions and negative screening

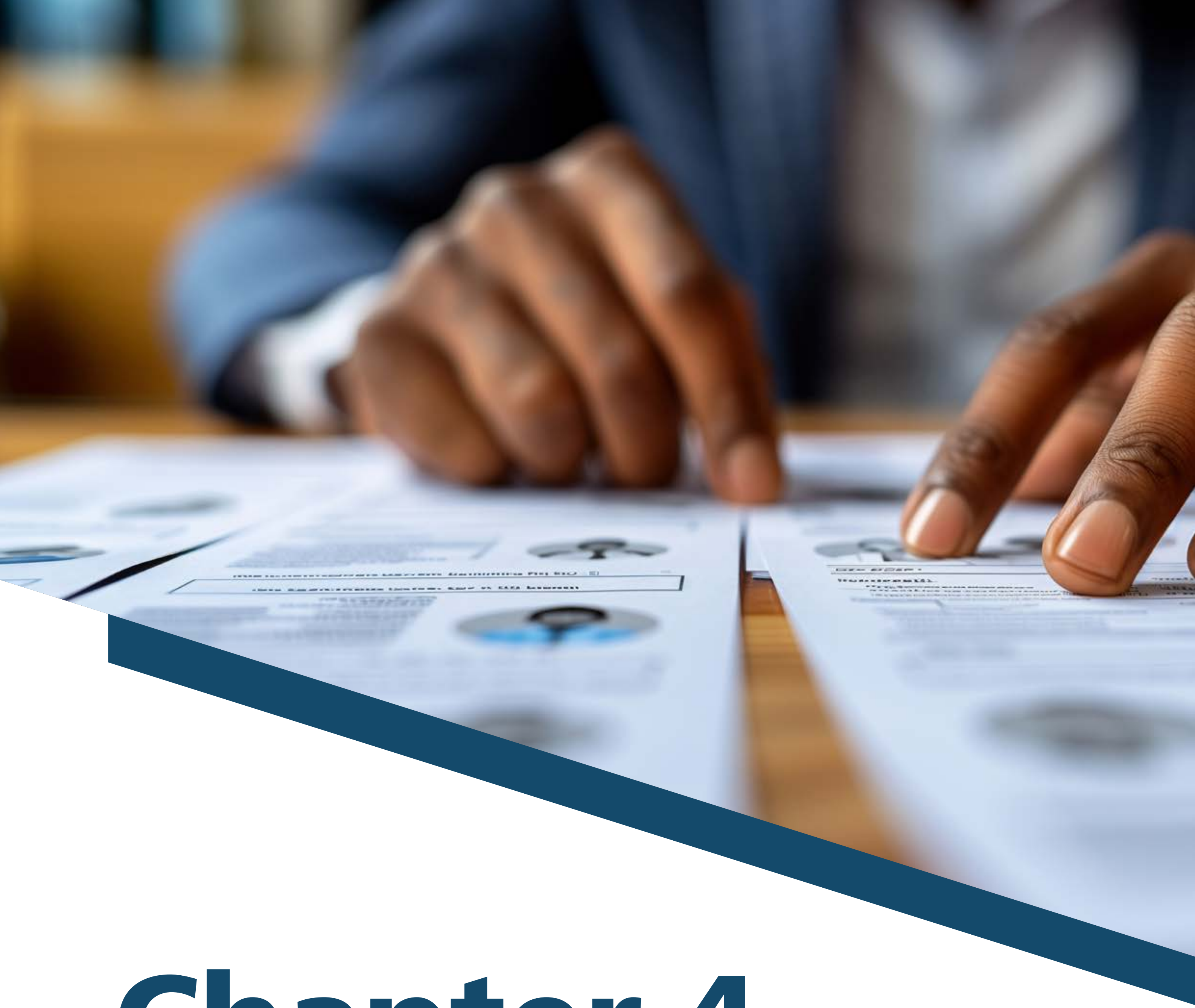
As indicated in this Framework, the second phase of the Ghana Green Finance Taxonomy will focus on transitional economic activities - additional sectors that are also integral to the low-carbon transition but are currently more carbon-intensive and still with limited cost-effective technologies in place than those in phase 1. These include the decarbonisation of oil and gas, sustainable mining, and the extraction of critical minerals. These sectors, while crucial for economic growth and the transition to a sustainable economy, require a more nuanced approach. Therefore, they have been set aside from the initial phase of the taxonomy to allow for the development of specific criteria and extensive stakeholder engagement that recognises their unique challenges and potential for reducing emissions over time and resource efficiencies.

Within this context, the taxonomy will maintain strict exclusions for certain activities that are fundamentally incompatible with environmental sustainability. Activities related to fossil fuels, including the exploration, extraction, and processing of coal, oil, and natural gas, are excluded due to their significant contribution to greenhouse gas emissions. This exclusion is critical for effective negative screening and upholding the integrity of the taxonomy framework, thus preventing greenwashing. Similarly, nuclear energy projects are currently excluded due to concerns regarding waste management, safety, and broader environmental impacts. This might have to be discussed further, as it was included in the EU taxonomy and Ghana has signed a letter of intent and increased international partnerships to explore the development of nuclear energy production in the country.

Projects leading to deforestation, biodiversity loss, or significant land degradation are also not eligible for green classification. Additionally, activities that result in social harm, such as displacing communities or violating human rights, are categorically excluded.

3.12 Incentives and Tax Exemptions

Incentives and tax exemptions are critical components of the Ghana Green Finance Taxonomy to stimulate investment in environmentally sustainable projects and accelerate the transition to a low-carbon, and climate-resilient economy. By offering targeted financial benefits, the Government aims to lower the barriers to entry for green investments, making it more attractive for businesses, investors, and entrepreneurs to engage in sustainable practices. The section on [Sector based incentives and Tax Exemptions available under the Green Finance Taxonomy will be developed for the Second Phase of the Ghana Green Finance Taxonomy.]



Chapter 4

Monitoring, Reporting and Evaluation

A comprehensive Monitoring, Reporting, and Evaluation (MRE) framework is established to track the progress and impact of the Green Taxonomy. Periodic reporting is required from stakeholders, with reports made publicly available to enhance transparency. Annual evaluations are conducted to assess the effectiveness of the taxonomy in achieving its goals, identifying areas for improvement, and updating criteria and guidelines as needed. This process involves independent reviews and stakeholder feedback to ensure continuous improvement.

This methodology provides a clear and structured approach to developing and implementing Ghana's Green Taxonomy. By aligning with national and international goals, facilitating access to green finance, leveraging cross-sectoral synergies, and addressing capacity building, risk management, and MRE, the methodology ensures that the taxonomy is both effective and sustainable. The inclusion of ISO and ISIC codes for technical criteria further aligns the taxonomy with international best practices. This approach ultimately contributes to environmental resilience, social equity, and economic growth, positioning the country as a leader in sustainable development within Africa.

4.1. Standards for Verification

Verification under the Green Taxonomy framework ensures projects meet national and international sustainability standards. This process assesses technical criteria like energy efficiency and environmental compliance, requiring adherence to the Ghanaian and international certifications, such as ISO 50001, ISO 14001, ISIC, GS-IEC and LEED. The independently verified application of tax incentives can contribute to ensure projects meet specific environmental criteria and comply with conditions set by the Ghana Revenue Authority (GRA) and other relevant authorities.

Projects must demonstrate compliance with the Ghanaian standards, including certifications from the Environmental Protection Agency (EPA) and sector-specific regulations, ensuring that they align with the nation's environmental and sustainability objectives. Additionally, verification will ensure alignment with government policies, while incorporating a gender lens to promote inclusiveness. Coordination with relevant and responsible agencies like the Ministry of Environment, Science, Technology, and Innovation (MESTI) will ensure projects receive necessary approvals, reinforcing their contribution to national development goals.

4.2 Evaluation Process

- Initial assessment: Projects will first be evaluated against the Green Taxonomy's technical screening criteria, including quantitative metrics (e.g., energy efficiency, emission reductions) and qualitative requirements (e.g., adherence to environmental protection regulations and sustainable development goals) to ensure they meet the minimum sustainability thresholds.

- Compliance with national standards: Projects must adhere to national standards and obtain relevant certifications from authorities including the EPA to ensure compliance with sector-specific regulations before certification.

- International certifications and standards: Appropriate international certifications such as ISIC, ISO 50001, 14001, and LEED are prioritised and shall be required to demonstrate commitment to global best practices during the certification process.

- Review and approval: After meeting national and international standards, projects will undergo review and approval by government agencies like the Ministry of Environment, Science, Technology, and Innovation and the Ghana Standards Authority to ensure alignment with national sustainability objectives.

- Recertification and ongoing monitoring: During the life of certified projects, regular monitoring and periodic audits will be conducted to maintain compliance, while potential recertification may be required to uphold their certified status.

4.3. Role of Third-Party Verifiers

Third-party verifiers will play a crucial role in the Ghana Green Finance Taxonomy by providing independent assessments that ensure projects meet both national and international sustainability standards. They include sector-specific regulators, ISO certification bodies, Ghana Standards Authority and Environmental Protection Agency approved verifiers, who serve as impartial entities that validate claims made by project developers, offering an additional layer of credibility to the certification process. Their verification will evaluate projects against technical screening criteria, confirm compliance with certifications like ISO and LEED, and enhance transparency and accountability in the certification process, thereby building trust among stakeholders.

In addition to assisting in facilitating access to green finance, third-party verifications help attract investment to certified projects, ensuring they meet rigorous standards required for sustainable finance instruments. They will further conduct ongoing monitoring to maintain compliance throughout the project's lifecycle, ensuring the long-term credibility and impact of certified projects.

4.4. Reporting

Reporting under the Framework aims to provide transparent and standardised information about how economic activities align with Environmental, Social, and Governance (ESG) goals to facilitate investment decisions and stakeholder information. The framework seeks to incentivise businesses, investors, or financial institutions to provide sustainability reports to align economic activities under the Taxonomy. This includes disclosing a proportion of operations, investments, or projects that qualify as environmentally sustainable according to the taxonomy.

Reporting for the activities under the Ghana Green Finance Taxonomy should conform to standards such as International Financial Reporting Standards (IFRS), sustainability guidelines by the Institute of Chartered Accountants Ghana (ICAG), Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), Global Real Estate Sustainability Benchmark (GRESB), Sustainable Procurement Reporting (SPR), and any other applicable standard.

Chapter 5

Governance

To ensure the effective implementation, management, and continuous improvement of the Ghana Green Finance Taxonomy, a unified Oversight Committee will be established. This Committee will have comprehensive oversight of the taxonomy, combining both strategic governance and technical expertise into a single, cohesive structure. The integration of governance and technical functions within the committee ensures streamlined decision-making, enhanced coordination, and a more agile response to emerging challenges and opportunities in sustainable finance.

5.1 Oversight Committee

5.1.1 Purpose and Role

The Oversight Committee will provide strategic oversight, ensure technical rigour, and maintain the integrity of the Green Finance Taxonomy. This committee will be responsible for setting the direction of the taxonomy, reviewing and updating technical criteria, and ensuring that the taxonomy aligns with national policies and international sustainability standards.

5.1.2 Composition

The Oversight Committee will be composed of a diverse group of stakeholders, including:

- Government Representatives: Officials from key ministries such as Finance, Foreign Affair, Environment, Energy, Roads and Highways, Agriculture, Transport, Trade and Industry, Water and Sanitation, Gender, Local Government, Fisheries and Aquaculture, Lands and Natural Resources, National Disaster Management Organisation, National Information Technology Agency, Council for Scientific and Industrial Research, SDGs Advisory Unit at the Presidency, Attorney General's Office .
- Regulatory Bodies: Representatives from the Central Bank, EPA, Water Commission, Energy Commission, Minerals Commission, Securities and Exchange Commission, National Insurance Commission, ISSER and other relevant regulators.
- Industry Experts: Professionals with expertise in energy, manufacturing, agriculture, and other relevant sectors.
- Academia and Research: Scholars and researchers with expertise in environmental science, sustainability, and economics.
- Civil Society: Representatives from non-governmental organisations focused on environmental and social issues, provide feedback and support capacity building..
- Legal and Compliance Experts: Professionals with experience in legal and regulatory aspects of sustainability and finance.

5.1.3 Responsibilities

- Strategic Oversight: Led by the Finance Ministry, the Committee will provide high-level direction and make strategic decisions regarding the development and implementation of the taxonomy.
- Technical Review: Evaluate and update the technical criteria for classifying activities under the taxonomy, ensuring they are scientifically sound and aligned with best practices.
- Policy Alignment: Ensure the taxonomy remains consistent with national sustainability policies and international commitments.
- Stakeholder Engagement: Facilitate communication and collaboration among various stakeholder groups to ensure the taxonomy reflects diverse perspectives.

- Monitoring and Reporting: Oversee the monitoring of activities classified under the taxonomy, ensuring compliance with established criteria and transparency in reporting.
- Risk Management: Identify and manage risks associated with the implementation of the taxonomy, ensuring its integrity and preventing greenwashing.

5.1.4 Subcommittees

To address specific areas of focus within the taxonomy, the Oversight Committee may establish subcommittees. These subcommittees will report to the main committee and may include:

- Sector-Specific Subcommittees: Focused on industries such as energy, agriculture, and manufacturing to address sector-specific challenges and opportunities.
- Sustainability Standards Subcommittee: Dedicated to ensuring alignment with international sustainability standards and best practices.
- Legal and Compliance Subcommittee: Focused on reporting, regulatory compliance and legal aspects of the taxonomy's implementation.

5.1.5 Meeting Frequency

The Oversight Committee will meet at least twice a year, with additional meetings scheduled as necessary to address urgent matters or significant updates to the taxonomy. Subcommittees will meet more frequently, depending on their specific focus areas and ongoing tasks.

5.2 Coordination and Communication

- Unified Decision-Making: By integrating governance and technical oversight within a single committee, decision-making processes will be streamlined, reducing delays and enhancing responsiveness to new developments.
- Regular Reporting: Subcommittees will report their findings and recommendations to the main committee, ensuring that all decisions are informed by the latest technical insights and stakeholder input.
- Stakeholder Communication: The committee will maintain open channels of communication with all stakeholders, including the government, investors, industry, civil society, and the public, to ensure transparency and build trust in the Taxonomy.

5.3 Secretariat

5.3.1 Purpose and Role

The Secretariat will provide administrative and operational support to the Oversight Committee. It will act as the central coordinating body, ensuring the smooth operation of the committee and its subcommittees.

5.3.2 Responsibilities

- Administrative Support: Organise meetings, prepare agendas, and manage the distribution of materials for the committee and its subcommittees.
- Documentation: Maintain records of all meetings, decisions, and updates to the Taxonomy.
- Coordination: Facilitate communication and coordination among committee members and subcommittees.
- Public Communication: Manage public relations and communications related to the taxonomy, including press releases, updates, and stakeholder engagement.

5.3.3 Staffing

The Secretariat will be staffed by professionals with experience in taxonomies, project management, communication, and sustainability, reporting directly to the Chair of the Oversight Committee.

5.4 Continuous Improvement and Review

- Annual Review: The Oversight Committee will conduct an annual review of the implementation of the taxonomy and its governance structure to identify areas for improvement.
- Stakeholder Feedback: The committee will establish a formal mechanism for gathering feedback from stakeholders, which will be used to inform continuous improvements to the taxonomy.
- Adaptability: The governance structure will be flexible enough to adapt to evolving sustainability challenges and opportunities, ensuring the taxonomy remains relevant and effective.

The establishment of an Oversight Committee ensures that the Green Finance Taxonomy is managed with both strategic insight and technical rigour. This integrated approach enhances the taxonomy's effectiveness, maintains its alignment with national and international standards, and ensures it can adapt to the changing landscape of sustainable finance. Through this governance structure, the taxonomy will continue to drive sustainable economic activities while maintaining transparency, accountability, and stakeholder trust.

Chapter 6

Sustainable Financing Landscape

Chapter 6: Sustainable Financing Landscape

6.1 Introduction

The sustainable finance market in Ghana and West Africa is poised for growth, backed by increasing awareness of climate change issues and the need for sustainable development. Stakeholders, including governments, financial institutions, and investors, are exploring various opportunities to mobilise financing for green projects, which are essential for the region's long-term sustainability and resilience.

Sustainable financing is a cornerstone of Ghana's efforts to transition to a low-carbon, climate-resilient economy. As outlined in the Green Finance Taxonomy, sustainable financing mechanisms, particularly green bonds, play a pivotal role in mobilising resources for projects that support environmental sustainability and climate resilience. This chapter provides a comprehensive overview of the various sustainable financing frameworks and guidelines that guide these efforts, including the Securities and Exchange Commission's Green Bond Guidelines, the Ministry of Finance's Sustainable Financing Framework, Ghana's Nationally Determined Contributions (NDC) Financing Strategy, and the Bank of Ghana's sustainable financing strategies. Additionally, this chapter will explore the role of the Climate Prosperity Plan in aligning financial flows with Ghana's broader environmental and economic goals.

Sustainable finance has been gaining traction in Ghana and the broader West African region. Below is an overview of the sustainable finance market size and opportunities in Ghana and the region:

Size of the Sustainable Finance Market

1. **Ghana:**

    - The sustainable finance market in Ghana is growing, particularly driven by government initiatives and international engagements. According to the Ministry of Finance, Ghana's International Capital Market Programme initiated in 2021 facilitated the issuance of sovereign bonds worth $3.025 billion, which included the country's first zero-coupon bond. A significant portion of these funds is being directed toward sustainable projects aimed at meeting environmental, social, and governance (ESG) targets. These initiatives are aligned with international frameworks such as the Green Bond Principles and the Sustainability Bond Guidelines.
    - In addition to sovereign bonds, the Ghanaian government has developed a Sustainable Financing Framework to help guide the issuance of green, social, and sustainability bonds. This framework allows the government to screen projects and programs that require sustainable financing, ensuring that funds are directed toward projects with green or social credentials.
    - Further, Ghana's banking sector has also embraced sustainable finance through the Sustainable Banking Principles, which were adopted in 2019. These principles guide the financial sector in incorporating ESG criteria into their operations.

2. **West Africa Region:**

    - The broader West African region has seen similar trends, with estimates suggesting that the sustainable finance market could be worth billions of dollars as countries seek to finance sustainable development goals (SDGs) and climate resilience initiatives.
    - In 2022, the West African Development Bank (WADB) launched initiatives aimed at improving access to financing for green projects, showcasing the region's commitment to sustainable finance.
    - Green Bond Issuances: Western Sub-Saharan Africa has seen an increasing number of green bond issuances in recent years. As of 2021, the region had issued green bonds totaling $2.75 billion, primarily from countries like Nigeria and South Africa. While Ghana and Côte

d'Ivoire have begun exploring sustainable finance options, Nigeria remains a leader with its first green bond issued in 2017, raising $10.7 million for projects tied to renewable energy and reforestation.

- Development Financing: Multilateral development banks (MDBs) like the African Development Bank (AfDB) and the International Finance Corporation (IFC) are key players in financing sustainable projects. AfDB, for instance, committed over $12 billion in climate finance from 2016 to 2020 across Africa, of which a substantial portion went to Western Sub-Saharan countries. The bank also aims to raise its climate finance commitments to $25 billion by 2025.

- Private Sector Engagement: The region has seen a rise in impact investment, with approximately $7.4 billion in capital deployed across Sub-Saharan Africa as of 2020, a large portion of which has been allocated to sectors like renewable energy, sustainable agriculture, and health. Western Sub-Saharan countries, including Ghana, Senegal, and Côte d'Ivoire, are increasingly benefiting from this capital.

- ESG Adoption: Sustainable finance in the form of ESG (Environmental, Social, and Governance) investing is gaining ground, with some estimates showing that ESG-focused assets under management in Africa could reach $100 billion by 2030.

Opportunities for Green and Sustainable Financing

1. **Renewable Energy Projects:**
    - Ghana has abundant resources for renewable energy, particularly solar, wind, and hydroelectric power. Investments in these areas are crucial for reducing reliance on fossil fuels and improving energy security.

2. **Sustainable Agriculture:**
    - There is a need for financing sustainable agricultural practices to boost food security and reduce the environmental impact of traditional farming methods. Opportunities include financing organic farming, agroforestry, and climate-smart agriculture.

3. **Infrastructure Development:**
    - Financing sustainable infrastructure, including green buildings, waste management systems, and public transportation projects that reduce carbon footprints, represents significant potential for investment.

4. **Climate Resilience Projects:**
    - Ghana is vulnerable to climate change impacts. There is a growing need for financing projects aimed at building climate resilience, such as water management and coastal protection efforts.

5. **Green Bonds:**
    - The issuance of green bonds in Ghana and the West African region presents an opportunity for raising capital specifically earmarked for environmentally friendly projects.

6. **Financial Instruments and Incentives:**
    - Developing innovative financial instruments, such as sustainability-linked loans or impact investment funds, can channel more resources into sustainable initiatives.

7. **Collaboration with International Donors:**
    - Partnerships with international financial institutions and development agencies can provide technical and financial support for sustainable finance initiatives.

6.2 Green Bonds: An Overview

Green bonds are debt securities issued to raise capital specifically for projects with positive environmental impacts. They are a critical tool in the sustainable finance landscape, providing a means to channel significant capital flows into projects that drive environmental sustainability and climate resilience. The Securities and Exchange Commission (SEC) of Ghana has since 2022 developed Green Bond Guidelines to ensure these bonds are issued in a manner that is transparent, accountable, and aligned with national and international standards.

Key Elements of the SEC's Green Bond Guidelines:

- Use of Proceeds: Proceeds from green bonds must be allocated to projects within the categories defined by Ghana's Green Finance Taxonomy. Eligible projects include those in renewable energy, energy efficiency, sustainable land use, and clean transportation.

- Project Evaluation and Selection: Projects financed through green bonds must undergo a rigorous evaluation and selection process to ensure they meet the environmental objectives outlined in the Green Finance Taxonomy.

- Management of Proceeds: Issuers must track and manage the proceeds to ensure they are allocated to eligible projects. This process includes maintaining transparency through regular reporting and disclosure.

- Reporting and Disclosure: Transparency in reporting is essential for building trust in the green bond market. Issuers are required to publish regular reports on the allocation of proceeds, the environmental and social impact of the financed projects, and any changes in the use of proceeds.

- Independent Review: To enhance the credibility of green bonds, an independent external review of the projects and the issuer's compliance with the Green Bond Framework is mandatory. This review ensures that financed projects meet the green criteria and that the issuer adheres to their commitments.

6.3 Ministry of Finance's Sustainable Financing Framework

The Ministry of Finance's Sustainable Financing Framework is a pivotal component of Ghana's broader sustainable development agenda, aimed at integrating sustainability into the country's public finance management. This framework guides the issuance of sustainable financial instruments, such as green bonds, social bonds, and sustainability-linked bonds, to finance projects that align with Ghana's environmental, social, and governance (ESG) goals.

Key Features:

- Holistic Approach: The framework encompasses a wide range of financial instruments, ensuring that public finances contribute to environmental sustainability, social well-being, and economic growth.

- Alignment with National and International Goals: It is aligned with Ghana's national development objectives, the Sustainable Development Goals (SDGs), and the Paris Agreement, ensuring that financing supports the country's transition to a sustainable economy.

- Project Selection: Projects are selected based on their potential to contribute to climate action, social inclusion, and economic development.

- Transparency and Accountability: The framework emphasises robust governance, with clear criteria for project selection, management of proceeds, and regular reporting to ensure transparency and accountability.

6.4 Ghana's NDC Financing Strategy

Ghana's Nationally Determined Contributions (NDC) Financing Strategy outlines the financial mechanisms and partnerships required to meet the targets set in its NDCs under the Paris Agreement. This strategy is crucial for mobilising the necessary resources for climate mitigation and adaptation efforts across various sectors.

Core Components:

- Resource Mobilisation: The strategy identifies potential sources of finance, including public budgets, international climate finance, private sector investments, and innovative financial instruments such as green bonds.
- Partnerships: Emphasises the importance of partnerships with international donors, multilateral development banks, and the private sector to leverage additional resources and technical expertise.
- Sectoral Focus: Prioritises sectors such as energy, agriculture, water resources, and infrastructure, ensuring alignment with the objectives of the Green Finance Taxonomy.
- Monitoring and Reporting: Includes mechanisms for tracking the flow of funds and the impact of financed projects, ensuring effective utilisation of resources to achieve NDC targets.

6.5 Bank of Ghana's Sustainable Financing Strategies

The Bank of Ghana (BoG) has developed sustainable financing strategies to guide the banking sector in supporting the transition to a low-carbon, climate-resilient economy. These strategies include the Sustainable Banking Principles, developed in collaboration with the Ghana Association of Banks (GAB) and the Environmental Protection Agency (EPA).

Highlights of BoG's Strategies:

- Sustainable Banking Principles: These principles provide a framework for banks to incorporate environmental, social, and governance (ESG) criteria into their lending and investment decisions, encouraging the financing of projects that contribute to sustainable development.
- Capacity Building: The BoG has initiated programmes to build capacity within the banking sector, ensuring financial institutions are equipped to assess and manage the risks and opportunities associated with sustainable financing.
- Incentives for Green Financing: Includes incentives for banks that finance green projects, such as preferential interest rates and regulatory support for issuing green bonds.
- Monitoring and Reporting: Requires banks to report on their sustainable financing activities, including the environmental and social impact of financed projects, to ensure accountability and transparency.

6.6 Climate Prosperity Plan

Ghana's Climate Prosperity Plan (CPP) is a strategic initiative aimed at aligning the country's economic growth with its climate resilience and sustainability goals. The CPP integrates economic planning with environmental sustainability, ensuring that development is pursued in a manner that is both prosperous and climate-resilient.

Key Components of the Climate Prosperity Plan:

- Economic Growth and Climate Resilience: The CPP aims to foster economic growth while enhancing the country's resilience to climate impacts. This includes investments in sustainable infrastructure, renewable energy, and climate-smart agriculture.

- Mobilising Green Finance: The CPP serves as a platform for mobilising green finance, including through the issuance of green bonds, to fund projects that contribute to both economic development and environmental sustainability.
- Bilateral Funding and Partnerships: The CPP actively seeks bilateral funding agreements to secure grants and concessional loans that reduce the overall cost of capital for climate-related projects. These partnerships are crucial for ensuring that the CPP's ambitious goals are financially achievable.
- De-risking and Low-Cost Capital: The CPP incorporates de-risking instruments such as guarantees, insurance, and blended finance mechanisms to lower the risk profile of green investments. By reducing financial risk, the CPP makes it easier to attract private sector capital at lower costs.
- Private Sector Engagement: The plan encourages private sector participation in green projects, offering incentives and creating a favourable environment for investment in sustainability.

6.7 Integrating Sustainable Financing into National Policy

The integration of sustainable financing into national policy frameworks is critical for scaling up investment in green projects. The Ghana Green Finance Taxonomy, the Green Bond Guidelines, the Sustainable Banking Principles along with other frameworks, provide a roadmap for aligning financial flows with Ghana's environmental and climate goals.

Policy Support and Incentives: The Ghanaian government, through the Ministry of Finance, is committed to providing policy support and incentives for green finance.

Capacity Building and Awareness: Building capacity among financial institutions, businesses, and government agencies is essential for the effective implementation of sustainable financing strategies. Training programs, workshops, and public awareness campaigns are necessary to increase understanding and uptake of green bonds and other sustainable financial instruments.

6.7.1 Grants

Grants are a vital component of Ghana's sustainable financing landscape, providing non-repayable funds that support the development and implementation of projects aligned with the country's environmental and climate goals. Grants play a crucial role in catalysing investments in green projects, especially in areas where the return on investment might not be immediate or where private sector involvement is limited due to perceived risks.

6.7.2 Role of Grants in Sustainable Financing

Grants serve as an essential tool in bridging the financing gap for projects that contribute to Ghana's Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), and other national priorities. By reducing the financial burden on project developers and lowering the overall cost of capital, grants can unlock additional investments from both public and private sectors. Grants play a pivotal role in supporting climate adaptation projects, which are typically not bankable due to their extended payback periods.

Key Areas Where Grants Are Utilised:

- Research and Development (R&D): Grants are often used to fund R&D in green technologies, such as renewable energy, energy efficiency, and climate-resilient agriculture. This funding is critical for driving innovation and bringing new technologies to market.
- Capacity Building and Technical Assistance: Grants support capacity building initiatives, including training programs for government

agencies, financial institutions, and local communities. These programs enhance the ability of stakeholders to design, implement, and manage sustainable projects.

- Pilot Projects and Demonstrations: Grants are used to fund pilot projects and demonstrations of new technologies or practices. These projects provide proof of concept and help to de-risk larger investments by showcasing the viability and benefits of sustainable solutions .

- Community-Based Projects: Grants are often allocated to community-based projects that address local environmental and social challenges. These projects can range from reforestation initiatives to sustainable water management practices, contributing to both environmental sustainability and community development

6.7.3 Sources of Grant Funding

Grants for sustainable financing in Ghana are sourced from various domestic and international entities, including:

1. **Government Programs:**
    - The Government of Ghana, through various ministries and agencies, allocates grants for projects that align with national development priorities. These grants are often part of broader programs aimed at achieving the SDGs, improving public infrastructure, and enhancing climate resilience.
2. **International Donors and Development Partners:**
    - International organisations, such as the United Nations Development Programme (UNDP), the World Bank, and the Green Climate Fund (GCF), provide grants to support Ghana's climate and sustainability initiatives. These grants are critical for financing large-scale projects and for building the capacity of local institutions.
3. **Private Foundations and NGOs:**
    - Private foundations and non-governmental organisations (NGOs) also provide grants for specific environmental and social projects. These grants often target grassroots initiatives and can be instrumental in fostering innovation at the local level.

6.7.4 Grant Allocation and Management

The allocation and management of grants are governed by clear criteria and processes to ensure that funds are used effectively and transparently.

Grant Allocation Criteria:

- Alignment with National and International Goals: Projects must align with Ghana's environmental and climate policies, as well as international agreements such as the Paris Agreement and the SDGs.

- Impact Potential: Projects are evaluated based on their potential to deliver significant environmental and social benefits, including emissions reductions, biodiversity conservation, and community empowerment.

- Feasibility and Sustainability: Projects must demonstrate feasibility, including a clear implementation plan and a strategy for sustainability beyond the grant funding period.

Management and Reporting:

- Monitoring and Reporting: Recipients of grants are required to report regularly on the progress of their projects, including financial expenditures and achieved outcomes. This reporting ensures accountability and allows for the assessment of the impact of grant-funded activities

6.8 Bilateral Funding Resources and De-Risking Instruments

6.8.1 Bilateral Funding Resources

Bilateral funding refers to financial resources provided by one country directly to another, often through grants, concessional loans, or technical assistance. These resources are critical for supporting Ghana's sustainable development agenda, particularly in financing green projects that may not be fully viable through private sector investment alone.

Role of Bilateral Funding in Sustainable Financing:

- Grants and Concessional Loans: Bilateral funding often includes grants and concessional loans that offer favourable terms, such as low-interest rates and extended repayment periods. These funds are crucial for financing large-scale infrastructure projects, renewable energy initiatives, and other climate-related investments that require substantial upfront capital.
- Technical Assistance and Capacity Building: In addition to financial resources, bilateral partners often provide technical assistance and capacity-building support. This helps to enhance the skills and capabilities of local institutions, ensuring that projects are effectively designed, implemented, and managed
- Project Co-Financing: Bilateral funding can also be used to co-finance projects, leveraging additional resources from multilateral development banks, private sector investors, and other sources. This co-financing approach helps to spread risk and increase the overall scale of investment in green projects

6.8.2 De-Risking Instruments

De-risking instruments are financial mechanisms designed to reduce the perceived or actual risks associated with investments in sustainable projects. By lowering the risk profile of these investments, de-risking instruments make it easier to attract capital, particularly from private sector investors who may otherwise be hesitant to invest in high-risk projects.

Key De-Risking Instruments:

Guarantees:

Guarantees are provided by bilateral agencies or development finance institutions (DFIs) to cover a portion of the risk associated with a project. For example, a guarantee may cover the risk of non-repayment on a loan, making it easier for project developers to secure financing at lower interest rates.

The involvement of bilateral funders, such as the World Bank's Multilateral Investment Guarantee Agency (MIGA), can mitigate political risks, enhancing investor confidence.

Blended Finance:

Blended finance combines concessional funding from bilateral partners with private sector investment. By using concessional capital to absorb part of the risk, blended finance structures make green projects more attractive to private investors. This approach leverages both public and private capital to maximise the impact of each dollar invested.

For example, the Green Climate Fund (GCF), in partnership with bilateral agencies, often uses blended finance to support renewable energy and climate adaptation projects in developing countries.

First-Loss Capital:

First-loss capital is another form of de-risking that involves a portion of the capital stack being designated as first-loss, meaning it absorbs the initial losses if a project underperforms. Bilateral agencies or donors often provide this first-loss capital, making it easier for private investors to participate in projects that would otherwise be too risky

6.9 Climate Finance

Ghana pledged to reduce 64 million tonnes of greenhouse gas emissions by 2030, setting the country on course to a net-zero emissions pathway by mid-century. This ambitious goal must be supported by an investment of USD 6.3 billion, directing funds into 34 robust mitigation actions across vital sectors such as energy, transport, industry, waste, and forestry. Carbon financing has emerged as a critical tool in mobilising resources for climate action in Ghana. As the country intensifies efforts to meet its climate goals under the Paris Agreement, particularly through the reduction of greenhouse gas (GHG) emissions, carbon markets provide a significant opportunity to channel investment into green projects while creating new revenue streams. Through carbon financing, Ghana has begun monetizing emission reductions and climate-friendly initiatives, accelerating progress toward its Nationally Determined Contributions (NDCs) and broader sustainable development objectives.

Overview of Ghana's Engagement in Carbon Markets

Ghana has made significant strides in carbon financing through its proactive involvement in both voluntary and compliance carbon markets. The Environmental Protection Agency (EPA) of Ghana plays a pivotal role in this space, overseeing the country's participation in the global carbon market and ensuring that carbon trading activities are aligned with national climate objectives.

Development of Article 6 Framework

Ghana has been a frontrunner in implementing Article 6 of the Paris Agreement, which allows countries to cooperate internationally through carbon markets to achieve their emission reduction targets. Article 6 establishes the rules for international trading of carbon credits, enabling countries like Ghana to sell emission reductions to other countries or private entities that require them to meet their own climate commitments.

The EPA, in collaboration with the Ministry of Environment, Science, Technology, and Innovation (MESTI), has published Ghana's Carbon Market Framework. This framework lays out the guidelines and governance structure for carbon trading, ensuring transparency, environmental integrity, and avoidance of double counting of emission reductions. It also defines the roles of various stakeholders, including government agencies, private sector actors, and international partners, in facilitating carbon trading.

Carbon Projects and Memorandums of Understanding (MoUs)

Ghana's EPA has actively supported the development of various carbon offset projects across different sectors, particularly in forestry, agriculture, renewable energy, and waste management. Several key projects have been initiated under the Article 6 framework, and Memorandums of Understanding (MoUs) have been signed with international partners to facilitate the implementation and financing of these projects.

This framework facilitates voluntary cooperation under Article 6 of the Paris Agreement, enabling both bilateral and unilateral approaches to carbon markets. Ghana plays a pivotal role in five Government-to-Government (G2G) cooperative agreements and has pioneered an innovative Government-to-Private (G2P) model, with partnerships including Switzerland, Sweden, Singapore, South Korea, and Liechtenstein, along with major corporations such as Mercuria Energy and British Petroleum.

Through the Ghana-Switzerland agreement, progress is being made on 12 projects in collaboration with the Swiss government. Eight of these projects are expected to mobilize approximately $850 million in investments and create at least 7,000 decent green jobs by 2030, underscoring Ghana’s dual commitment to reducing emissions while fostering economic growth and job creation.

By the first quarter of 2024, Ghana’s project pipeline had significantly expanded to encompass 48 projects, led by private entities across sectors such as renewable energy, waste management, and sustainable agriculture. Additionally, Swedish Energy has announced a tender for three energy-related projects under the Internationally Transferred Mitigation Outcomes (ITMOs) framework.

Furthermore, Ghana and Switzerland have authorized three Article 6 projects focusing on sustainable agriculture, clean cooking, and waste management, representing a combined investment of $100 million. These projects are part of a broader portfolio of 48 pipeline activities spanning sectors like solar energy, clean cooking, green cooling, and electric transport. While many of these projects are developed under G2G cooperation, some operate within the Voluntary Carbon Market (VCM), with projects in various stages from concept development to implementation and authorization requests for their mitigation contributions.

The establishment of a compliance carbon market in Africa could significantly amplify the continent’s collective climate action efforts, while addressing critical financial gaps in adaptation strategies. Targeting key sectors such as forestry and land use, renewable energy, agriculture, waste management, and transportation could lead to substantial reductions in carbon emissions and attract vital financing from wealthier nations. In the forestry sector, a carbon market could help protect Africa's vast carbon sinks,

The financial potential of Ghana’s carbon credits is significant.

The forestry projects alone are projected to generate approximately 20-25 million carbon credits over the next decade. Renewable energy projects could contribute an additional 5-10 million credits, further boosting Ghana's carbon market portfolio. These credits are expected to bring in an estimated $100-150 million in carbon financing by 2030, with further potential as additional projects come online.

In addition to these projections, ongoing negotiations with international partners indicate that the demand for Ghana’s carbon credits will increase, providing a sustained source of climate financing for the country.

Ghana’s Carbon Budget and National Emission Targets

Ghana’s climate action is underpinned by a clear carbon budget, which guides the country’s emission reduction efforts. The carbon budget is part of Ghana’s broader climate strategy, as outlined in its Nationally Determined Contributions (NDCs) and the National Climate Change Policy.

- National Carbon Budget: Ghana’s carbon budget, established in line with its NDC commitments, sets a limit on the total amount of greenhouse gas emissions that the country can emit while contributing to the global effort to keep temperature rise below 2°C, with aspirations to limit it to 1.5°C. Under the current carbon budget, Ghana aims to reduce emissions by 64 MtCO2e by 2030, compared to business-as-usual (BAU) projections.

- Emission Reduction Targets: Ghana’s NDC commits to reducing emissions by 15% unconditionally by 2030 and up to 45% with international support through carbon financing and other mechanisms. These targets cover key sectors such as energy, waste management, agriculture, and forestry, with a focus on promoting renewable energy, reducing deforestation, and improving energy efficiency.

Ghana’s engagement in carbon markets through the EPA is critical to achieving these ambitious targets. The revenue generated from carbon trading will be reinvested in scaling up emission reduction efforts across various sectors, supporting the country’s broader goal of transitioning to a low-carbon economy.

Future Outlook

Looking ahead, Ghana is set to deepen its engagement in sustainable financing with a particular emphasis on building climate resilience. Expanding its participation in the global carbon market will play a key role in this strategy, focusing on scaling up project development, strengthening governance frameworks, and enhancing carbon credit issuance capabilities. By developing more sophisticated monitoring, reporting, and verification (MRV) systems, Ghana aims to ensure that its carbon credits meet the highest international standards, thus attracting greater investment and financing opportunities for climate adaptation and resilience-building projects.

The combination of a robust carbon budget, ambitious emission reduction targets, and active participation in carbon markets positions Ghana as a leader in climate finance within Africa. Through continued collaboration with international partners and stakeholders, Ghana can leverage carbon financing.

Chapter 7

Conclusion

Chapter 7: Conclusion

The Ghana Green Finance Taxonomy represents a pivotal step in Ghana's commitment to driving sustainable economic growth while addressing the pressing challenges of climate change and environmental degradation. As the first of its kind in West Africa, this taxonomy provides a clear and structured framework that aligns with national and international goals, positioning Ghana as a leader in sustainable finance on the African continent.

Through the classification of economic activities based on their environmental sustainability, the taxonomy facilitates the flow of capital towards green projects that contribute to climate resilience, resource efficiency, and environmental protection. It also sets the foundation for increasing investor confidence by reducing the risks of greenwashing and ensuring transparency in green finance initiatives.

By leveraging cross-sectoral synergies and prioritising key sectors such as energy, agriculture, transportation, and waste management, the taxonomy not only aligns with Ghana's Nationally Determined Contributions (NDCs) and the broader Sustainable Development Goals (SDGs) but also strengthens the nation's transition towards a low-carbon and climate-resilient future.

Moreover, the phased implementation of the taxonomy ensures that it remains adaptable, evolving in response to emerging challenges, new technologies, and global sustainability standards. The commitment to continuous improvement, robust governance, and rigorous monitoring and evaluation frameworks ensures that Ghana's green finance efforts will remain credible, inclusive, and impactful.

In conclusion, the Ghana Green Finance Taxonomy is not just a tool for environmental protection but a strategic framework that integrates economic, social, and environmental goals, fostering sustainable development that benefits all stakeholders. Its success will be instrumental in attracting sustainable investments, creating green jobs, and ensuring a prosperous, climate-resilient future for Ghana.

Glossary of Definitions

Glossary of Definitions

Biodiversity Protection	The practice of protecting and preserving the variety of life on Earth, including species, ecosystems, and genetic diversity, to ensure the health and resilience of the planet's environments.
Blue Economy	
Carbon Credits	Tradable certificates representing the right to emit a specific amount of carbon dioxide or other greenhouse gases. One credit permits the emission of one ton of CO2 or equivalent gases.
Carbon Footprint	The total amount of greenhouse gases (GHGs) emitted directly or indirectly by an individual, organisation, event, or product, measured in carbon dioxide equivalents.
Circular Economy	An economic system aimed at minimising waste and making the most of resources by reusing, recycling, and refurbishing materials and products throughout their lifecycle.
Climate Change Adaptation	Actions taken to adjust to current or expected future climate impacts, aimed at reducing vulnerability and increasing resilience to climate change effects.
Climate Change Mitigation	Efforts to reduce or prevent the emission of greenhouse gases, including investments in renewable energy, energy efficiency, and carbon capture technologies.
Energy Efficiency	Using less energy to perform the same task, reducing energy waste, and lowering overall energy consumption.
Entrepreneurship	The process of designing, launching, and running a new business, particularly one that is environmentally sustainable or contributes to green economy goals.
Environmental, Social, and Governance (ESG) Criteria	A set of standards for a company's operations that socially conscious investors use to screen potential investments. Environmental criteria consider how a company performs as a steward of nature, social criteria examine how it manages relationships with employees, suppliers, customers, and communities, and governance deals with a company's leadership, audits, and internal controls.
Environmental Objectives	The specific goals set within the green taxonomy to protect and enhance the environment, such as reducing carbon emissions, improving energy efficiency, conserving natural resources, and protecting biodiversity.
Green Bonds	Bonds specifically earmarked to raise funds for projects that have positive environmental benefits, such as renewable energy projects, pollution prevention, or conservation initiatives.
Greening	The process of transforming policies, practices, industries, and behaviours to become more environmentally friendly, often involving the reduction of carbon footprints, the adoption of sustainable practices, and the promotion of environmental stewardship.

Glossary of Definitions

Green Jobs	Employment opportunities that contribute to preserving or restoring the environment, often linked to sectors such as renewable energy, energy efficiency, sustainable agriculture, and conservation.
Green Taxonomy	A classification system that defines a number of economic activities that are environmentally sustainable. It sets criteria for labelling investments and activities as 'green' based on their contribution to environmental objectives like climate change mitigation, adaptation, and biodiversity protection.
Greenwashing	The practice of making misleading claims about the environmental benefits of a product, service, or company practices, to appear more environmentally friendly than they are.
Impact Investing	Investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return.
ISIC	ISIC is a United Nations standard classification of economic activities arranged so that entities can be classified according to the activity they carry out. ISIC is a basic tool for studying economic phenomena, fostering international comparability of data,
ISO	ISO Standards are a set of internationally recognized standards that were created with the aim of helping companies to establish levels of homogeneity in relation to the management, provision of services and product development in the industry.
Just Transition	A framework developed by the labour movement to encompass a range of social interventions needed to secure workers' rights and livelihoods when economies are shifting to sustainable production, particularly in sectors like energy and agriculture.
LEED	Leadership in Energy and Environmental Design is a globally recognised certification system for buildings and communities that are designed, constructed, maintained, and operated for improved environmental and human health performance. Developed by the U.S. Green Building Council (USGBC), LEED provides a framework for healthy, efficient, and cost-saving green buildings.
Low-Carbon Economy	An economy that has a minimal output of greenhouse gas emissions into the environment, achieved through energy efficiency, renewable energy, and low-carbon technologies.
Nationally Determined Contributions (NDCs)	Nationally Determined Contributions (NDCs) are the climate action plans submitted by countries under the Paris Agreement, an international treaty aimed at limiting global warming to well below 2°C above pre-industrial levels, with efforts to limit the increase to 1.5°C. NDCs outline each country's commitments to reduce national greenhouse gas emissions and adapt to the impacts of climate change.

Glossary of Definitions

Net Zero	"Net Zero" refers to the balance between the amount of greenhouse gases (GHGs) emitted into the atmosphere and the amount removed or offset. Achieving Net Zero means that the total greenhouse gas emissions produced by human activities are offset by equivalent amounts of greenhouse gases being removed from the atmosphere, either through natural processes like reforestation or technological solutions like carbon capture and storage.
Renewable Energy	Energy derived from natural processes that are replenished at a faster rate than they are consumed, such as solar, wind, hydro, and geothermal energy.
Resilience	The ability of systems, communities, and individuals to anticipate, absorb, and recover from environmental shocks and stresses, such as those caused by climate change.
Retrofitting	The process of adding new technologies or features to existing systems, buildings, or infrastructure to improve energy efficiency, reduce environmental impact, and extend their useful life, often as part of a sustainability initiative.
Stakeholder Engagement	The process by which an organisation involves individuals or groups who may be affected by or can influence the outcomes of a decision, project, or policy, ensuring their concerns and inputs are considered.
Sustainability	The ability to meet the needs of the present without compromising the ability of future generations to meet their own needs, ensuring a balance between economic growth, environmental care, and social well-being.
Sustainable Agriculture	Farming practices that maintain or enhance environmental quality, while ensuring profitability and social equity. This includes methods that conserve water, reduce greenhouse gas emissions, and promote biodiversity.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs, balancing economic growth, environmental protection, and social equity.
Sustainable Finance	Financing and investment practices that take into account environmental, social, and governance (ESG) criteria to promote long-term sustainability.
Sustainable Infrastructure	Infrastructure designed to meet the present and future needs of society in a sustainable way, including renewable energy systems, energy-efficient buildings, sustainable transport, and waste management systems.
Taxonomy	A system of classification, typically used to categorise and organise complex information. In the context of a green taxonomy, it refers to the systematic classification of economic activities based on their environmental sustainability.
Technical Screening Criteria	Detailed performance metrics and requirements that projects must meet to qualify as 'green' under the taxonomy. These criteria ensure that investments genuinely contribute to sustainability goals.
Zero Rated	"Zero Rated" is a term commonly used in taxation, particularly in the context of Value-Added Tax (VAT) or Goods and Services Tax (GST). It refers to goods or services that are taxable, but the tax rate applied to them is 0%.

Annexes

Exclusion List

a. Production or trade in any product or activity deemed illegal under the laws or regulations of the Republic of Ghana, or international conventions and agreements, or subject to international bans, such as pharmaceuticals, pesticides/herbicides, ozone depleting substances, Polychlorinated Biphenyls (PCBs), wildlife or products regulated under Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

b. Production or trade in weapons and munitions.

c. Production or trade in alcoholic beverages (excluding beer and wine).

d. Production or trade in tobacco.

e. Gambling, casinos and equivalent enterprises.

f. Production or trade in radioactive materials. This does not apply to the purchase of medical equipment, quality control (measurement) equipment and any equipment where the radioactive source is considered trivial and/or adequately shielded.

g. Production or trade in unbonded asbestos fibers. This does not apply to purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%. 10

h. Drift net fishing in the marine environment using nets in excess of 2.5 km. in length. (i) Production or activities involving harmful or exploitative forms of forced labour/harmful child labour.

i. Commercial logging operations for use in primary tropical moist forest.

j. Production or trade in wood or other forestry products other than from sustainably managed forests.

k. Coal, oil and gas power generation.

l. Industrial processes related to fossil fuels (e.g. coal/oil/gas mining/extraction, coal washing & processing, oil refinery, associated supply chain infrastructure).

m. Landfills.

Phased Approach to the Ghana Green Finance Taxonomy

The Green Finance Taxonomy is being developed and implemented through a phased approach to ensure it remains comprehensive and adaptable to Ghana's evolving landscape.

Phase 1: Qualitative Green Finance Taxonomy (Launch: October 9, 2024)

The first phase of the Taxonomy is being launched today.

This foundational framework introduces qualitative technical screening criteria for a broad range of economic activities.

It will serve as a basis for identifying and classifying green investments across diverse sectors of the economy.

Phase 2: Quantitative Green Finance Taxonomy and Sector Incentives (Target: May 2025)

This phase will build upon the qualitative framework by introducing quantitative thresholds to the screening criteria.

These thresholds will provide specific, measurable standards for assessing the environmental impact and sustainability of economic activities.

Additionally, this phase will introduce tax exemptions and sector-specific incentives aimed at encouraging investment in green projects. These fiscal measures will create a more favourable investment environment for businesses and investors, further accelerating the adoption of sustainable practices.

With the addition of quantitative criteria, financial institutions, investors, and businesses will gain clearer guidance, and the accompanying incentives will make green investments even more attractive and financially viable.

Transitional Taxonomy (Target: February 2026)

Recognizing the importance of carbon-intensive sectors, the third phase will introduce a transitional taxonomy.

This phase will focus on sectors such as oil and gas, mining, and heavy industry.

The transitional taxonomy will outline a strategic pathway for these sectors to gradually shift toward more sustainable practices, balancing economic growth with environmental responsibility.

Implementation and Impact

The phased rollout of the Green Finance Taxonomy will:

- Provide clarity and consistency in defining green investments.
- Facilitate the flow of capital toward sustainable projects with environmental and social benefits.
- Offer financial incentives, such as tax exemptions, which will lower the cost of investing in green projects and stimulate increased investment.
- Align with Ghana's commitment to international climate goals and sustainable development objectives.
- Encourage innovation and the development of sustainable technologies and practices by making them more accessible through financial incentives.
- Strengthen Ghana's position and competitiveness in the global green economy by creating a more attractive and supportive environment for green investments.

This approach will ensure that the Taxonomy not only evolves in alignment with sustainable growth objectives but also incorporates incentives to catalyse investment, ensuring that both businesses and investors are motivated to contribute to Ghana's green and climate-resilient future.

Guidelines for the Use of the Green Taxonomy

1. Financial Institutions

Objective:

Financial institutions play a critical role in facilitating green finance by ensuring that investments comply with the Ghana Green Taxonomy, contributing to sustainability objectives while mitigating risks.

Guidelines:

1. Evaluate Projects Using ISIC Codes:

Financial institutions must classify all projects they finance using the International Standard Industrial Classification (ISIC) codes, as specified in the Green Taxonomy. This classification ensures that projects are accurately categorized based on their economic activities, making it easier to assess their eligibility for green finance. ISIC codes provide a standardized, globally recognized framework that enables institutions to align with international sustainability standards.

2. Screen Projects Against Technical Criteria:

Before approving financing, institutions must verify that the project meets the Green Taxonomy's technical screening criteria. This includes ensuring that the project contributes to environmental objectives such as climate change mitigation, adaptation, resource efficiency, or environmental protection. The criteria also emphasize the "Do No Significant Harm" (DNSH) principle, ensuring that financed projects do not negatively impact other environmental or social objectives.

3. Prioritize Compliance with Global Standards:

Financial institutions should require that projects seeking green financing comply with recognized international standards such as ISO 14001 (Environmental Management), ISO 50001 (Energy Management), or other relevant certifications. ISIC codes help identify the sectors where these standards apply, ensuring that projects are eligible for sustainable finance.

4. Conduct Environmental and Social Risk Assessments:

In addition to screening for technical compliance, financial institutions must conduct comprehensive risk assessments to evaluate potential environmental and social risks associated with the project. Using ISIC codes to identify the relevant sectors helps institutions apply appropriate risk mitigation strategies based on the specific industry or activity.

5. Monitor and Report on Project Performance:

Institutions should establish robust monitoring frameworks to track the performance of funded projects, ensuring they deliver on their environmental and social commitments. ISIC codes assist in benchmarking performance across sectors, enabling financial institutions to compare project impacts effectively. Regular reporting from project developers on key performance indicators (KPIs) related to sustainability is essential to maintain transparency.

6. Mitigate Greenwashing Risks:

By applying the ISIC codes and technical criteria of the Green Taxonomy, financial institutions can ensure that their portfolio only includes genuinely green projects, thereby minimizing the risk of greenwashing. The use of recognized international standards, coupled with sector-specific ISIC codes, provides a robust framework for verifying the environmental integrity of financed projects.

7. Incentivize Green Investments:

Financial institutions should develop green financial products (such as green bonds, loans, and sustainability-linked bonds) and offer favorable financing terms for projects that comply with the Green Taxonomy and ISIC classifications. These incentives encourage businesses and project developers to prioritize sustainability and align their activities with the national and global climate goals.

8. Leverage Cross-Sector Synergies with ISIC Codes:

ISIC codes allow financial institutions to identify cross-sectoral opportunities for sustainable investment. For example, a project in renewable energy (ISIC Section D) may complement projects in sustainable agriculture (ISIC Section A) or water management (ISIC Section E), enhancing overall sustainability impacts across multiple sectors. Using ISIC codes enhances consistency and transparency, boosts credibility and confidence in green projects.

9. Use Third-Party Verifiers for Certification:

To ensure credibility, financial institutions should engage third-party verifiers, such as ISO certification bodies, to audit projects against the Green Taxonomy's requirements. These verifiers ensure that projects meet both local and international environmental and social standards. The ISIC code classifications help third-party verifiers apply the correct standards for each sector. The Third-Party Verifier must be independent.

10. Train Staff on the Use of the Green Taxonomy and ISIC Codes:

Financial institutions should provide ongoing training for their staff to familiarize them with the Green Taxonomy, ISIC codes, and relevant international standards. This ensures that the institution has the internal capacity to properly assess, finance, and monitor green projects. Staff should also be trained to assess evolving sustainability practices and emerging risks (e.g., new regulations or technologies).

2. Investors

Objective:

Investors can use the Ghana Green Taxonomy to make informed decisions that align their portfolios with sustainability goals, ensuring transparency, accountability, and the avoidance of greenwashing.

Guidelines:

1. Align Investments with Green Taxonomy and ISIC Codes:

Investors should ensure that all projects and assets they invest in are aligned with the economic sectors and activities classified by the International Standard Industrial Classification (ISIC) codes within the Green Taxonomy. ISIC codes provide a universal classification system, making it easier to compare projects globally and ensure they meet recognized sustainability standards.

2. Assess Environmental Impact:

Use the technical screening criteria of the Green Taxonomy to evaluate the environmental performance of potential investments. Key metrics, such as greenhouse gas (GHG) emissions reductions, energy efficiency, and biodiversity protection, should guide investment decisions.

3. Ensure Compliance with Do No Significant Harm (DNSH) and Social Safeguards:

Ensure that investments comply with the DNSH principle, meaning projects must not negatively impact other environmental or social objectives. Investments must also meet minimum social safeguards, addressing labor standards, human rights, and fair governance.

4. Verify Standards through ISIC Codes, ISO Standard and other relevant International Certifications:

Investors should check for certifications such as ISO (14001, 50001), LEED, or other internationally recognized sustainability standards to validate the environmental claims of the project. I.e. ISO 14001 (Environmental Management), ISO 50001 (Energy Management), and LEED (green building certification).

5. Monitor and Report Progress:

Investees to provide ongoing reporting on environmental, social, and governance (ESG) impacts. Regular monitoring ensures that the investments align with the criteria of the Green Taxonomy and continue to deliver measurable positive outcomes.

3. Project Developers

Objective:

Project developers must align their projects with the Ghana Green Taxonomy to ensure they qualify for green financing and contribute to sustainability goals.

Guidelines:

1. Classify Projects with ISIC Codes:

Identify the relevant ISIC code for your project, which ensures proper classification within the Green Taxonomy. ISIC codes allow developers to categorize their activities clearly, demonstrating alignment with global and national sustainability frameworks.

2. Comply with Technical Screening Criteria:

Ensure that the project meets the specific environmental and social criteria set out in the Green Taxonomy. For example, renewable energy projects should showcase measurable reductions in emissions, while water management projects must improve efficiency and quality.

3. Obtain Certifications:

Secure relevant certifications based on international standards, including ISO certifications (ISO 14001 for environmental management, ISO 50001 for energy efficiency) and national regulatory approvals, to enhance project credibility.

4. Adhere to Do No Significant Harm (DNSH) Principles:

Projects must comply with the DNSH principle, ensuring they do not negatively impact other environmental or social objectives. For instance, while promoting climate mitigation, a project should avoid harming biodiversity or causing social displacement.

5. Use ISIC for Cross-Sectoral Synergies:

The ISIC system allows for identification of projects across sectors, enabling developers to highlight synergies between activities. For instance, projects in renewable energy can complement those in sustainable agriculture or water management, increasing their overall sustainability impact.

6. Monitor and Report:

Establish regular monitoring and reporting mechanisms to track the project’s environmental and social performance. This ensures transparency and continued compliance with the Green Taxonomy throughout the project lifecycle.

4. Businesses

Objective:

Businesses applying for green financing or incorporating sustainability into their operations must use the Green Taxonomy as a guide for aligning their activities with environmental goals.

Guidelines:

1. Align Business Operations Using ISIC Codes:

Classify your business operations and projects according to the relevant ISIC code under the Green Taxonomy. ISIC codes provide a standardized framework for identifying green activities and make it easier to show compliance with international standards when applying for green finance.

2. Adopt Sustainable Practices and Certifications:

Implement recognized international standards, such as ISO 14001 (Environmental Management) and ISO 50001 (Energy Management), to ensure your business meets both local and global sustainability criteria. Use ISIC codes to highlight relevant sectors of activity that qualify for green financing.

3. Develop Sustainable Products and Services:

Focus on creating products or services that align with the environmental and social goals outlined in the Green Taxonomy. For example, energy-efficient appliances or recycled materials would fall under ISIC-classified sectors that are eligible for green financing.

4. Ensure Compliance with DNSH:

Ensure that business operations do not cause significant harm to other environmental or social objectives. For example, in expanding resource efficiency, avoid increasing pollution or harming biodiversity.

5. Access Green Financing:

By aligning your business activities with ISIC codes and the Green Taxonomy's sustainability criteria, you can access green bonds, loans, and other sustainable financial products. ISIC codes help financial institutions and investors quickly assess the eligibility of your business for green finance.

6. Monitor and Report Progress:

Establish systems for regular tracking and reporting of environmental and social outcomes, using metrics tied to the Green Taxonomy. Reports should clearly link activities back to their ISIC classifications and sustainability criteria, providing investors and regulators with transparency.

Data Set - Technical Screening Criteria for the Ghana Green Finance Taxonomy

The technical screening criteria for economic activities, detailed below, are integral to the overall Ghana Green Finance Taxonomy Framework. Given the comprehensive nature of this data, including sector-specific standards, codes, and policies, the full dataset is included as an Annex to the main framework. This annexe provides a structured breakdown of the technical screening criteria, ensuring that the relevant activities across different sectors are aligned with Ghana's environmental and climate objectives.

To facilitate easier navigation and application, the technical screening criteria will also be integrated into an interactive dashboard. This dashboard will simplify access to the Taxonomy, allowing users to seamlessly connect sectors and subsectors to their corresponding technical screening criteria, standards, and International Standard Industrial Classification (ISIC) codes. Furthermore, it will provide links to available sustainable financing sources tailored to each sector.

Over time, this dynamic tool will enable stakeholders—including financial institutions, businesses, and policymakers—to efficiently access the data required to assess green investments and monitor alignment with the Ghana Green Finance Taxonomy, supporting the country's transition to a sustainable, low-carbon economy.

Energy

1. Renewable Energy Generation and Infrastructure

Solar PV production, installation and maintenance. Solar Photovoltaic (PV) systems convert sunlight into electricity and are a crucial part of the transition to a renewable energy-based economy.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Renewable Energy and Emissions Reduction Criteria: Solar PV systems must be designed to maximize renewable energy generation and contribute to a significant reduction in greenhouse gas (GHG) emissions compared to conventional energy sources. The project must demonstrate a positive energy balance, where energy output exceeds the energy used in manufacturing, installation, and operation.

DNSH Consideration: Ensure that the lifecycle emissions of the PV system, from production to end-of-life disposal, are minimized. The sourcing of raw materials must not significantly contribute to deforestation or biodiversity loss.

1.2 Sustainable Material Use

Criteria: Solar PV production must prioritize the use of sustainable and recyclable materials. The materials used in solar panels, including silicon, glass, and aluminum, should be responsibly sourced, with a preference for recycled content where possible.

DNSH Consideration: Avoid the use of materials that are environmentally harmful or sourced from regions with high risks of environmental degradation or human rights abuses. Special attention should be paid to avoiding conflict minerals.

1.3 Water Efficiency

Criteria: The production of solar PV panels must minimize water consumption, particularly in water-scarce regions. Water used in manufacturing should be recycled or sourced from non-potable water supplies wherever possible.

DNSH Consideration: Ensure that solar PV manufacturing processes do not lead to the depletion of local water resources or water pollution.

2. Resource Efficiency and System Performance

2.1 High Energy Efficiency in Production

Criteria: Solar PV manufacturing facilities must employ energy-efficient processes, aiming to minimize the energy input required for panel production. Manufacturing should integrate renewable energy sources wherever possible to reduce the carbon footprint.

DNSH Consideration: Avoid significant harm by ensuring that manufacturing processes are not overly energy-intensive, which could offset the environmental benefits of solar energy generation.

2.2 Maximizing System Efficiency in Installation

Criteria: Solar PV installations must be optimized for maximum energy generation, considering factors such as solar irradiance, orientation, tilt, and shading. Projects should aim for high system efficiency, including inverter and wiring efficiencies.

DNSH Consideration: Ensure that the installation does not cause significant land degradation, soil erosion, or disruption to ecosystems, particularly when installing large-scale solar farms.

2.3 Waste Minimization in Production and Installation

Criteria: Waste generated during the production and installation of solar PV systems must be minimized, with priority given to recycling or reusing materials. The installation process should also minimize the disturbance of the natural landscape.

DNSH Consideration: Avoid significant harm by reducing waste at every stage of production and installation, ensuring that hazardous materials are not improperly disposed of and that installation sites are properly managed.

3. Social and Community Benefits

3.1 Local Employment and Economic Development

Criteria: Solar PV projects must create local jobs, especially during the installation and maintenance phases, contributing to local economic development. This includes opportunities for training and skill development in solar PV technology.

DNSH Consideration: Ensure that labor practices comply with fair labor standards, providing safe working conditions, fair wages, and opportunities for local workers and disadvantaged groups.

3.2 Community Health and Safety

Criteria: Solar PV installations must prioritize the health and safety of local communities, ensuring that electrical systems are safely designed and installed. Installations should be located at a safe distance from residential areas to prevent electrical hazards and other risks.

DNSH Consideration: Avoid significant harm to community health and safety by ensuring that proper safety measures are in place during installation and maintenance. This includes avoiding hazardous working conditions and protecting local communities from accidents.

3.3 Equitable Access to Solar Energy

Criteria: Projects must ensure that the benefits of solar PV systems, such as access to clean and affordable energy, are equitably distributed to local communities, including low-income and rural populations.

DNSH Consideration: Ensure that no community is disproportionately burdened by the installation of solar PV projects, and that all communities have access to the benefits of clean energy.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate Change Impacts

Criteria: Solar PV systems must be designed and installed to withstand climate-related risks such as extreme heat, heavy rainfall, storms, and other extreme weather conditions. Panels should be durable and capable of functioning efficiently in diverse climate conditions.

DNSH Consideration: Avoid significant harm by ensuring that the infrastructure is not vulnerable to climate risks, such as flooding, which could damage equipment or reduce system efficiency.

4.2 Adaptability for Future Technologies

Criteria: Solar PV installations must be designed with future-proof features, allowing for easy integration with emerging technologies such as energy storage systems, microgrids, or upgrades to higher-efficiency panels.

DNSH Consideration: Ensure that systems are adaptable to avoid obsolescence and to minimize environmental impacts over the system's lifetime.

5. Monitoring and Reporting

5.1 Continuous Monitoring of System Performance

Criteria: Solar PV systems must include a robust monitoring system to track performance indicators such as energy output, system efficiency, and maintenance needs. This ensures that the system operates efficiently and continues to provide maximum renewable energy.

DNSH Consideration: Avoid significant harm by ensuring that performance issues are identified early, minimizing energy losses and operational inefficiencies.

5.2 Regular Reporting on Environmental and Social Impact

Criteria: Projects must report regularly on their environmental and social performance, including metrics on energy generation, emissions reductions, and local employment creation.

DNSH Consideration: Ensure transparency and accountability through regular reporting, avoiding greenwashing or misrepresentation of the project's benefits.

6. Safety and Regulatory Compliance

6.1 Adherence to Safety Standards

Criteria: Solar PV installations must comply with local, national, and international safety standards for electrical installations, including measures to prevent fire hazards, electrical faults, and equipment failure.

DNSH Consideration: Ensure no significant harm by adhering to high safety standards and performing regular safety audits to protect workers, users, and the surrounding environment.

6.2 Compliance with Environmental Regulations

Criteria: Solar PV projects must comply with all applicable environmental regulations, including those related to land use, emissions, and waste management. Environmental impact assessments (EIAs) should be conducted prior to installation.

DNSH Consideration: Ensure that the project does not violate environmental laws, particularly those related to the protection of ecosystems, water resources, and local air quality.

7. End-of-Life and Circular Economy Considerations

7.1 Circular Economy and Recycling

Criteria: Solar PV systems must be designed to incorporate circular economy principles, prioritizing the use of recyclable materials and minimizing waste at the end of the system's life. A clear plan for recycling or safe disposal of PV panels at the end of their useful life must be in place.

DNSH Consideration: Avoid significant harm by ensuring that end-of-life panels are not sent to landfills and that valuable materials, such as metals and glass, are recovered and reused.

7.2 Safe Decommissioning

Criteria: The project must include a plan for safe decommissioning at the end of its operational life, including the removal of solar panels, inverters, and associated infrastructure. Decommissioning should restore the land to its original condition or enable its reuse for other sustainable purposes.

DNSH Consideration: Ensure that decommissioning does not result in environmental damage, such as soil contamination or improper disposal of hazardous materials.

» ISO Standards

1. Safety and Performance Standards

ISO 61215: Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval

Application: Specifies requirements for the design qualification and type approval of PV modules, ensuring that the modules meet performance, durability, and safety standards under different environmental conditions.

ISO 61730: Photovoltaic (PV) Module Safety Qualification

Application: Defines the safety requirements for PV modules, focusing on electrical and mechanical safety. It ensures that PV modules are safe for use in both residential and commercial installations.

ISO 29462: Solar Energy – Collector Fields – Check of Performance

Application: Specifies the procedures for verifying the performance of solar energy collector fields, including testing efficiency and output. This standard ensures that installed solar PV systems perform as expected.

2. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing and implementing an environmental management system for solar PV production, installation, and maintenance. It ensures that environmental impacts are minimized and compliance with environmental regulations is maintained.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in assessing the environmental impacts of solar PV systems over their entire life cycle, from raw material extraction to manufacturing, installation, operation, and end-of-life disposal. This ensures the sustainability of solar PV projects.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Provides guidelines for quantifying and reporting the carbon footprint of solar PV systems, helping reduce emissions associated with manufacturing, installation, and maintenance activities.

ISO 14046: Environmental Management – Water Footprint

Application: Offers a framework to assess the water use and environmental impacts of water consumption during the production and maintenance of solar PV systems, ensuring responsible water management.

3. Energy Efficiency and Performance

ISO 50001: Energy Management Systems

Application: Offers a framework to improve energy efficiency during the manufacturing, installation, and operation of solar PV systems, ensuring that the processes minimize energy consumption and optimize energy generation.

ISO 50002: Energy Audits

Application: Provides guidance for conducting energy audits on solar PV systems, identifying inefficiencies and areas for improvement in energy production, system operation, and maintenance.

ISO 50015: Energy Management – Measurement and Verification of Energy Performance

Application: Focuses on measuring and verifying the energy performance of solar PV installations, ensuring that the systems meet their energy production targets and perform efficiently over time.

4. Materials and Recycling Standards

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Helps solar PV manufacturers evaluate material flows and costs during production, promoting resource efficiency and minimizing waste generation during manufacturing and installation processes.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Provides guidelines for designing solar PV systems with disassembly and recycling in mind, ensuring that materials used in solar panels and their supporting infrastructure can be easily recovered at the end of their life cycle.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Ensures that packaging materials used during the transportation of solar PV modules and equipment are recyclable, supporting the reduction of waste generated during system installation and maintenance.

5. Installation and Maintenance Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides guidelines for ensuring health and safety during the installation and maintenance of solar PV systems. It helps prevent accidents and ensures safe working conditions for employees and contractors involved in solar PV projects.

ISO 29463: Solar Energy – Thermal Performance Testing and Monitoring

Application: Establishes procedures for the thermal performance testing of solar energy systems, including PV systems. It ensures that performance parameters are monitored regularly during the system's operational lifetime.

ISO 21914: Solar Energy – Test Methods for Determining Thermal Performance

Application: Specifies the methods for testing the thermal performance of solar PV installations, ensuring that they operate efficiently and meet energy production requirements.

6. End-of-Life and Recycling

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Offers guidelines for effective communication about the environmental impacts and sustainability efforts of solar PV projects, including end-of-life disposal and recycling initiatives.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Assists in evaluating and monitoring the environmental performance of solar PV systems throughout their lifecycle, ensuring continuous improvement in sustainability and efficiency.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Provides a framework for assessing and reporting the climate-related impacts of investments in solar PV projects, ensuring that financial activities are aligned with climate action goals.

» ISICS Codes

1. Manufacture of Solar PV Modules and Components

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the manufacturing of components used in solar PV systems, such as inverters, transformers, and other electrical distribution equipment necessary for solar power generation and integration into the grid.

ISIC Code 2733: Manufacture of Wiring Devices

Application: Includes the production of electrical wiring, connectors, and devices used in the installation and integration of solar PV systems, ensuring efficient and safe connections.

ISIC Code 2790: Manufacture of Other Electrical Equipment

Application: Covers the manufacturing of other specialized equipment for solar PV systems, including control devices, monitoring systems, and other electronic components used in solar installations.

2. Production of Electricity from Solar PV Systems

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Includes the generation of electricity using solar energy, as well as the transmission and distribution of this electricity through the power grid. It covers solar farms and distributed solar energy systems.

ISIC Code 3511: Production of Electricity

Application: Specifically covers the production of electricity from renewable energy sources such as solar PV systems. It applies to both utility-scale solar farms and smaller, distributed solar power generation systems.

3. Installation of Solar PV Systems

ISIC Code 4321: Electrical Installation

Application: Includes the installation of solar PV systems and associated electrical equipment, including wiring, inverters, and control systems. It covers residential, commercial, and utility-scale solar installations.

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Covers the construction of large-scale solar energy projects, including solar farms and utility-scale installations that generate electricity for the grid. It includes the construction of solar power plants and infrastructure for electricity generation.

4. Maintenance and Operation of Solar PV Systems

ISIC Code 8110: Combined Facilities Support Activities

Application: Includes the ongoing maintenance and operation of solar PV systems, including system monitoring, performance optimization, cleaning, and minor repairs to ensure the efficient operation of solar power installations.

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Covers engineering services and technical consultancy related to the design, installation, and maintenance of solar PV systems. It includes feasibility studies, performance assessments, and system optimization services.

5. Research and Development for Solar PV Technology

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves research and development activities focused on improving solar PV technology, including the development of more efficient photovoltaic cells, new materials, and improved energy storage systems for solar projects.

6. Transportation and Logistics for Solar PV Projects

ISIC Code 4923: Freight Transport by Road

Application: Includes the transportation of solar PV panels, inverters, and other components from manufacturing facilities to installation sites. It covers the logistical activities needed to transport large-scale solar components.

ISIC Code 5229: Other Transportation Support Activities

Application: Covers the coordination and logistics services related to transporting solar PV equipment, including handling, storage, and movement of solar power infrastructure components.

7. Waste Management and Recycling of Solar PV Systems

ISIC Code 3830: Materials Recovery

Application: Covers the recycling and recovery of materials from decommissioned or end-of-life solar PV panels and equipment, including the extraction and reuse of valuable materials such as silicon, glass, and metals.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes the management of waste generated from solar PV system decommissioning, including the safe disposal or recycling of hazardous materials such as cadmium or lead from certain types of PV technologies."

» Other international or adapted Certifications & Standards

IEC/ISO 62446 – Photovoltaic (PV) Systems: Requirements for Testing, Documentation, and Maintenance

Description: This standard outlines the requirements for testing and maintaining grid-connected PV systems. It includes guidelines for verifying the electrical safety of installations, as well as commissioning and maintenance procedures.

Key Sections:

Installation Testing: Provides testing requirements for verifying that PV systems are installed correctly and function safely.

Documentation: Outlines what system documentation should be provided, including system configuration, performance benchmarks, and user manuals.

Maintenance: Covers periodic inspection and maintenance procedures to ensure the long-term efficiency of PV systems.

Applicability: Essential for ensuring the safe installation and operation of solar PV systems in grid-connected environments, including residential, commercial, and utility-scale installations.

IEC 60364-7-712 – Low-Voltage Electrical Installations: Requirements for Special Installations or Locations – Solar Photovoltaic (PV) Power Supply Systems

Description: This standard provides detailed guidelines for the electrical installation of low-voltage solar PV systems, including safety requirements for integrating PV systems into the electrical grid.

Applicability: Ensures the safe and proper connection of PV systems to low-voltage grids, particularly in residential and small commercial installations.

» Applicable Tax Incentives

Import duty exemption on the equipment and technology used for waste management and recycling.

» Specific Government Policy (National Standards or Certification)

Renewable Energy Act (Act 832) ,

Renewable Energy Master Plan (REMP)

Wind energy projects

involve the generation of electricity through wind turbines, providing a renewable and clean source of energy that reduces reliance on fossil fuels.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Renewable Energy and Emissions Reduction

Criteria: Wind energy projects must generate electricity from wind power with a significantly lower carbon footprint than fossil fuel-based energy. The project should aim for near-zero greenhouse gas emissions during operation.

DNSH Consideration: Ensure that the construction and operation of wind turbines do not cause significant GHG emissions during the production or transportation of materials or from auxiliary equipment.

1.2 Protection of Natural Habitats and Biodiversity

Criteria: Wind energy projects must be located away from ecologically sensitive areas, such as protected areas, wetlands, and wildlife corridors. Site selection should avoid critical habitats for endangered species, particularly birds and bats.

DNSH Consideration: Ensure that the project does not significantly harm local biodiversity, including the disruption of migratory bird paths or destruction of natural habitats. Comprehensive environmental impact assessments (EIA) should be conducted before construction.

1.3 Sustainable Land Use

Criteria: Wind farms must optimize land use by minimizing the physical footprint of turbines, avoiding deforestation, and prioritizing previously developed or degraded land. Projects should co-exist with agricultural or other compatible land uses.

DNSH Consideration: Avoid significant harm to ecosystems or displacement of local communities due to large-scale land acquisition. Ensure no significant soil erosion or degradation during construction.

2. Resource Efficiency and Energy Performance

2.1 High Energy Efficiency and Load Factor

Criteria: Wind turbines must be selected and sited to maximize energy output (high capacity factor), taking into account the local wind resource potential. The project should aim for optimal energy generation efficiency, considering wind patterns and turbine technology.

DNSH Consideration: Ensure that the project design minimizes energy losses through the efficient siting of turbines and grid integration, avoiding unnecessary energy wastage.

2.2 Efficient Use of Materials and Construction Resources

Criteria: Wind energy projects must use materials that are resource-efficient and sustainable. Prioritize recycled and low-impact materials in the construction of turbines, foundations, and transmission infrastructure.

DNSH Consideration: Avoid significant harm by ensuring that the sourcing and use of materials do not lead to deforestation, habitat destruction, or unsustainable mining practices. Minimize the carbon footprint of material transportation.

3. Social and Community Benefits

3.1 Local Employment and Economic Development

Criteria: Wind energy projects must create jobs and contribute to local economic development, particularly in rural or underserved areas. Employment opportunities should focus on both the construction and operational phases of the project.

DNSH Consideration: Ensure that local communities are engaged in the project and benefit economically from employment opportunities and infrastructure improvements. Avoid significant harm by ensuring fair wages, safe working conditions, and local participation.

3.2 Community Health and Safety

Criteria: Wind projects must be located at a safe distance from residential areas to avoid noise pollution, shadow flicker, and other potential health impacts on nearby communities. Projects must comply with local safety regulations, including minimum setback distances.

DNSH Consideration: Ensure that the siting of wind turbines does not result in significant harm to human health, such as excessive noise or safety hazards from turbine failure or accidents.

3.3 Social Equity and Inclusiveness

Criteria: Wind energy projects should ensure inclusivity in decision-making processes, with input from local communities, including vulnerable and marginalized groups. Benefits from the project, such as electricity access, should be equitably distributed.

DNSH Consideration: Avoid significant harm to local communities by ensuring that the project does not lead to forced relocations or disruptions to traditional land use without compensation and adequate consultation.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate Change Impacts

Criteria: Wind energy infrastructure must be designed to withstand climate-related risks such as extreme weather events (storms, high winds, flooding), which could affect turbine integrity and power generation.

DNSH Consideration: Ensure that turbine structures and foundations are durable and resilient to extreme climate conditions, avoiding risks such as turbine collapse or grid disruptions during adverse weather.

4.2 Adaptability to Future Technologies

Criteria: The project must incorporate future-proof design features, allowing for upgrades and integration with advanced wind turbine technologies and energy storage systems as they become available.

DNSH Consideration: Avoid locking the project into obsolete or inefficient technology that could reduce the long-term sustainability and cost-effectiveness of the wind farm.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Environmental Impacts

Criteria: Wind energy projects must include a robust monitoring system to track environmental impacts, such as impacts on local wildlife (e.g., bird strikes), noise levels, and soil erosion, ensuring that mitigation measures are effective.

DNSH Consideration: Ensure real-time monitoring to detect and address potential environmental issues early, avoiding significant harm to local ecosystems and wildlife.

5.2 Regular Reporting of Energy Performance

Criteria: Projects must report on their energy production performance, including capacity factors, efficiency, and contribution to grid stability. The project's performance should be made publicly available to ensure transparency.

DNSH Consideration: Ensure accurate and transparent reporting to avoid greenwashing and ensure that the project meets its stated environmental and energy performance goals.

6. Safety and Regulatory Compliance

6.1 Adherence to Safety Standards

Criteria: Wind energy projects must comply with all local, national, and international safety standards related to turbine design, installation, operation, and maintenance. Projects should have emergency response plans in place to address potential accidents.

DNSH Consideration: Avoid significant harm by ensuring that turbines are designed, installed, and maintained following high safety standards to minimize the risk of accidents, fires, or structural failures.

6.2 Compliance with Environmental Regulations

Criteria: Projects must comply with environmental regulations, including those related to land use, wildlife protection, and emissions reductions. Environmental impact assessments (EIAs) should be conducted and approved before project initiation.

DNSH Consideration: Ensure no harm by strictly adhering to environmental laws and regulations, particularly in terms of ecosystem protection and emissions standards.

7. End-of-Life and Circular Economy Considerations

7.1 Circular Economy Integration

Criteria: Wind energy projects must incorporate circular economy principles, including the use of recyclable materials in turbine blades, towers, and other components. The project should have a plan for the reuse or recycling of decommissioned turbines and infrastructure.

DNSH Consideration: Avoid significant harm by preventing turbine components from being sent to landfills or improperly disposed of at the end of their lifecycle.

7.2 Decommissioning and Site Restoration

Criteria: The project must include a decommissioning plan that ensures the removal of turbines, restoration of land to its original condition, and the safe disposal or recycling of materials when the project reaches the end of its life.

DNSH Consideration: Ensure no significant harm by leaving no permanent environmental damage after the wind farm is decommissioned."

» ISO Standards

1. Safety and Risk Management

ISO 61400 Series: Wind Turbines

ISO 61400-1: Wind Energy Generation Systems – Part 1: Design Requirements

Application: Specifies essential design requirements for wind turbines, including structural integrity, durability, and safety. It covers aspects such as load calculations, mechanical systems, and control systems to ensure that turbines are designed for safe and efficient operation.

ISO 61400-2: Wind Energy Generation Systems – Part 2: Small Wind Turbines

Application: Provides safety and performance requirements for small wind turbines (up to $200m^2$ rotor swept area), focusing on design, safety, and testing to ensure reliable performance for smaller-scale applications.

ISO 61400-12: Wind Energy Generation Systems – Part 12: Power Performance Testing

Application: Defines procedures for measuring the power performance of wind turbines, ensuring that energy production is optimized and meets project specifications.

ISO 61400-11: Wind Energy Generation Systems – Part 11: Acoustic Noise Measurement Techniques

Application: Specifies measurement techniques for determining the noise emissions from wind turbines, ensuring that noise impacts are minimized for nearby communities.

ISO 61400-21: Wind Energy Generation Systems – Part 21: Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines

Application: Provides guidelines for measuring the power quality of wind turbines connected to the grid, ensuring that they meet the necessary grid stability and performance requirements.

ISO 45001: Occupational Health and Safety Management Systems

Application: Ensures that wind energy projects have robust occupational health and safety management systems to protect workers during construction, operation, and maintenance of wind turbines. It covers risk assessment, emergency preparedness, and safety protocols for turbine installation and maintenance.

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for risk management in wind energy projects, including the identification, assessment, and mitigation of risks related to turbine design, environmental factors, and operational safety.

2. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing and implementing an environmental management system for wind energy projects. It helps project developers monitor, mitigate, and reduce environmental impacts such as land use, wildlife interactions, and resource consumption.

ISO 14040: Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of wind energy projects over their entire lifecycle, from raw material sourcing for turbine production to end-of-life decommissioning and recycling. This ensures that the project minimizes its environmental footprint.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Offers methods to measure and reduce the carbon footprint of wind energy systems, ensuring that the overall environmental benefits of wind power are maximized and that emissions reductions are quantifiable.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Provides a framework for assessing the water use and environmental impacts of water consumption during wind energy project construction and operation, ensuring efficient use of water resources.

3. Energy Efficiency and Performance

ISO 50001: Energy Management Systems

Application: Offers a systematic approach to improving energy performance and efficiency within wind energy projects. It helps ensure that wind turbines and supporting systems operate efficiently, minimizing energy losses and maximizing electricity production.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Provides guidelines for conducting energy audits on wind energy systems, helping to identify inefficiencies and opportunities for improving energy production and system performance.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Focuses on the measurement and verification of the energy performance of wind energy projects, ensuring that performance improvements are verified and sustainable over time.

4. Materials and Resource Management

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Helps project developers evaluate the flow of materials in wind energy projects, ensuring resource efficiency and waste minimization during turbine manufacturing, installation, and maintenance.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Encourages designing wind turbines and supporting infrastructure for easy disassembly and recycling, promoting the circular economy and reducing waste at the end of a turbine's life.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Provides guidelines for ensuring that packaging materials used during wind turbine construction and transport are recyclable, supporting sustainable practices and minimizing waste.

5. Noise and Environmental Impact

ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors

Application: Provides methods for predicting and measuring the sound propagation from wind turbines to the surrounding environment, ensuring that noise levels are within acceptable limits to avoid disturbing local communities and wildlife.

6. End-of-Life Management and Recycling

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Offers guidance on communicating the environmental impacts and sustainability efforts of wind energy projects, including end-of-life turbine recycling, to stakeholders and the public.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Assists in the ongoing evaluation of a wind project's environmental performance, including emissions, resource use, and recycling efforts, ensuring continuous improvement in sustainability.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Provides a framework for assessing and reporting on the climate-related financial impacts of wind energy projects, ensuring alignment with sustainability-linked financing and carbon reduction goals.

» ISICS Codes

1. Electricity Generation from Wind Power

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: This code covers the generation of electricity using wind power, including wind farms that produce electricity and integrate it into the grid, as well as the transmission and distribution of the electricity generated.

ISIC Code 3511: Production of Electricity

Application: Specifically refers to the production of electricity, including electricity from renewable energy sources like wind turbines. This is relevant for companies and projects involved in wind power generation.

2. Manufacture of Wind Turbines and Components

ISIC Code 2811: Manufacture of Engines and Turbines, Except Aircraft, Vehicle, and Cycle Engines

Application: Includes the manufacturing of turbines used in wind power generation. This encompasses the production of wind turbine nacelles, rotor blades, and other key components of wind turbines.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the production of electric motors and generators, including those used in wind turbines, as well as the electrical distribution and control systems required for wind farms.

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Includes the manufacturing of machinery and equipment specifically designed for wind energy generation, such as gearboxes, inverters, and other specialized components.

3. Construction and Installation of Wind Turbines

ISIC Code 4290: Construction of Other Civil Engineering Projects

Application: Covers the construction of wind farm infrastructure, including the installation of wind turbines, the construction of foundations, access roads, and other necessary facilities for wind energy projects.

ISIC Code 4321: Electrical Installation

Application: Includes the installation of electrical systems and infrastructure required for wind energy projects, such as grid connections, transformers, and electrical wiring associated with wind farms.

4. Maintenance and Operation of Wind Farms

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Covers engineering and technical consultancy services related to the design, installation, operation, and maintenance of wind energy projects. It includes feasibility studies, turbine siting, and performance optimization.

ISIC Code 8110: Combined Facilities Support Activities

Application: Includes the provision of support services such as the ongoing operation and maintenance of wind turbines, including monitoring systems, cleaning, and periodic inspections to ensure efficient operation.

5. Research and Development for Wind Energy Technologies

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves research and development activities focused on wind energy technology innovation, including improvements in turbine efficiency, new materials for turbine blades, and advanced control systems for optimizing wind energy production.

6. Transportation and Logistics for Wind Energy Projects

ISIC Code 4923: Freight Transport by Road

Application: Includes the transportation of wind turbine components (blades, towers, nacelles, etc.) to wind farm sites, often requiring specialized vehicles for oversized loads.

ISIC Code 5229: Other Transportation Support Activities

Application: Covers transportation and logistics services that support wind energy projects, including the coordination of heavy-lift equipment and logistics planning for transporting large turbine components.

7. Environmental and Sustainability Consulting

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Includes consulting services related to environmental assessments, sustainability evaluations, and other scientific and technical services required for the planning and approval of wind energy projects.

8. Waste Management and Recycling of Wind Turbine Components

ISIC Code 3830: Materials Recovery

Application: Covers the recycling and recovery of materials from decommissioned wind turbines, including the reuse of metals, composites, and other components from wind turbine blades and towers.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes waste management services related to the disposal or recycling of wind energy infrastructure, including end-of-life turbines, concrete foundations, and other components.

» Other international or adapted Certifications & Standards

GH2 accreditation and certification

» Specific Government Policy (National Standards or Certification)

National Energy Policy 2021

» Responsible Agencies/ Regulators

Energy Commission

Hydropower development

» Technical Screening Criteria

GHG Emissions: Ensure low lifecycle GHG emissions (<100 gCO_2e per kWh).

Environmental Impact: Conduct a comprehensive Environmental Impact Assessment (EIA) and implement strategies for biodiversity protection, sediment management, and water resource sustainability.

Social Impact: Engage with communities through Free, Prior, and Informed Consent (FPIC) and ensure fair compensation for any displacement.

Safety and Risk Management: Comply with dam safety standards, conduct seismic and flood risk assessments, and implement real-time monitoring systems.

Climate Resilience: Design the project for climate resilience, with adaptive water management and operational flexibility.

Grid Stability: Integrate hydropower effectively into the grid and explore hybrid systems with other renewables.

» ISO Standards

ISO 14001 – Environmental Management Systems: Ensures that hydropower projects meet environmental management standards and reduce ecological impacts.

ISO 14040/14044 – Life Cycle Assessment (LCA): Helps assess and minimize the lifecycle environmental impact of hydropower infrastructure.

ISO 45001 – Occupational Health and Safety: Ensures safe working conditions during the construction, operation, and maintenance of hydropower projects.

ISO 31000 – Risk Management: Provides a framework for managing operational and environmental risks.

ISO 9001 – Quality Management Systems: Ensures consistent quality in the design, construction, and operation of hydropower plants.

ISO 55001 – Asset Management: Focuses on efficient management of hydropower assets over their lifecycle.

ISO 22320 – Emergency Management: Ensures that hydropower projects have plans for emergency response and incident management.

ISO 14046 – Water Footprint: Assesses the water use and impact of hydropower projects, helping optimize water resource management.

» ISICS Codes

ISIC 3510 – Electric Power Generation, Transmission, and Distribution (covers the entire hydropower generation process).

ISIC 3511 – Production of Electricity (focuses specifically on electricity generation).

ISIC 4220 – Construction of Utility Projects for Electricity (applies to the construction of hydropower plants and associated infrastructure).

ISIC 3600 – Water Collection, Treatment, and Supply (relates to water management and reservoir operation).

ISIC 3312 – Repair of Machinery (covers maintenance of turbines and mechanical systems).

ISIC 3314 – Repair of Electrical Equipment (focuses on the maintenance of electrical systems).

ISIC 3512 – Transmission of Electricity (transmission of hydropower-generated electricity).

ISIC 3513 – Distribution of Electricity (distribution of hydropower electricity to end-users).

ISIC 4290 – Construction of Other Civil Engineering Projects (covers additional infrastructure construction, such as tunnels and water diversion systems).

ISIC 7210 – Research and Experimental Development on Natural Sciences and Engineering (focuses on R&D for improving hydropower technologies)."

» Other international or adapted Certifications & Standards

Generation of hydropower plants are to comply with the Ghana Standard Authority (GSA)

» Specific Government Policy (National Standards or Certification)

"Renewable Energy Act (Act 832), Renewable Energy Master Plan (REMP)"

» Responsible Agencies/ Regulators

Energy Commission

Electricity Company of Ghana

Hydogen Production and storage

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Low-Carbon Hydrogen Production

Criteria: Hydrogen production must be based on renewable energy sources (e.g., electrolysis using solar, wind, or hydropower) or carbon-neutral technologies. The carbon intensity of the hydrogen produced must be lower than 3 kg CO_2 per kilogram of hydrogen.

DNSH Consideration: Ensure that hydrogen production does not rely on fossil fuels unless carbon capture and storage (CCS) technologies are applied to minimize emissions. Avoid the use of gray hydrogen (produced from fossil fuels without CCS).

1.2 Sustainable Water Use

Criteria: Hydrogen production, particularly through electrolysis, must use water efficiently, prioritizing the use of non-potable water sources (e.g., seawater, recycled water). Water consumption must be minimized to avoid depletion of local water resources.

DNSH Consideration: Ensure that hydrogen production does not strain freshwater resources in areas facing water scarcity or cause harm to local ecosystems by diverting critical water flows.

1.3 Resource Efficiency and Material Use

Criteria: Hydrogen production and storage facilities must prioritize the use of sustainable and recyclable materials in the construction of production units, storage tanks, and related infrastructure.

DNSH Consideration: Avoid using materials that contribute to significant environmental degradation, such as rare-earth elements with high extraction impacts, unless they are sourced sustainably or recycled.

2. Greenhouse Gas Emissions Reduction

2.1 Contribution to Emissions Reduction

Criteria: Hydrogen production projects must contribute to reducing greenhouse gas (GHG) emissions, either through decarbonizing industrial processes, providing clean fuel for transportation, or integrating into renewable energy storage systems.

DNSH Consideration: Ensure that hydrogen production and storage do not result in significant emissions during construction, transportation, or operational phases, including indirect emissions related to the use of non-renewable energy for production.

2.2 Carbon Capture and Storage (CCS) for Blue Hydrogen

Criteria: For hydrogen produced from natural gas (blue hydrogen), CCS technology must capture at least 90% of associated CO_2 emissions to be considered a low-carbon option.

DNSH Consideration: Ensure that carbon capture systems are reliable, with secure long-term storage solutions to avoid emissions leaks into the atmosphere.

3. Energy Efficiency and System Performance

3.1 Energy Efficiency in Production

Criteria: Hydrogen production processes must be optimized for energy efficiency, particularly in electrolysis where energy input must be minimized relative to hydrogen output.

DNSH Consideration: Avoid inefficient production processes that result in excessive energy consumption, reducing the overall environmental benefits of hydrogen as a clean energy carrier.

3.2 Energy Efficiency in Storage

Criteria: Hydrogen storage systems must be designed to minimize energy losses during compression, liquefaction, or other storage methods, ensuring efficient energy retrieval during use.

DNSH Consideration: Ensure that storage systems do not contribute to significant energy losses, particularly during compression, transportation, or conversion.

4. Social and Community Benefits

4.1 Job Creation and Economic Development

Criteria: Hydrogen production and storage projects must create local employment opportunities, particularly in green technology sectors, contributing to economic development and the transition to a low-carbon economy.

DNSH Consideration: Ensure that labor practices comply with fair labor standards, offering safe working conditions, fair wages, and opportunities for local community involvement.

4.2 Community Health and Safety

Criteria: Hydrogen production and storage systems must ensure the safety of surrounding communities, particularly regarding fire risks, leak prevention, and air quality impacts. Safety measures must include hazard detection, emergency response plans, and safety training for operators.

DNSH Consideration: Ensure that storage facilities are located at a safe distance from populated areas, minimizing risks of accidents, explosions, or hazardous leaks.

5. Climate Resilience and Adaptation

5.1 Resilience to Climate Change

Criteria: Hydrogen production and storage facilities must be designed to withstand the impacts of climate change, including extreme weather events, temperature fluctuations, and natural disasters. The design should include climate-resilient materials and infrastructure.

DNSH Consideration: Ensure that infrastructure is not vulnerable to climate risks such as flooding, which could compromise hydrogen storage tanks or production facilities.

5.2 Infrastructure Durability and Safety

Criteria: Storage and transportation infrastructure must be designed with durable, corrosion-resistant materials to prevent leaks or ruptures over time, ensuring the safe and long-term storage of hydrogen.

DNSH Consideration: Avoid the use of low-quality materials or poorly designed infrastructure that could result in hydrogen leakage or environmental contamination.

6. Monitoring and Reporting

6.1 Continuous Monitoring of Environmental Impacts

Criteria: Hydrogen production and storage projects must include comprehensive monitoring systems to track water use, energy efficiency, emissions, and any environmental impacts throughout the project lifecycle.

DNSH Consideration: Ensure that monitoring systems are capable of identifying inefficiencies or environmental risks in real time, allowing for timely corrective measures.

6.2 Regular Reporting on Performance

Criteria: Projects must report regularly on their environmental and social performance, including metrics such as emissions reductions, energy efficiency, water use, and community benefits.

DNSH Consideration: Ensure transparency in reporting, with accurate data provided to regulators, stakeholders, and local communities.

7. Safety and Regulatory Compliance

7.1 Compliance with Safety Standards

Criteria: Hydrogen production and storage systems must adhere to all local and international safety standards, including those related to fire protection, leak detection, and pressure control systems.

DNSH Consideration: Ensure no significant harm by implementing rigorous safety protocols, including regular safety audits and the installation of fire suppression and leak detection systems.

7.2 Compliance with Environmental Regulations

Criteria: Hydrogen projects must comply with all relevant environmental regulations, including those related to water use, emissions, land use, and waste management, ensuring that the project aligns with both local and international environmental standards.

DNSH Consideration: Ensure full compliance with environmental laws and avoid shortcuts that could lead to environmental harm, such as improper disposal of materials or failure to manage emissions.

8. End-of-Life and Circular Economy Considerations

8.1 Circular Economy Integration

Criteria: Hydrogen production and storage systems must be designed to incorporate circular economy principles, such as reuse of materials, recycling of components, and the recovery of energy from by-products.

DNSH Consideration: Avoid designs that contribute to excessive waste or materials that cannot be recycled, leading to unnecessary environmental impacts at the end of the project's life cycle.

8.2 Safe Decommissioning and Recycling of Equipment

Criteria: Projects must have a clear plan for the safe decommissioning and recycling of equipment and infrastructure at the end of the project’s life, including storage tanks, electrolyzers, and pipelines.

DNSH Consideration: Ensure that decommissioned infrastructure is not disposed of in ways that lead to environmental pollution, such as leaving equipment in place to degrade or improper waste disposal."

» ISO Standards

1. Safety and Risk Management

ISO 19880-1: Gaseous Hydrogen – Fueling Stations – General Requirements

Application: Provides guidelines for the design, construction, and operation of hydrogen fueling stations, focusing on safety measures such as leak detection, ventilation, and emergency response systems. It is applicable to hydrogen storage and handling in various environments.

ISO/TR 15916: Basic Considerations for the Safety of Hydrogen Systems

Application: Offers general safety guidelines for hydrogen production, storage, and distribution, including risk assessment methods, safety design, and mitigation of hydrogen-related hazards such as leaks, fires, and explosions.

ISO 14687: Hydrogen Fuel – Product Specification

Application: Defines the quality specifications for hydrogen fuel used in fuel cells and other applications. It ensures that hydrogen produced for storage or energy use meets purity requirements to prevent damage to fuel cells and other systems.

ISO 16110-1: Hydrogen Generators Using Fuel Processing Technologies – Part 1: Safety

Application: Provides safety requirements for hydrogen generators using fuel processing technologies such as steam methane reforming or water electrolysis, ensuring safe production, handling, and storage of hydrogen.

ISO 26142: Hydrogen Detection Apparatus – Stationary Applications

Application: Covers the design and operation of hydrogen detection systems for stationary applications, such as hydrogen production and storage facilities. It ensures early detection of hydrogen leaks, minimizing safety risks.

2. Environmental Management

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing an environmental management system to monitor, reduce, and manage the environmental impacts of hydrogen production and storage, ensuring compliance with environmental regulations.

ISO 14040: Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of hydrogen production and storage across the entire life cycle, from raw material sourcing to production, operation, and disposal.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Offers guidelines to measure and reduce the carbon footprint of hydrogen production and storage systems, helping to ensure that hydrogen projects align with greenhouse gas (GHG) emissions reduction targets.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Provides a method to assess the water footprint of hydrogen production, particularly through electrolysis, ensuring that water use is efficient and does not contribute to local water scarcity or environmental degradation.

3. Energy Efficiency and Performance

ISO 50001: Energy Management Systems

Application: Provides a framework for improving energy efficiency in hydrogen production and storage systems, ensuring that energy inputs are optimized to minimize energy losses and maximize overall system efficiency.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Offers guidelines for conducting energy audits on hydrogen production and storage systems, identifying inefficiencies and areas for improvement to ensure optimal energy use and cost savings.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Assists in measuring and verifying energy performance in hydrogen production and storage, ensuring that the systems meet energy efficiency goals and improve over time.

4. Hydrogen Production and Storage Standards

ISO 22734: Hydrogen Generators Using Water Electrolysis – Industrial, Commercial, and Residential Applications

Application: Specifies the safety, performance, and operational requirements for hydrogen generators using water electrolysis, ensuring safe and efficient production of hydrogen from renewable energy sources.

ISO 14687-2: Hydrogen Fuel – Product Specification – Part 2: Proton Exchange Membrane (PEM) Fuel Cell Applications for Road Vehicles

Application: Provides quality specifications for hydrogen used in PEM fuel cells, ensuring that hydrogen production and storage systems provide hydrogen of sufficient purity for use in fuel cells, minimizing contamination risks.

ISO 16111: Transportable Gas Storage Devices – Hydrogen Absorbed in Reversible Metal Hydride

Application: Establishes the safety and performance requirements for transportable hydrogen storage systems using metal hydrides, ensuring safe storage, transportation, and handling of hydrogen in these systems.

ISO 19880-3: Gaseous Hydrogen – Fueling Stations – Valves

Application: Covers the requirements for the design, manufacture, testing, and use of valves used in hydrogen fueling and storage stations, ensuring safe control and management of hydrogen flow.

5. Materials and Resource Management
ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Provides a methodology to evaluate the flow of materials and costs throughout the hydrogen production and storage process, helping to identify areas where resource use can be optimized, and waste minimized.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Encourages designing hydrogen storage and production facilities for easy disassembly, recycling, and adaptability, supporting circular economy principles and minimizing environmental impacts at the end of the project lifecycle.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Ensures that packaging materials used in hydrogen production and storage projects are recyclable, supporting the reduction of waste generated during equipment transportation, construction, and maintenance.

6. End-of-Life Management and Recycling

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for effective communication of the environmental impacts and benefits of hydrogen production and storage projects, including recycling efforts, energy efficiency improvements, and emissions reductions.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Assists in evaluating and monitoring the environmental performance of hydrogen production and storage systems, including emissions, resource use, and recycling efforts, ensuring continuous improvement and sustainability.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Provides guidelines for assessing and reporting on investments in hydrogen production and storage projects, especially those financed through green bonds or sustainability-linked loans, ensuring alignment with climate action goals."

» ISICS Codes

1. Hydrogen Production

ISIC Code 2011: Manufacture of Basic Chemicals

Application: Includes the production of hydrogen through various processes, such as electrolysis, steam methane reforming (with or without carbon capture), and other chemical processes.

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: In cases where hydrogen is produced using renewable energy (green hydrogen), this code covers the generation and distribution of electricity needed for hydrogen production through electrolysis.

2. Hydrogen Storage and Transportation

ISIC Code 2812: Manufacture of Fluid Power Equipment

Application: Covers the manufacturing of storage systems, including tanks and high-pressure containers used for storing hydrogen in both liquid and gaseous forms.

ISIC Code 5210: Warehousing and Storage

Application: Includes the storage of hydrogen in specialized facilities, ensuring that hydrogen is stored under controlled conditions to prevent leaks and ensure safety.

ISIC Code 4930: Transport via Pipelines

Application: Covers the transportation of hydrogen through pipelines, an essential aspect of moving hydrogen from production sites to storage facilities or end-use locations.

ISIC Code 4923: Freight Transport by Road

Application: Involves the transportation of hydrogen in tankers or other specialized vehicles designed for the safe movement of compressed or liquefied hydrogen.

3. Manufacture of Equipment for Hydrogen Production and Storage

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Involves the manufacture of specialized machinery and equipment used for hydrogen production, such as electrolyzers, compressors, and related industrial machinery.

ISIC Code 2811: Manufacture of Engines and Turbines, Except Aircraft, Vehicle, and Cycle Engines

Application: Covers the manufacture of turbines and engines that can use hydrogen as a fuel source, as well as equipment used to convert hydrogen into electricity in power generation systems.

4. Research and Development for Hydrogen Technologies

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Includes research and development activities related to hydrogen production technologies, fuel cells, storage systems, and new methods of producing hydrogen from renewable sources.

5. Maintenance and Operation of Hydrogen Systems

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes engineering and technical consultancy services related to the design, construction, installation, and optimization of hydrogen production and storage facilities.

ISIC Code 8110: Combined Facilities Support Activities

Application: Covers maintenance and operational support services for hydrogen production and storage systems, ensuring that facilities operate safely and efficiently.

6. Environmental and Sustainability Consulting

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Includes consulting services related to the environmental and sustainability aspects of hydrogen production, including impact assessments, safety evaluations, and lifecycle analysis of hydrogen systems.

7. Waste Management and Recycling of Hydrogen Systems

ISIC Code 3830: Materials Recovery

Application: Involves the recycling and recovery of materials from decommissioned hydrogen systems, including the extraction and reuse of metals and other materials used in hydrogen production and storage equipment.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Covers the management and disposal of waste generated from hydrogen production processes, such as by-products from electrolysis or steam reforming, ensuring environmentally sound practices.

» Other international or adapted Certifications & Standards

Projects are required to comply with international best guideliness on environmental , health and safety (EHS) for geothermal energy generation. Emmissions performance is required for Climate Bonds certification.

ISO 14001 certification.

» Specific Government Policy (National Standards or Certification)

Renewable Energy Act (Act 832) ,

Renewable Energy Master Plan (REMP)

Geothermal energy projects

involve harnessing heat from the Earth's interior to generate electricity or provide heating and cooling. These projects contribute to renewable energy goals, reduce greenhouse gas emissions, and can provide a stable and reliable energy source.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Climate Change Mitigation

Criteria: Geothermal energy projects must contribute to reducing greenhouse gas (GHG) emissions compared to fossil fuel-based energy sources. The project should demonstrate significant carbon savings over its lifetime.

DNSH Consideration: Ensure that the extraction and use of geothermal energy do not result in significant GHG emissions, such as methane leaks from geothermal wells.

1.2 Protection of Natural Habitats and Biodiversity

Criteria: Geothermal projects must avoid locations that are critical for biodiversity, including protected areas and ecologically sensitive regions.

DNSH Consideration: Ensure that the drilling and installation of geothermal plants do not disrupt local ecosystems, habitats, or species, particularly endangered or vulnerable species.

1.3 Groundwater and Surface Water Protection

Criteria: The project must implement measures to protect groundwater and surface water resources from contamination during drilling, extraction, and reinjection processes.

DNSH Consideration: Avoid significant harm by ensuring that geothermal fluids are handled responsibly and that there is no contamination of freshwater resources, either through surface spills or subsurface leaks.

1.4 Land Use and Soil Conservation

Criteria: The project must use land efficiently, minimizing disruption to natural landscapes and ecosystems. Where possible, projects should aim for compact design and limit land use to already developed or degraded areas.

DNSH Consideration: Ensure no significant harm to soil quality, avoid deforestation, and prevent erosion or land degradation from project development activities.

2. Resource Efficiency and Energy Use

2.1 High Energy Efficiency

Criteria: Geothermal projects must demonstrate a high energy conversion efficiency (ratio of energy output to energy input) to maximize the use of geothermal resources.

DNSH Consideration: Avoid the inefficient use of geothermal resources, which could lead to resource depletion or unnecessarily high environmental impacts.

2.2 Sustainable Water Use

Criteria: Geothermal projects must optimize water use, employing closed-loop systems where feasible to minimize water consumption. The project should use sustainable water sources and avoid competition with local communities for freshwater.

DNSH Consideration: Avoid excessive water withdrawal that could lead to the depletion of local water sources, especially in areas prone to drought or water scarcity.

2.3 Resource Conservation

Criteria: Projects must reinject geothermal fluids back into the Earth after use to maintain reservoir pressure and sustainability of the geothermal resource.

DNSH Consideration: Ensure no significant harm by preventing the depletion of geothermal resources or creating subsurface voids that could lead to geological instability.

3. Social and Community Benefits

3.1 Local Employment and Economic Development

Criteria: Geothermal projects must contribute to local economic development by creating jobs, particularly during the construction, operation, and maintenance phases. The project should prioritize hiring from local communities.

DNSH Consideration: Ensure that the project does not displace local populations or disrupt livelihoods. Labor practices must comply with fair labor standards, ensuring safety and inclusivity.

3.2 Community Health and Safety

Criteria: Projects must ensure that geothermal energy extraction does not pose risks to community health and safety, such as through the release of toxic gases or the risk of seismic activity.

DNSH Consideration: Avoid significant harm by conducting thorough risk assessments for seismic activity (induced earthquakes), air pollution, and other environmental hazards, ensuring mitigation measures are in place.

3.3 Community Engagement and Benefit Sharing

Criteria: The project must engage local communities in the planning and development stages, ensuring that the benefits of the project are shared with the affected communities, including access to cheaper or more reliable energy.

DNSH Consideration: Ensure no harm to community relations by avoiding forced relocations or the imposition of project activities without informed consent and benefit sharing.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate Change

Criteria: Geothermal energy projects must be designed to operate reliably in the face of changing climate conditions, such as increased temperatures, droughts, or more frequent extreme weather events.

DNSH Consideration: Ensure that the project does not increase vulnerability to climate impacts, such as exacerbating water scarcity in drought-prone regions.

4.2 Infrastructure Durability and Reliability

Criteria: Geothermal plants and related infrastructure must be designed to be durable and resilient to environmental hazards such as earthquakes, landslides, and flooding.

DNSH Consideration: Ensure that the project does not compromise public safety or environmental integrity due to poor structural resilience or improper site selection.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Environmental Impacts

Criteria: Geothermal energy projects must include comprehensive monitoring systems to track environmental impacts, such as emissions, water use, and potential seismic activity.

DNSH Consideration: Ensure that real-time monitoring data is used to mitigate any negative environmental effects promptly, including pollution or seismic activity.

5.2 Regular Reporting of Social and Environmental Performance

Criteria: Projects must report regularly on their environmental and social performance, including metrics related to energy production efficiency, water use, emissions reduction, and community benefits.

DNSH Consideration: Ensure transparency and accountability through public reporting, avoiding misrepresentation or greenwashing of project impacts.

6. Compliance with Environmental and Safety Standards

6.1 Adherence to Environmental Regulations

Criteria: Geothermal projects must comply with all local, national, and international environmental regulations, including those related to emissions, water use, and ecosystem protection.

DNSH Consideration: Ensure no significant harm by strictly following regulatory requirements and avoiding illegal practices or cutting corners in environmental compliance.

6.2 Safety Standards for Workers and Communities

Criteria: Projects must adhere to occupational health and safety standards, ensuring that workers and nearby communities are protected from the potential hazards associated with geothermal energy extraction, such as exposure to toxic gases or equipment-related risks.

DNSH Consideration: Ensure no harm by implementing rigorous safety protocols and emergency response plans for potential hazards such as gas leaks, well blowouts, or seismic events.

7. Waste Management and Pollution Control

7.1 Safe Disposal of By-products

Criteria: Geothermal projects must implement safe disposal methods for by-products, such as geothermal brine, minerals, and gases, ensuring that they do not contaminate the environment.

DNSH Consideration: Ensure that waste disposal processes do not result in water, soil, or air pollution, particularly in sensitive ecosystems or populated areas.

7.2 Emission Control

Criteria: The project must implement technologies and practices that minimize the release of air pollutants, including sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and carbon dioxide (CO_2).

DNSH Consideration: Avoid significant harm by ensuring emissions are kept within legal limits and that gas releases are managed effectively.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing environmental management systems to monitor, reduce, and manage environmental impacts during the lifecycle of geothermal energy projects, ensuring compliance with environmental objectives.

ISO 14040: Environmental Management – Life Cycle Assessment (LCA) – Principles and Framework

Application: Helps geothermal projects assess their environmental impacts over the entire lifecycle, from exploration and drilling to operation and decommissioning, identifying areas to reduce their environmental footprint.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines to assess the water footprint of geothermal projects, ensuring responsible water use and protection of water resources, particularly in water-scarce regions.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in quantifying and reducing the carbon footprint of geothermal energy production, helping to mitigate greenhouse gas emissions and improve the sustainability of geothermal operations.

2. Energy Efficiency and Performance

ISO 50001: Energy Management Systems

Application: Offers a framework for improving energy efficiency in geothermal energy operations, helping to optimize energy conversion and reduce energy losses throughout the production process.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Provides guidelines for conducting energy audits in geothermal plants, identifying areas for improving energy efficiency and ensuring optimal energy output with minimal waste.

ISO 50006: Energy Management Systems – Measuring Energy Performance

Application: Helps geothermal projects measure, analyze, and improve their energy performance, ensuring continuous improvement in energy management and maximizing energy output.

3. Water and Resource Management

ISO 46001: Water Efficiency Management Systems

Application: Provides guidance for optimizing water use in geothermal energy projects, helping to minimize water consumption, manage geothermal fluids, and reduce water pollution risks.

ISO 24516-1: Guidelines for the Management of Water and Wastewater Utilities

Application: Assists geothermal projects in managing water resources and wastewater systems, ensuring efficient use of water for cooling, reinjection, and other operational purposes, while protecting local water systems.

4. Geological and Environmental Risk Management

ISO 31000: Risk Management – Principles and Guidelines

Application: Provides a comprehensive approach to identifying and managing risks associated with geothermal energy projects, including geological risks (e.g., seismicity, subsidence), environmental impacts, and operational risks.

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Helps geothermal energy projects integrate climate resilience measures, ensuring that projects can adapt to the potential impacts of climate change, such as changes in groundwater levels, increased temperatures, or extreme weather events.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Assists geothermal projects in assessing their vulnerability to climate change and other environmental risks, ensuring that adaptation strategies are incorporated into project design and operation.

5. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides a framework for geothermal projects to operate in a socially responsible manner, ensuring that community engagement, fair labor practices, and benefit-sharing mechanisms are incorporated into project planning and development.

ISO 45001: Occupational Health and Safety Management Systems

Application: Ensures geothermal energy projects protect the health and safety of workers and nearby communities by implementing comprehensive safety management systems, particularly during drilling, extraction, and operational phases.

6. Monitoring, Reporting, and Transparency

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Provides guidelines for evaluating the environmental performance of geothermal projects, including water use, emissions, land use, and resource consumption, ensuring continuous monitoring and improvement.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Assists geothermal projects in effectively communicating their environmental performance and sustainability metrics to stakeholders, including regulators, investors, and local communities, ensuring transparency.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Helps geothermal projects assess and report the impact of green investments, including sustainability-linked loans or green bonds, ensuring alignment with climate mitigation goals and responsible financing.

7. Emission and Waste Management

ISO 14064-1: Greenhouse Gases – Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

Application: Helps geothermal projects measure and report their greenhouse gas emissions, including direct emissions from operations and indirect emissions from energy use, ensuring compliance with emissions reduction targets.

ISO 14065: Requirements for Greenhouse Gas Validation and Verification Bodies

Application: Assists geothermal projects in obtaining third-party verification of their greenhouse gas emissions data, ensuring credibility and transparency in reporting emissions performance.

ISO 14004: Environmental Management Systems – General Guidelines on Principles, Systems, and Support Techniques

Application: Provides guidelines for the systematic implementation of waste management and pollution control strategies within geothermal projects, ensuring the responsible disposal of by-products, such as geothermal fluids and gases.

8. Sustainable Infrastructure and Construction

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works

Application: Offers methods for assessing the sustainability of infrastructure used in geothermal projects, including site development, drilling facilities, and plant construction, ensuring minimal environmental impact.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Assists in designing geothermal infrastructure to be adaptable, durable, and sustainable over the long term, reducing the environmental footprint of construction and future decommissioning.

» ISICS Codes

1. Electricity Generation from Geothermal Energy

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: This covers the generation, transmission, and distribution of electricity from all sources, including geothermal energy. It includes activities such as building and operating geothermal power plants.

ISIC Code 3511: Production of Electricity

Application: Specifically applies to the production of electricity, including from renewable sources such as geothermal energy. It encompasses the conversion of geothermal heat into electricity.

2. Drilling and Well Construction

ISIC Code 4290: Construction of Other Civil Engineering Projects

Application: Covers the construction of specialized infrastructure, such as geothermal wells and other civil engineering projects required for geothermal energy exploration and extraction.

ISIC Code 4312: Site Preparation

Application: Involves site preparation activities for geothermal energy projects, including drilling and well construction, and clearing or leveling of land for geothermal installations.

3. Geological Surveying and Exploration

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes geological surveying, exploration, and consulting services necessary for identifying geothermal resources. It also covers engineering services related to the design and construction of geothermal facilities.

ISIC Code 0990: Support Activities for Other Mining and Quarrying

Application: Covers activities that support geothermal energy exploration, including geological surveys, drilling, and exploratory activities to assess geothermal resource availability.

4. Water and Steam Supply for Geothermal Projects

ISIC Code 3530: Steam and Air Conditioning Supply

Application: Includes the supply of steam and geothermal heat for industrial and residential heating, cooling, and other uses. This code covers geothermal district heating systems.

5. Maintenance and Operation of Geothermal Facilities

ISIC Code 8110: Combined Facilities Support Activities

Application: Includes the provision of support services for operating and maintaining geothermal plants, such as facilities management, safety monitoring, and operational efficiency improvement.

ISIC Code 7120: Technical Testing and Analysis

Application: Covers services related to technical testing and analysis of geothermal systems, including environmental impact assessments, performance monitoring, and testing for emissions control.

6. Environmental and Sustainability Consulting

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Includes consulting services focused on environmental sustainability, impact assessments, emissions reductions, and compliance with environmental regulations related to geothermal projects.

7. Waste Management and Pollution Control

ISIC Code 3821: Treatment and Disposal of Non-Hazardous Waste

Application: Covers the treatment and disposal of non-hazardous waste generated during geothermal energy production, including geothermal brine management and disposal of by-products.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Involves activities related to the management of geothermal waste, including the cleanup of contaminated sites, reinjection of geothermal fluids, and management of pollutants from geothermal operations.

8. Manufacture of Equipment for Geothermal Projects

ISIC Code 2811: Manufacture of Engines and Turbines, Except Aircraft, Vehicle, and Cycle Engines

Application: Includes the manufacture of turbines and engines used in geothermal power plants to convert geothermal heat into electricity.

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Covers the manufacture of specialized machinery used in geothermal plants, such as drilling equipment, heat exchangers, and other equipment necessary for geothermal energy production.

» Other international or adapted Certifications & Standards

GH2 accreditation and certification

» Specific Government Policy (National Standards or Certification)

National Energy Policy 2021

» Responsible Agencies/ Regulators

Energy Commission

Battery storage technologies for renewable energy

play a crucial role in enhancing the efficiency and reliability of renewable energy systems, such as solar and wind power. These technologies enable energy storage when generation is high and distribution when demand increases, thus addressing the intermittency challenges of renewable energy.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Renewable Energy Integration

Criteria: Battery storage systems must support the integration of renewable energy into the grid by enabling energy storage and distribution, thereby maximizing the use of renewable energy sources like solar, wind, and hydropower.

DNSH Consideration: Ensure that battery storage systems are used primarily to store and distribute renewable energy, not energy derived from non-renewable or high-carbon sources.

1.2 Sustainable Materials Sourcing

Criteria: Projects must prioritize the use of sustainably sourced, recycled, or low-impact materials in battery production. This includes reducing reliance on conflict minerals or materials with significant environmental impacts.

DNSH Consideration: Ensure that materials used in battery storage systems do not contribute to significant environmental degradation or social harm, such as deforestation, human rights abuses, or biodiversity loss.

1.3 Emissions Reduction

Criteria: Battery storage systems must demonstrably contribute to reducing greenhouse gas (GHG) emissions by supporting the integration and stability of renewable energy, reducing the need for fossil-fuel-based backup power.

DNSH Consideration: Ensure that the deployment of battery storage does not increase emissions through inefficient energy use or support for non-renewable power sources.

2. Resource Efficiency and Waste Management

2.1 Energy Efficiency

Criteria: Battery storage systems must be designed to maximize energy efficiency, minimizing energy losses during charging, storage, and discharging.

DNSH Consideration: Avoid significant energy losses during operation that would reduce the overall efficiency and environmental benefits of renewable energy integration.

2.2 End-of-Life Management and Recycling

Criteria: Battery storage systems must include provisions for responsible end-of-life management, including recycling, reuse, or safe disposal of battery components to minimize environmental impacts.

DNSH Consideration: Ensure that waste from decommissioned batteries is not improperly disposed of in landfills or incinerated, leading to air or soil pollution.

2.3 Water and Resource Conservation

Criteria: Battery storage projects must minimize water use in battery production and cooling systems and ensure responsible use of critical raw materials such as lithium, cobalt, and nickel.

DNSH Consideration: Ensure that water and resource consumption does not deplete local resources or contribute to environmental degradation in sensitive areas.

3. Social and Community Benefits

3.1 Access to Clean Energy

Criteria: Battery storage technologies must enhance access to reliable and affordable clean energy for local communities, particularly in off-grid or underserved areas.

DNSH Consideration: Ensure that the deployment of battery storage systems does not disproportionately benefit affluent regions while leaving underserved communities with limited access to clean energy.

3.2 Job Creation and Economic Development

Criteria: Battery storage projects must contribute to local economic development by creating jobs in manufacturing, installation, and maintenance, with a focus on building local capacity in green technology sectors.

DNSH Consideration: Ensure that labor practices comply with fair labor standards, including safety regulations, fair wages, and inclusion of local workers.

3.3 Community Health and Safety

Criteria: Projects must ensure that battery storage systems are installed and operated safely, with no risks to community health from potential hazards such as battery leaks, fire risks, or exposure to harmful chemicals.

DNSH Consideration: Avoid installing battery storage systems in ways that pose significant risks to nearby populations, such as siting them in densely populated areas without proper safety measures.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate Change

Criteria: Battery storage systems must be designed to withstand the impacts of climate change, including extreme temperatures, humidity, and weather events, ensuring reliable operation under varying climate conditions.

DNSH Consideration: Ensure that battery systems are not vulnerable to climate-related risks, such as flooding, overheating, or storms, which could compromise performance or cause damage.

4.2 Infrastructure Durability

Criteria: Projects must use durable, weather-resistant materials and designs to ensure the long-term functionality of battery storage systems in the face of environmental stressors.

DNSH Consideration: Ensure that infrastructure choices do not lead to increased vulnerability to climate impacts or require frequent maintenance or replacement due to poor design.

5. Monitoring and Reporting

5.1 Continuous Monitoring of System Performance

Criteria: Battery storage systems must include real-time monitoring of energy storage, discharge rates, efficiency, and environmental impacts to ensure optimal performance and quick responses to potential issues.

DNSH Consideration: Ensure that monitoring systems are accurate, transparent, and capable of detecting inefficiencies, emissions, or environmental hazards in real time.

5.2 Reporting on Environmental and Social Performance

Criteria: Projects must report regularly on the environmental and social impacts of battery storage systems, including energy efficiency, emissions reduction, and community benefits.

DNSH Consideration: Ensure that reporting is transparent and credible, avoiding the risk of greenwashing or misrepresentation of environmental and social outcomes.

6. Safety and Regulatory Compliance

6.1 Adherence to Safety Standards

Criteria: Battery storage projects must comply with all local and international safety standards, ensuring that battery systems are installed and operated without risk of fires, leaks, or electrical hazards.

DNSH Consideration: Ensure no significant harm by implementing rigorous safety protocols, including fire suppression systems and regular safety audits.

6.2 Compliance with Environmental Regulations

Criteria: Battery storage systems must comply with environmental regulations related to emissions, waste management, and resource use, ensuring alignment with local, national, and international standards.

DNSH Consideration: Avoid any non-compliance with environmental regulations, particularly those related to hazardous waste management and emissions.

7. Battery Technology and Innovation

7.1 Use of Advanced Battery Technologies

Criteria: Projects should use advanced battery technologies, such as solid-state batteries or lithium-ion systems, that offer higher energy density, longer life cycles, and lower environmental impacts.

DNSH Consideration: Ensure that the choice of battery technology does not contribute to environmental degradation or pose significant safety risks.

7.2 Innovation and Research

Criteria: Projects must support innovation in battery storage technologies, such as improving energy storage capacity, enhancing charge/discharge efficiency, and developing environmentally friendly battery materials.

DNSH Consideration: Ensure that research and development activities do not result in harmful environmental consequences, such as high waste generation or reliance on toxic materials.

8. End-of-Life and Circular Economy Considerations

8.1 Circular Economy Integration

Criteria: Battery storage systems must be designed to integrate circular economy principles, such as modular designs for easier repair and disassembly, and the reuse of materials in new battery systems.

DNSH Consideration: Ensure that systems are not designed with planned obsolescence in mind, leading to unnecessary waste and resource depletion.

8.2 Safe Disposal and Recycling of Battery Components

Criteria: Battery storage projects must have clear plans for the safe disposal and recycling of battery components at the end of their lifecycle, prioritizing recovery and reuse of critical materials.

DNSH Consideration: Ensure no harm by avoiding the disposal of batteries in a way that leads to soil, water, or air pollution from hazardous substances.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing environmental management systems to minimize the environmental impact of battery storage systems throughout their lifecycle, from production to operation and disposal.

ISO 14040: Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of battery storage technologies, including raw material extraction, production, use, and end-of-life disposal, ensuring sustainable resource management.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Provides a method to measure the carbon footprint of battery storage systems, including emissions from production, operation, and disposal, helping to reduce overall greenhouse gas emissions.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Helps assess the water use and its environmental impacts throughout the lifecycle of battery storage systems, ensuring efficient water use and minimizing water pollution.

2. Energy Efficiency and Performance

ISO 50001: Energy Management Systems

Application: Offers a framework for improving the energy efficiency of battery storage systems, ensuring that they operate efficiently and support the integration of renewable energy into the grid.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Provides guidelines for conducting energy audits on battery storage systems, helping identify inefficiencies and areas for improvement in energy storage and conversion.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance of Organizations

Application: Supports the measurement and verification of the energy performance of battery storage projects, ensuring accurate tracking of energy efficiency improvements.

3. Safety and Risk Management

ISO 45001: Occupational Health and Safety Management Systems

Application: Ensures that battery storage systems are designed and operated safely, protecting workers and communities from hazards such as battery leaks, fires, and exposure to harmful chemicals.

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for managing the risks associated with battery storage technologies, including safety risks, environmental risks, and operational risks, ensuring a safe and resilient system.

ISO 21498-1: Electrically Propelled Road Vehicles – Electrical Specifications and Tests for Battery Systems

Application: Covers the safety and testing requirements for battery systems, particularly for lithium-ion batteries used in electric vehicles and stationary energy storage, ensuring compliance with safety standards.

4. Battery Technology and Performance Standards

ISO 62660-1: Secondary Lithium-Ion Cells for the Propulsion of Electric Road Vehicles – Part 1: Performance Testing

Application: Provides performance testing standards for lithium-ion batteries, ensuring that battery storage systems used for renewable energy storage meet high standards of energy efficiency, durability, and safety.

ISO 12405-4: Electrically Propelled Road Vehicles – Test Specification for Lithium-Ion Traction Battery Packs and Systems

Application: Establishes the testing requirements for lithium-ion batteries used in energy storage, focusing on performance, safety, and reliability in various conditions.

ISO 18243: Electrically Propelled Vehicles – Test Specification for Lithium-Ion Battery Systems for Stationary Applications

Application: Focuses on lithium-ion battery systems used in stationary applications, such as renewable energy storage, ensuring safety, performance, and reliability under operational conditions.

5. Materials and Resource Management

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Helps identify the flow of materials and costs within battery production, promoting resource efficiency and reducing waste in battery manufacturing and operation.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Provides guidelines for designing battery systems for easy disassembly and recycling, supporting circular economy principles by ensuring that components can be reused or recycled at the end of their lifecycle.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Applies to battery storage systems' packaging and related materials, ensuring that they can be recycled and reused, minimizing waste generation and promoting sustainability.

6. End-of-Life Management and Recycling

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Assists in communicating the environmental impacts and benefits of battery storage systems to stakeholders, including recycling efforts, sustainability initiatives, and energy savings.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Provides a framework for evaluating and monitoring the environmental performance of battery storage systems, including resource use, emissions, and end-of-life disposal, ensuring continuous improvement.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Supports the assessment and reporting of investments in battery storage projects, particularly those financed through green bonds, ensuring alignment with climate mitigation and adaptation goals.

7. Circular Economy and Sustainability

ISO 14021: Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labeling)

Application: Provides guidelines for making environmental claims about the sustainability of battery storage systems, such as recyclability, energy efficiency, or carbon neutrality, ensuring accurate and reliable communication.

ISO 14055-1: Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification

Application: Ensures that the sourcing of materials for battery storage systems does not contribute to land degradation or deforestation, particularly in mining for critical battery materials such as lithium or cobalt.

ISO 14080: Greenhouse Gas Management and Related Activities – Framework and Principles for Methodologies on Climate Actions

Application: Provides a framework for identifying, developing, and implementing climate actions in battery storage projects, supporting low-carbon development and emissions reduction.

8. Water and Resource Efficiency

ISO 46001: Water Efficiency Management Systems

Application: Offers a framework for managing water resources efficiently during the production, operation, and cooling of battery storage systems, ensuring responsible water use and conservation.

» ISICS Codes

1. Manufacture of Batteries and Storage Devices

ISIC Code 2720: Manufacture of Batteries and Accumulators

Application: Covers the manufacturing of battery storage systems, including rechargeable lithium-ion batteries, lead-acid batteries, and other types of energy storage devices used for renewable energy applications.

2. Manufacture of Electrical Equipment

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Includes the manufacture of electrical equipment used in battery storage systems, such as transformers, electrical converters, and distribution systems for energy storage and management.

ISIC Code 2790: Manufacture of Other Electrical Equipment

Application: Covers the manufacture of additional electrical components and systems related to battery storage, including energy management systems, inverters, and power control units used in renewable energy integration.

3. Installation and Operation of Battery Storage Systems

ISIC Code 4321: Electrical Installation

Application: Involves the installation of battery storage systems and related electrical equipment in renewable energy projects, such as solar farms, wind farms, or hybrid energy systems.

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes engineering and consultancy services related to the design, installation, and optimization of battery storage systems, including feasibility studies, system design, and performance optimization for energy storage projects.

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Covers the operation of battery storage systems as part of electricity generation and distribution networks, ensuring the integration of stored energy into the power grid from renewable sources.

4. Maintenance and Management of Battery Systems

ISIC Code 8110: Combined Facilities Support Activities

Application: Includes maintenance services for battery storage systems, such as monitoring, performance optimization, and repair of energy storage units used in renewable energy installations.

ISIC Code 7120: Technical Testing and Analysis

Application: Covers services related to testing and analyzing battery storage systems' performance, safety, and efficiency, ensuring their proper functioning and compliance with technical standards.

5. Research and Development for Battery Technologies

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves research and development activities focused on improving battery storage technologies, enhancing energy efficiency, developing new battery chemistries, and finding sustainable materials for energy storage.

6. Waste Management and Recycling of Batteries

ISIC Code 3830: Materials Recovery

Application: Covers the recycling and recovery of materials from end-of-life batteries, including the extraction of valuable metals like lithium, cobalt, and nickel, to support circular economy principles in energy storage technologies.

ISIC Code 3821: Treatment and Disposal of Non-Hazardous Waste

Application: Involves the safe treatment and disposal of non-hazardous battery waste, ensuring that decommissioned batteries are disposed of or recycled in an environmentally friendly manner.

7. Storage and Distribution of Energy

ISIC Code 3512: Transmission of Electricity

Application: Refers to the transmission of electricity, including electricity stored in battery storage systems and distributed to the power grid, contributing to energy reliability and stability.

ISIC Code 3513: Distribution of Electricity

Application: Involves the distribution of electricity from battery storage systems to consumers, ensuring a steady and reliable supply of energy, especially from renewable energy sources.

» Other international or adapted Certifications & Standards

UL 1973, IEC 62619,

ISO 9001, ISO 14001,

CE and UL 9540A

certifications are all important

certifications to consider when

purchasing energy storage batteries.

» Specific Government Policy (National Standards or Certification)

National Energy Policy 2021

» Responsible Agencies/ Regulators

Energy Commission

Energy Efficiency and Clean Energy Technologies

Retrofitting buildings for energy efficiency involves upgrading existing buildings to improve their energy performance, reduce energy consumption, and lower greenhouse gas emissions. This process can include enhancements to insulation, heating, ventilation, air conditioning (HVAC) systems, lighting, and the building envelope, among other aspects.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Energy Efficiency and Emissions Reduction

Criteria: The retrofitting project must achieve a significant improvement in energy efficiency, reducing energy consumption by at least 30% compared to the building's pre-retrofit energy use. The retrofit should result in lower greenhouse gas emissions and comply with national or local energy efficiency standards.

DNSH Consideration: Ensure that energy efficiency improvements do not lead to rebound effects where energy savings are offset by increased energy use elsewhere in the building.

1.2 Sustainable Materials Use

Criteria: The materials used in retrofitting, such as insulation, windows, and HVAC systems, must be sustainably sourced, durable, and recyclable where possible. Preference should be given to low-impact materials, including those with lower embodied carbon.

DNSH Consideration: Avoid the use of materials that contribute to significant environmental degradation or have high carbon footprints, such as non-recyclable plastics or hazardous substances.

1.3 Waste Minimization and Recycling

Criteria: The retrofitting process must prioritize waste minimization, with clear plans for reusing, recycling, or safely disposing of construction materials. This includes recycling old building materials like glass, metal, and insulation where feasible.

DNSH Consideration: Ensure that waste management practices avoid environmental harm, such as improper disposal of hazardous materials, and minimize the volume of waste sent to landfills.

2. Energy Efficiency and System Performance

2.1 Improved Building Envelope Performance

Criteria: Retrofitting must significantly improve the thermal performance of the building envelope (walls, roof, windows, and doors). The goal is to reduce heat loss in winter and heat gain in summer, thus reducing the need for heating and cooling.

DNSH Consideration: Ensure that any modifications to the building envelope do not compromise structural integrity or lead to unintended consequences, such as moisture build-up and mold.

2.2 High-Efficiency HVAC Systems

Criteria: Retrofitted buildings must use energy-efficient HVAC systems, including heating, cooling, and ventilation. The systems must meet or exceed national or international energy efficiency standards and be properly sized to meet the building's needs.

DNSH Consideration: Avoid installing oversized HVAC systems, which can lead to inefficiency and higher energy use. The system should be designed for optimal performance based on the building's specific energy needs.

2.3 Energy-Efficient Lighting and Appliances

Criteria: The retrofit must include the installation of energy-efficient lighting (such as LED lighting) and energy-efficient appliances with low energy consumption. Lighting should also incorporate automatic controls, such as daylight sensors or timers, to further reduce energy use.

DNSH Consideration: Ensure that energy-efficient appliances and lighting systems are properly installed and maintained to avoid performance degradation over time.

3. Social and Community Benefits

3.1 Health and Comfort Improvements

Criteria: Retrofitting must improve indoor environmental quality, including air quality, thermal comfort, and lighting. Ventilation systems must ensure adequate fresh air circulation, and building modifications should prevent the build-up of indoor pollutants.

DNSH Consideration: Ensure that the retrofit does not inadvertently reduce indoor air quality or introduce hazardous materials, such as low-quality insulation or paints containing harmful chemicals.

3.2 Job Creation and Local Economic Development

Criteria: Retrofitting projects must create local employment opportunities, particularly in skilled trades such as construction, HVAC installation, and electrical work. The project should prioritize hiring local workers and contractors.

DNSH Consideration: Ensure that the workforce is provided with safe working conditions, fair wages, and opportunities for training in energy-efficient building practices.

3.3 Social Equity and Inclusivity

Criteria: Retrofit projects should consider the needs of vulnerable or marginalized populations, ensuring equitable access to energy-efficient buildings. Retrofitted buildings in low-income areas should offer affordable energy bills and improved living conditions for residents.

DNSH Consideration: Ensure that retrofitting projects do not lead to increased rents or displace existing tenants, particularly in low-income housing developments.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Design

Criteria: The retrofitting project must incorporate climate-resilient design elements, ensuring that the building can withstand extreme weather events such as heatwaves, storms, and flooding. This may include flood-proofing measures, increased insulation, or heat-reflective materials.

DNSH Consideration: Ensure that retrofitting does not increase the building's vulnerability to climate risks or lead to new risks, such as insufficient drainage or poor roof design.

4.2 Adaptability for Future Energy Systems

Criteria: Retrofitted buildings should be designed with future adaptability in mind, allowing for the integration of renewable energy systems such as solar panels or energy storage in the future. Buildings should also support the use of smart grid technology and energy monitoring systems.

DNSH Consideration: Ensure that the retrofit does not lock the building into outdated technologies or prevent future upgrades to improve energy performance.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Energy Performance

Criteria: The retrofitted building must include systems for continuously monitoring energy consumption, temperature, and indoor air quality. Building performance should be regularly evaluated to ensure that energy efficiency improvements are sustained over time.

DNSH Consideration: Ensure that monitoring systems are properly installed and maintained, avoiding issues such as inaccurate data collection or failure to identify performance issues early.

5.2 Reporting on Environmental and Social Performance

Criteria: Projects must report regularly on the environmental and social performance of retrofitted buildings, including metrics such as energy savings, emissions reductions, and improvements in occupant comfort. Reports should be transparent and publicly accessible.

DNSH Consideration: Ensure accurate reporting to avoid greenwashing or misrepresenting the benefits of the retrofit project.

6. Safety and Regulatory Compliance

6.1 Compliance with Building and Safety Standards

Criteria: Retrofitted buildings must comply with all relevant building codes and safety standards, ensuring that structural, electrical, and mechanical systems are safe and reliable. This includes compliance with fire safety regulations and seismic standards where applicable.

DNSH Consideration: Ensure that retrofitting does not compromise the building's safety or lead to unintended risks, such as electrical faults or fire hazards.

6.2 Adherence to Environmental Regulations

Criteria: Retrofit projects must adhere to national and local environmental regulations, including those related to emissions, waste management, and energy efficiency. Environmental impact assessments (EIAs) should be conducted as necessary.

DNSH Consideration: Ensure that all environmental laws are followed, particularly regarding the disposal of hazardous materials or the treatment of building waste.

7. End-of-Life and Circular Economy Considerations

7.1 Circular Economy Integration

Criteria: Retrofitting projects must incorporate circular economy principles, such as using recyclable and reusable materials, minimizing waste, and designing for future disassembly. Retrofitting should extend the building's life cycle, reducing the need for demolition.

DNSH Consideration: Ensure that retrofitting does not generate excessive waste and that materials are properly recycled or reused at the end of the building's life.

7.2 Safe Decommissioning

Criteria: A decommissioning plan must be in place to safely remove or replace retrofitted systems at the end of their useful life. This includes safely disposing of or recycling insulation, HVAC systems, and other building components.

DNSH Consideration: Ensure that decommissioning activities do not lead to environmental harm, such as improper disposal of materials or contamination of land and water sources.

» ISO Standards

1. Energy Performance and Efficiency Standards

ISO 52000-1: Energy Performance of Buildings – Overarching EPB Framework

Application: Provides a framework for assessing the energy performance of buildings. This standard includes criteria for determining energy efficiency improvements in retrofitted buildings and calculating energy use and savings from the retrofit.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Offers a framework for improving energy performance in buildings through retrofitting, helping building owners implement systems that enhance energy efficiency while continuously reducing energy consumption.

ISO 50002: Energy Audits

Application: Provides guidelines for conducting energy audits, which are essential before and after retrofitting a building. This standard helps identify areas for energy efficiency improvements and verifies the impact of retrofitting efforts on energy consumption.

ISO 12655: Energy Performance of Buildings – Presentation of Measured Energy Use of Buildings

Application: Specifies methods for measuring and presenting energy use in buildings, which is critical for assessing the effectiveness of retrofitting projects and tracking energy savings over time.

ISO 16346: Energy Performance of Buildings – Assessment of Overall Energy Performance

Application: Provides a methodology for assessing the overall energy performance of buildings after retrofitting. It helps ensure that retrofitting achieves significant energy efficiency improvements in line with performance goals.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing an environmental management system, ensuring that retrofitting projects minimize their environmental impacts, including resource use, waste generation, and emissions.

ISO 14040: Life Cycle Assessment – Principles and Framework

Application: Assists in assessing the environmental impacts of retrofitting projects across the building's life cycle, from material sourcing and construction to operation and decommissioning, ensuring the sustainability of retrofitting measures.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Offers guidelines to measure the carbon footprint of building materials and retrofitting processes, helping reduce emissions associated with the retrofit and ensuring compliance with low-carbon building targets.

ISO 14046: Environmental Management – Water Footprint

Application: Helps assess and minimize water use during retrofitting projects, ensuring that water consumption is managed efficiently and does not contribute to local water scarcity.

3. Sustainable Building and Construction Standards

ISO 21929-1: Sustainability in Building Construction – Sustainability Indicators

Application: Provides sustainability indicators for buildings, which can be used to assess the environmental and social performance of retrofitted buildings. This includes energy efficiency, resource use, and indoor environmental quality improvements.

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works

Application: Establishes methods for assessing the environmental performance of buildings undergoing retrofitting, ensuring that retrofitting activities contribute to sustainability goals, including energy efficiency, reduced resource consumption, and lower emissions.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Promotes the use of materials and construction methods that enable future disassembly and adaptability of buildings, ensuring that retrofitting projects align with circular economy principles and minimize waste generation at the end of the building's life.

4. Safety and Health Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides guidelines to ensure the health and safety of workers involved in retrofitting projects. This standard helps prevent accidents, ensures safe working conditions, and promotes proper risk management during construction and maintenance activities.

ISO 7730: Ergonomics of the Thermal Environment – Analytical Determination and Interpretation of Thermal Comfort

Application: Ensures that retrofitting measures, such as insulation and HVAC upgrades, contribute to thermal comfort in buildings. This standard helps optimize indoor environmental quality, improving occupant well-being and comfort.

ISO 16000-1: Indoor Air Quality – General Aspects of Indoor Air Quality

Application: Provides guidelines for maintaining healthy indoor air quality during and after retrofitting, especially when introducing new materials or upgrading ventilation systems. This standard ensures that retrofitting does not negatively impact the indoor environment.

5. Waste and Material Management Standards

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Helps track material flows during retrofitting projects, promoting resource efficiency and minimizing waste generation. This standard supports the use of sustainable building materials and the recycling or reuse of construction waste.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Ensures that packaging materials used during retrofitting projects are recyclable, reducing the environmental impact of packaging waste generated during material transportation and installation.

ISO 21930: Sustainability in Buildings and Civil Engineering Works – Environmental Declaration of Building Products

Application: Provides guidelines for declaring the environmental impacts of building products used in retrofitting projects. It ensures that materials meet sustainability requirements and that their environmental impacts are disclosed transparently.

6. Monitoring and Reporting Standards

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Focuses on the measurement and verification of energy performance in retrofitted buildings. This standard ensures that the energy efficiency improvements resulting from retrofitting are measured accurately and verified over time.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Assists in communicating the environmental impacts and benefits of retrofitting projects to stakeholders, ensuring transparency and promoting awareness of energy efficiency improvements.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Provides methods for evaluating the environmental performance of retrofitted buildings, including energy savings, emissions reductions, and waste minimization. This helps track the environmental benefits of retrofitting efforts.

7. Climate Resilience and Adaptation Standards

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Ensures that retrofitting projects consider climate resilience, incorporating design elements that help buildings adapt to climate change impacts such as extreme heat, storms, and flooding.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Provides a framework for assessing the vulnerability of buildings to climate change, ensuring that retrofitting projects address specific climate risks and contribute to long-term resilience

» ISICS Codes

1. Construction and Building Activities

ISIC Code 4321: Electrical Installation

Application: Covers the installation of electrical systems in buildings, including energy-efficient lighting, energy management systems, and other electrical work needed for retrofitting projects.

ISIC Code 4322: Plumbing, Heat, and Air Conditioning Installation

Application: Includes the installation of energy-efficient heating, ventilation, and air conditioning (HVAC) systems as part of retrofitting activities to improve building energy performance.

ISIC Code 4330: Building Completion and Finishing

Application: Refers to activities related to the final stages of building renovation, including the installation of insulation, windows, and doors, and other improvements to the building envelope to enhance energy efficiency.

2. Manufacture of Energy-Efficient Systems and Materials

ISIC Code 2610: Manufacture of Electronic Components and Boards

Application: Includes the production of components for energy-efficient systems, such as solar panels, energy storage devices, and other electronics used in retrofitting buildings for energy efficiency.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the production of electrical equipment needed for energy-efficient retrofits, including transformers, inverters, and other energy management systems.

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Involves the manufacture of specialized machinery and equipment for HVAC systems, energy-efficient appliances, and other systems installed during retrofitting projects.

3. Engineering and Consultancy Services

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes the provision of architectural and engineering services for retrofitting projects, such as energy audits, building performance assessments, and technical consultancy on energy-efficient building upgrades.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Covers consulting services related to environmental sustainability, energy efficiency assessments, and other technical services needed to plan and execute retrofitting projects.

4. Waste Management and Recycling

ISIC Code 3830: Materials Recovery

Application: Covers the recovery and recycling of building materials during retrofitting, such as windows, insulation, and other components, supporting circular economy principles and reducing waste.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes services related to the disposal of construction waste generated during retrofitting, ensuring that waste is managed sustainably and in compliance with environmental regulations.

5. Energy Generation and Supply

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: In cases where retrofitting includes the installation of on-site renewable energy systems (e.g., solar panels), this code covers the generation, transmission, and distribution of electricity produced by these systems.

ISIC Code 3530: Steam and Air Conditioning Supply

Application: Refers to the supply of energy-efficient heating, cooling, and air conditioning systems in retrofitted buildings, especially where district energy systems or centralized HVAC systems are involved.

6. Research and Development for Energy Efficiency

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities related to energy efficiency technologies, building materials, and retrofitting processes aimed at improving building energy performance and sustainability.

» Other international or adapted Certifications & Standards

European Union Energy

Performance of Buildings Directive (European

EPBD), or Energy Smart or

ENERGY STAR

» Specific Government Policy (National Standards or Certification)

National Energy Policy (2021), Ghana's National Energy Transition Framework (2022 -2070).

» Responsible Agencies/ Regulators

Energy Commission

Development and deployment of energy-efficient appliances

play a key role in reducing energy consumption, lowering greenhouse gas emissions, and promoting sustainable energy use in both residential and commercial sectors.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Energy Efficiency and Emissions Reduction

Criteria: Energy-efficient appliances must achieve at least 20% greater energy efficiency compared to conventional appliances, as measured by internationally recognized energy efficiency standards (such as Energy Star, ISO, or equivalent). The appliance should be designed to minimize energy consumption during operation.

DNSH Consideration: Ensure that the production, use, and disposal of the appliance do not lead to significant environmental degradation or increase in greenhouse gas (GHG) emissions. The lifecycle emissions of the appliance should be minimized.

1.2 Use of Sustainable Materials

Criteria: Appliances must be manufactured using materials that are sustainably sourced, recyclable, and have a low environmental impact. Priority should be given to recycled materials and those with low embodied carbon.

DNSH Consideration: Avoid the use of materials that contribute to deforestation, environmental degradation, or are associated with hazardous waste, such as non-recyclable plastics and materials sourced from unsustainable practices.

1.3 Waste Minimization and Recycling

Criteria: The design and production of energy-efficient appliances must include a plan for minimizing waste during manufacturing and ensuring that the appliance is recyclable at the end of its life. Manufacturers should provide take-back programs or recycling options for consumers.

DNSH Consideration: Ensure that end-of-life appliances are not sent to landfills or improperly disposed of, leading to environmental pollution. Recycling programs must be implemented to handle appliance disposal sustainably.

2. Energy Efficiency and System Performance

2.1 High Energy Efficiency Performance

Criteria: Appliances must meet or exceed internationally recognized energy efficiency standards, such as those established by the International Electrotechnical Commission (IEC) or Energy Star certification. The appliance should be optimized for minimal energy consumption while maintaining functionality.

DNSH Consideration: Avoid using inefficient components or designs that could lead to excessive energy consumption. Energy efficiency must be verified through standardized testing.

2.2 Low Standby Power Consumption

Criteria: Appliances must consume minimal power when in standby or idle mode, with a target of less than 1 watt of standby power consumption. Automatic power-off features should be included to reduce unnecessary energy use.

DNSH Consideration: Ensure that standby modes do not account for a significant portion of energy consumption, which would undermine the appliance's overall energy efficiency.

2.3 Durability and Longevity

Criteria: Energy-efficient appliances must be designed for long-term use, with a minimum lifespan of 10 years under normal operating conditions. Durability reduces the need for frequent replacements and contributes to resource conservation.

DNSH Consideration: Avoid designing appliances with planned obsolescence, which would lead to unnecessary resource use and waste generation. The appliance should be easy to repair and maintain.

3. Social and Community Benefits

3.1 Affordability and Accessibility

Criteria: Energy-efficient appliances must be affordable and accessible to a broad range of consumers, including low-income households. Pricing should reflect long-term energy savings and include incentives or subsidies where available.

DNSH Consideration: Ensure that energy-efficient appliances are not prohibitively expensive, limiting access for marginalized or low-income populations. Consider providing financing options or government incentives to promote widespread adoption.

3.2 Health and Safety Improvements

Criteria: Appliances must meet high safety standards, including electrical safety, fire protection, and the absence of harmful substances (such as hazardous chemicals). Appliances should improve indoor environmental quality, particularly in cooking or heating applications.

DNSH Consideration: Ensure that the production and use of appliances do not expose consumers or workers to hazardous materials or increase the risk of accidents.

3.3 Local Employment and Economic Development

Criteria: The development and deployment of energy-efficient appliances must contribute to local job creation, particularly in the areas of manufacturing, distribution, installation, and maintenance. Training programs should be offered to build local capacity in appliance repair and maintenance.

DNSH Consideration: Ensure that job opportunities created by the production and distribution of energy-efficient appliances provide fair wages, safe working conditions, and contribute to local economic development.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate-Related Impacts

Criteria: Appliances must be designed to operate efficiently under varying climate conditions, including high temperatures, humidity, and other environmental factors. Appliances should be tested for performance in extreme conditions to ensure reliability.

DNSH Consideration: Ensure that appliances do not fail prematurely or become less efficient due to climate-related stresses such as heatwaves or high humidity, which could lead to increased energy consumption or replacement.

4.2 Adaptability to Renewable Energy Systems

Criteria: Appliances must be compatible with renewable energy systems, such as solar or wind power. Appliances should have the ability to operate on variable power inputs and integrate with smart grid technology to enhance energy efficiency.

DNSH Consideration: Ensure that appliances are designed to function effectively with decentralized or renewable energy sources, reducing reliance on non-renewable energy and enhancing energy resilience.

5. Monitoring and Reporting

5.1 Energy Performance Monitoring

Criteria: Appliances must include features for monitoring and reporting energy usage in real-time, providing consumers with information on energy consumption and enabling energy-saving behaviors. Smart appliances should be compatible with energy management systems.

DNSH Consideration: Ensure that monitoring systems are accurate, user-friendly, and do not significantly increase the cost of the appliance.

5.2 Reporting on Environmental and Social Impact

Criteria: Manufacturers must report on the environmental impact of their appliances, including lifecycle assessments, energy savings, emissions reductions, and material sourcing. Social impact reporting should include job creation and community benefits.

DNSH Consideration: Ensure that reporting is transparent, accurate, and aligned with recognized standards such as ISO or GRI (Global Reporting Initiative), avoiding greenwashing.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety and Performance Standards

Criteria: Appliances must comply with all relevant national and international safety standards, such as those set by the IEC or UL (Underwriters Laboratories). Electrical safety, fire resistance, and product durability must be verified before market release.

DNSH Consideration: Ensure that appliances do not pose safety risks to users, such as electrical faults, fire hazards, or health risks from toxic materials.

6.2 Compliance with Environmental Regulations

Criteria: Appliances must comply with environmental regulations related to energy efficiency, emissions, hazardous substances, and waste management. This includes adherence to directives such as the EU's EcoDesign Directive or equivalent national policies.

DNSH Consideration: Ensure that manufacturing and distribution processes comply with environmental laws, particularly regarding emissions, waste disposal, and the use of hazardous substances.

7. End-of-Life and Circular Economy Considerations

7.1 Recyclability and Circular Economy Integration

Criteria: Energy-efficient appliances must be designed for recyclability, with easily disassembled components and materials that can be reused or recycled. Manufacturers should provide clear guidance on recycling options and take-back schemes.

DNSH Consideration: Ensure that appliances are not designed for single-use or short lifespans, contributing to electronic waste. Materials used should be compatible with existing recycling infrastructure.

7.2 Safe Disposal and E-Waste Management

Criteria: Manufacturers must implement programs for the safe disposal of end-of-life appliances, including electronic waste (e-waste) recycling programs. Consumers should be informed about proper disposal methods to prevent environmental harm.

DNSH Consideration: Ensure that appliances do not contribute to e-waste in landfills, where hazardous materials could contaminate soil and water. E-waste management programs should comply with national and international standards for waste management.

» ISO Standards

1. Energy Performance and Efficiency Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for establishing energy management systems to optimize energy efficiency in the development, manufacturing, and deployment of energy-efficient appliances. It ensures continuous improvements in energy use and performance.

ISO 50002: Energy Audits

Application: Specifies requirements for conducting energy audits, allowing manufacturers to identify energy-saving opportunities during the development and production of energy-efficient appliances.

ISO 50003: Energy Management Systems – Requirements for Bodies Providing Audit and Certification of Energy Management Systems

Application: Defines the requirements for auditing and certifying the energy management systems of organizations involved in the development and production of energy-efficient appliances, ensuring compliance with energy efficiency standards.

ISO 5151: Non-Ducted Air Conditioners and Heat Pumps – Testing and Rating for Performance

Application: Provides testing methods and performance ratings for air conditioners and heat pumps, ensuring that these energy-efficient appliances meet international energy performance standards.

ISO 16358-1: Air-Cooled Air Conditioners and Air-to-Air Heat Pumps – Testing and Calculation Methods for Seasonal Performance Factors – Part 1: Cooling Seasonal Performance Factor

Application: Establishes testing and calculation methods for assessing the seasonal energy performance of air conditioning systems, ensuring they operate efficiently across different seasons.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for establishing and maintaining environmental management systems that minimize the environmental impacts of appliance production, ensuring sustainable practices throughout the product lifecycle.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impact of energy-efficient appliances from production through to disposal, helping to reduce the overall environmental footprint of the appliances.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides detailed guidelines for conducting life cycle assessments (LCA), ensuring that environmental impacts of energy-efficient appliances are accurately measured and minimized.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Defines the methodology for calculating the carbon footprint of products, including energy-efficient appliances, to assess and reduce GHG emissions throughout the product lifecycle.

ISO 14046: Environmental Management – Water Footprint

Application: Offers guidance on assessing the water footprint of energy-efficient appliance production, ensuring that water consumption is minimized and managed sustainably.

3. Product Design and Materials

ISO 14021: Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labeling)

Application: Specifies requirements for self-declared environmental claims made about energy-efficient appliances, ensuring that product labels are accurate and promote sustainability.

ISO 14024: Environmental Labels and Declarations – Type I Environmental Labelling – Principles and Procedures

Application: Defines the principles and procedures for third-party environmental labeling, certifying that energy-efficient appliances meet high environmental performance criteria.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Promotes the use of design principles that allow for the easy disassembly, repair, and recycling of energy-efficient appliances, ensuring they align with circular economy principles.

4. Safety and Health Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for ensuring the health and safety of workers involved in the design, production, and installation of energy-efficient appliances, including electrical safety and safe handling of hazardous materials.

ISO 60335-1: Household and Similar Electrical Appliances – Safety – Part 1: General Requirements

Application: Specifies the general safety requirements for household appliances, ensuring that energy-efficient appliances meet essential safety standards to protect consumers from electrical hazards, fire, and mechanical risks.

ISO 60335-2 (Various Parts): Household and Similar Electrical Appliances – Safety

Application: Covers safety requirements for specific categories of household appliances, such as washing machines, refrigerators, and air conditioners, ensuring they are safe for use while maintaining energy efficiency.

ISO 7730: Ergonomics of the Thermal Environment – Analytical Determination and Interpretation of Thermal Comfort Using Calculation of the PMV and PPD Indices and Local Thermal Comfort Criteria

Application: Establishes criteria for assessing the thermal comfort provided by energy-efficient appliances such as HVAC systems, ensuring that comfort levels are optimized while maintaining energy efficiency.

5. Waste and Material Management

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Assists manufacturers in tracking material flows and costs during the production of energy-efficient appliances, promoting resource efficiency and minimizing waste.

ISO 18604: Packaging and the Environment – Material Recycling

Application: Provides guidance on recycling packaging materials used in the distribution of energy-efficient appliances, ensuring that packaging waste is minimized and managed sustainably.

ISO 21930: Sustainability in Buildings and Civil Engineering Works – Environmental Declaration of Building Products

Application: Offers a framework for declaring the environmental impacts of building products, including energy-efficient appliances, promoting transparency and sustainability in the appliance sector.

6. End-of-Life and Recycling

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Offers guidelines for communicating the environmental benefits of energy-efficient appliances to consumers, including information about the appliance's recyclability and end-of-life disposal options.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Provides methods for evaluating the environmental performance of energy-efficient appliances throughout their lifecycle, including energy use, emissions reductions, and recyclability.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Offers guidelines for assessing and reporting climate-related financial impacts of investments in energy-efficient appliances, ensuring that financial activities align with climate action goals.

7. Monitoring and Reporting

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Focuses on the measurement and verification of energy performance in energy-efficient appliances, ensuring that they meet or exceed specified energy efficiency standards and perform as expected over time.

ISO 50006: Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators

Application: Defines methodologies for setting energy baselines and performance indicators for appliances, ensuring that their energy efficiency improvements are quantifiable and measurable.

» ISICS Codes

1. Manufacture of Energy-Efficient Appliances

ISIC Code 2750: Manufacture of Domestic Appliances

Application: Includes the manufacture of energy-efficient household appliances such as refrigerators, washing machines, dishwashers, ovens, and microwaves, with a focus on energy-saving features.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the manufacture of electric motors and generators used in energy-efficient appliances like air conditioners, fans, and other electronic devices that contribute to reducing energy consumption.

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Includes the production of specialized machinery and components for energy-efficient heating, ventilation, air conditioning (HVAC) systems, and other appliances that enhance energy performance.

ISIC Code 2610: Manufacture of Electronic Components and Boards

Application: Refers to the manufacture of electronic components, sensors, and control systems used in smart appliances that improve energy efficiency, such as thermostats, energy meters, and energy management systems.

2. Wholesale and Retail Distribution of Appliances

ISIC Code 4659: Wholesale of Other Machinery and Equipment

Application: Covers the wholesale distribution of energy-efficient machinery and appliances, including air conditioners, refrigerators, HVAC systems, and other appliances that help reduce energy consumption.

ISIC Code 4759: Retail Sale of Electrical Household Appliances, Furniture, Lighting Equipment, and Other Household Articles in Specialized Stores

Application: Includes the retail sale of energy-efficient appliances in specialized stores, such as home appliances, lighting equipment, and other energy-saving devices.

3. Installation and Maintenance of Energy-Efficient Appliances

ISIC Code 4321: Electrical Installation

Application: Includes the installation of energy-efficient electrical systems and appliances, such as lighting, HVAC systems, and home energy management systems, in both residential and commercial buildings.

ISIC Code 4322: Plumbing, Heat, and Air Conditioning Installation

Application: Covers the installation of energy-efficient heating and cooling systems, including energy-efficient water heaters, boilers, and HVAC units designed to reduce energy consumption.

ISIC Code 8110: Combined Facilities Support Activities

Application: Involves the ongoing maintenance and operation of energy-efficient appliances and systems, ensuring that installed appliances continue to operate at peak energy efficiency over their lifespan.

4. Research and Development for Energy-Efficient Appliances

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Refers to research and development activities focused on improving the energy efficiency of appliances, including the development of new technologies, materials, and systems that reduce energy consumption.

5. Waste Management and Recycling of Appliances

ISIC Code 3830: Materials Recovery

Application: Covers the recovery, recycling, and reuse of materials from discarded energy-efficient appliances, such as electronic waste recycling and the recovery of metals, plastics, and other components.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes waste management services related to the disposal or recycling of energy-efficient appliances at the end of their life, ensuring proper e-waste management and environmental protection.

6. Energy Supply and Distribution

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Involves the generation and distribution of electricity, including renewable energy used to power energy-efficient appliances. This code is relevant for integrating energy-efficient appliances into grid-connected or off-grid renewable energy systems.

» Other international or adapted Certifications & Standards

Energy Star, Appliance and Equipment Standards Program

» Specific Government Policy (National Standards or Certification)

Energy Commission Act 1997 (Act 541),

Standard and Laelling (S&L) regime, National Energy Policy 2021

» Responsible Agencies/ Regulators

Energy Commision

Industrial energy efficiency improvements, including carbon capture and storage (CCS) technologies.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Energy Efficiency and Emissions Reduction

Criteria: Industrial energy efficiency improvements must achieve at least a 20% reduction in energy consumption compared to baseline operations. This can include retrofitting equipment, optimizing processes, or implementing energy management systems.

DNSH Consideration: Ensure that energy efficiency measures do not lead to indirect increases in emissions (rebound effect) where improvements encourage higher production or energy use elsewhere.

1.2 Reduction of Greenhouse Gas Emissions through CCS

Criteria: Carbon capture and storage (CCS) technologies must capture at least 85% of the CO_2 emissions from industrial processes, including power generation, cement, steel, and chemical production. CCS facilities must comply with high environmental standards for carbon capture, transport, and long-term storage.

DNSH Consideration: Ensure that the carbon capture process does not lead to significant energy penalties or emissions elsewhere in the system (e.g., from transportation or compression of CO_2).

1.3 Use of Sustainable Materials and Waste Minimization

Criteria: Industrial energy efficiency and CCS projects must prioritize the use of sustainable and recyclable materials in equipment and system upgrades. Waste generated during retrofitting or construction should be minimized and properly managed.

DNSH Consideration: Ensure that the materials used do not contribute to significant environmental degradation, deforestation, or hazardous waste generation.

2. Energy Efficiency and System Performance

2.1 Implementation of Energy Management Systems (EMS)

Criteria: Industrial facilities must implement comprehensive energy management systems (EMS) in line with ISO 50001 standards. EMS should include continuous monitoring of energy consumption, identification of inefficiencies, and implementation of energy-saving measures.

DNSH Consideration: Ensure that EMS is designed to operate efficiently and is integrated into broader operational practices to avoid inefficiencies.

2.2 Process Optimization for Energy Efficiency

Criteria: Industrial processes must be optimized to reduce energy consumption per unit of output. This can include upgrading equipment, improving heat recovery systems, and reducing energy losses in transmission or storage.

DNSH Consideration: Ensure that energy savings are not offset by increased production or inefficiencies in other parts of the process.

2.3 High Efficiency in CCS Technologies

Criteria: CCS systems must be designed to operate with high energy efficiency, minimizing the energy consumption required for capturing, transporting, and storing CO_2. Energy efficiency measures should be incorporated into the entire CCS value chain.

DNSH Consideration: Avoid significant energy penalties in the CCS process that could reduce the overall efficiency of the industrial system.

3. Social and Community Benefits

3.1 Job Creation and Local Economic Development

Criteria: Industrial energy efficiency improvements and CCS projects must create local employment opportunities in manufacturing, construction, operation, and maintenance. Training programs should be provided to equip local workers with the necessary skills.

DNSH Consideration: Ensure that job opportunities created are equitable, provide fair wages, and meet safety standards for workers involved in high-risk operations like CCS installation and maintenance.

3.2 Health and Safety Improvements

Criteria: Energy efficiency and CCS projects must improve worker safety and reduce health risks. This includes mitigating air pollution and other emissions from industrial processes and ensuring that CCS operations are safe for workers and the community.

DNSH Consideration: Ensure that safety protocols are in place to prevent accidents, particularly in high-risk areas like chemical plants or CCS facilities.

3.3 Community Engagement and Social Equity

Criteria: The development of industrial energy efficiency and CCS projects must include stakeholder engagement with local communities. Projects should ensure that benefits, such as job creation or reduced pollution, are shared equitably among the affected populations.

DNSH Consideration: Ensure that local communities, particularly marginalized or low-income groups, are not adversely affected by the development of large industrial projects.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Design

Criteria: Energy efficiency and CCS systems must be designed to be resilient to climate-related risks, such as extreme weather events, flooding, or high temperatures. This includes ensuring that facilities can operate efficiently under changing climate conditions.

DNSH Consideration: Avoid siting industrial and CCS infrastructure in areas highly vulnerable to climate risks, such as floodplains or coastal zones, which could lead to system disruptions or failures.

4.2 Adaptability to Future Technologies

Criteria: Industrial energy efficiency systems and CCS technologies must be designed with flexibility for future upgrades, including the integration of renewable energy or the adoption of more efficient capture and storage methods.

DNSH Consideration: Avoid locking systems into outdated technologies that may become inefficient or obsolete in the near future, requiring costly upgrades or replacements.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Energy Performance

Criteria: Industrial energy efficiency improvements must include real-time monitoring of energy performance, using energy management systems to track and optimize energy use. Key performance indicators (KPIs) should be established to track energy savings and emissions reductions.

DNSH Consideration: Ensure that monitoring systems are regularly maintained and that data is accurate and transparently reported to stakeholders.

5.2 Reporting on Carbon Capture and Storage Performance

Criteria: CCS projects must include continuous monitoring and verification of CO_2 capture rates, storage integrity, and emissions reductions. Data on captured and stored CO_2 must be transparently reported to regulators and stakeholders.

DNSH Consideration: Ensure that CCS projects are regularly audited to verify the long-term storage of CO_2 and to avoid risks of leakage or storage failure.

6. Safety and Regulatory Compliance

6.1 Compliance with Industrial Safety Standards

Criteria: Industrial energy efficiency and CCS projects must comply with relevant national and international safety standards, such as ISO 45001 (occupational health and safety). This includes ensuring the safe handling of hazardous materials and preventing accidents during CCS operation.

DNSH Consideration: Ensure that safety protocols for handling CO_2 and other industrial by-products are strictly followed to avoid risks to workers and nearby communities.

6.2 Compliance with Environmental Regulations

Criteria: Projects must comply with all relevant environmental regulations, including emissions limits, waste management, and water use. Environmental impact assessments (EIAs) must be conducted prior to the implementation of CCS projects.

DNSH Consideration: Ensure that regulatory compliance is maintained throughout the lifecycle of the project, and that environmental impacts are minimized.

7. End-of-Life and Circular Economy Considerations

7.1 Recyclability of Equipment and Materials

Criteria: Equipment and materials used in energy efficiency and CCS projects must be designed for easy disassembly, recycling, or reuse. Preference should be given to materials with high recyclability or that support circular economy principles.

DNSH Consideration: Ensure that equipment and materials are not disposed of in ways that cause environmental harm, and that hazardous materials are handled and disposed of safely.

7.2 Safe Decommissioning of CCS Infrastructure

Criteria: CCS infrastructure must have a clear plan for safe decommissioning at the end of its operational life. This includes the safe disposal of captured CO_2, disassembly of storage equipment, and rehabilitation of storage sites.

DNSH Consideration: Ensure that decommissioning does not lead to environmental damage or the release of stored CO_2, and that sites are restored to their natural condition where possible.

» ISO Standards

1. Energy Management and Efficiency Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for establishing and maintaining energy management systems (EMS) that help industrial facilities optimize energy use, reduce energy consumption, and improve overall energy efficiency.

ISO 50002: Energy Audits

Application: Defines guidelines for conducting energy audits that identify opportunities for energy efficiency improvements in industrial settings. It is crucial for assessing the baseline energy performance and verifying post-improvement energy savings.

ISO 50006: Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators

Application: Provides methodologies for setting energy baselines and defining energy performance indicators, ensuring that industrial energy efficiency improvements are measurable and verifiable over time.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Establishes guidelines for the measurement and verification of energy performance improvements in industrial systems, allowing for accurate monitoring of energy savings and efficiency gains.

2. Carbon Capture and Storage (CCS) Standards

ISO 27914: Carbon Dioxide Capture, Transportation, and Geological Storage – General Requirements

Application: Provides general requirements for the entire CCS chain, including the capture, transportation, and geological storage of CO_2. It sets out safety, environmental, and risk management guidelines to ensure the secure long-term storage of captured carbon.

ISO 27916: Carbon Dioxide Storage – Carbon Dioxide Storage Using Enhanced Oil Recovery (CO_2-EOR)

Application: Specifies the requirements for CO_2 storage through enhanced oil recovery (EOR). This standard covers the injection, storage, and monitoring of CO_2 in geological formations, ensuring safe and effective storage.

ISO 27912: Carbon Dioxide Capture – Performance Evaluation Methods for Post-Combustion CO_2 Capture

Application: Defines the methods for evaluating the performance of post-combustion CO_2 capture technologies, ensuring that carbon capture systems operate efficiently and meet performance expectations in industrial applications.

ISO 27917: Carbon Dioxide Capture – Pipeline Transportation Systems

Application: Sets out safety, environmental, and technical guidelines for the transportation of captured CO_2 via pipelines. It ensures the safe handling and transportation of CO_2 to storage sites.

3. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for implementing an environmental management system that minimizes environmental impacts from industrial energy efficiency projects and CCS technologies, ensuring compliance with environmental regulations.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of industrial energy efficiency improvements and CCS projects throughout their lifecycle, from materials extraction and equipment production to operation and decommissioning.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Defines methods for calculating the carbon footprint of industrial processes, including CCS projects. It ensures that the overall environmental benefits of energy efficiency and CCS are accurately measured.

ISO 14046: Environmental Management – Water Footprint

Application: Specifies guidelines for assessing the water footprint of industrial projects, particularly relevant for CCS systems that may require water-intensive processes. This ensures that water resources are managed sustainably.

4. Health, Safety, and Risk Management Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for ensuring worker safety during the implementation of industrial energy efficiency improvements and CCS projects. It includes risk assessments and safety protocols to reduce accidents and hazards.

ISO 31000: Risk Management – Guidelines

Application: Offers guidelines for risk management, applicable to both industrial energy efficiency and CCS projects. It covers the identification, assessment, and mitigation of risks associated with technological and operational activities.

ISO 27919-1: Carbon Dioxide Capture – Performance Evaluation Methods for Post-Combustion CO_2 Capture

Application: Focuses on safety and performance evaluation methods for post-combustion CO_2 capture systems, ensuring that equipment used for carbon capture meets safety and environmental standards.

5. Monitoring and Reporting Standards

ISO 50047: Energy Savings – Determination of Energy Savings in Organizations

Application: Provides guidelines for determining the energy savings achieved through energy efficiency improvements in industrial settings. This standard ensures that energy savings are consistently measured and reported.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for transparent communication of environmental information, including the results of energy efficiency and CCS projects. It ensures that stakeholders are informed of environmental benefits and risks.

ISO 27913: Carbon Dioxide Capture, Transportation, and Storage – Pipeline Transportation

Application: Focuses on the monitoring and verification of CO_2 during transportation, including regular reporting of captured CO_2 volumes, transportation emissions, and pipeline integrity.

6. End-of-Life and Decommissioning Standards

ISO 22628: Road Vehicles – Recyclability and Recoverability – Calculation Method

Application: Provides methodologies for calculating the recyclability and recoverability of materials used in industrial processes and CCS infrastructure. This helps ensure that materials can be repurposed at the end of the project's life.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Specifies guidelines for evaluating the environmental performance of CCS infrastructure and industrial energy efficiency projects over their lifecycle, including during decommissioning.

» ISICS Codes

1. Manufacture of Energy-Efficient Industrial Equipment

ISIC Code 2829: Manufacture of Other Special-Purpose Machinery

Application: Includes the manufacture of specialized machinery used in industrial energy efficiency improvements, such as energy-efficient motors, boilers, turbines, and heat recovery systems.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the manufacturing of electric motors, generators, transformers, and other electrical control equipment used in energy-efficient industrial systems.

2. Carbon Capture and Storage (CCS) Technologies

ISIC Code 3520: Manufacture of Gas; Distribution of Gaseous Fuels Through Mains

Application: Involves the manufacture and distribution of gases, including captured CO_2 for transport and storage. It applies to CCS technologies that involve the transportation of captured CO_2 via pipelines.

ISIC Code 0620: Extraction of Natural Gas

Application: Relates to carbon capture and storage activities associated with the extraction of natural gas, where CO_2 is captured during extraction or processing operations.

ISIC Code 0910: Support Activities for Petroleum and Natural Gas Extraction

Application: Includes services supporting the extraction of oil and natural gas, including CO_2 injection for enhanced oil recovery (EOR) in CCS projects.

ISIC Code 4290: Construction of Other Civil Engineering Projects

Application: Covers the construction of infrastructure required for CCS projects, such as pipelines, storage facilities, and CO_2 compression and injection systems.

3. Installation and Maintenance of Energy-Efficient Systems and CCS Infrastructure

ISIC Code 4322: Plumbing, Heat, and Air Conditioning Installation

Application: Includes the installation of industrial energy-efficient heating, cooling, and air conditioning systems, as well as carbon capture systems integrated into industrial processes.

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Involves the construction of utility projects, such as electrical systems, pipelines, and other infrastructure needed to support energy-efficient operations and carbon capture technologies.

ISIC Code 8110: Combined Facilities Support Activities

Application: Covers maintenance and operational support for industrial facilities with energy efficiency upgrades and CCS systems to ensure they run efficiently and meet performance targets.

4. Electricity Generation and Supply for Energy-Efficient Systems

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Includes the generation, transmission, and distribution of electricity required for energy-efficient industrial operations, especially for running energy management systems or CCS technologies.

5. Research and Development for Industrial Energy Efficiency and CCS

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities aimed at improving energy efficiency in industrial processes and advancing CCS technologies, including developing new materials and processes for carbon capture, transportation, and storage.

6. Waste Management and Recycling of Industrial Materials

ISIC Code 3830: Materials Recovery

Application: Refers to the recovery and recycling of materials used in energy-efficient industrial equipment and CCS technologies. This includes recycling metals and other materials from decommissioned equipment.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes the management of hazardous waste generated during the operation or decommissioning of CCS systems, ensuring safe disposal of captured CO_2 and related materials.

» Specific Government Policy (National Standards or Certification)

Ghana National Climate Change Policy,

National Energy Policy, 2021. Ghana Renewable Energy Master Plan, National Energy Transition Framework, Ghana Energy Transition and Investment Plan.

» Responsible Agencies/ Regulators

Energy Commission

Environmental Protection Agency

Energy-efficient cooling systems

Such as air conditioning, refrigeration, and HVAC systems, play a critical role in reducing energy consumption, minimizing greenhouse gas emissions, and improving indoor environmental quality.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Energy Efficiency and Emissions Reduction

Criteria: Cooling systems must achieve at least 20% higher energy efficiency than conventional systems. This can be measured using Seasonal Energy Efficiency Ratio (SEER), Coefficient of Performance (COP), or similar standards. The use of low global warming potential (GWP) refrigerants is required to minimize direct greenhouse gas (GHG) emissions.

DNSH Consideration: Ensure that refrigerants used in the cooling system have low or zero GWP, such as natural refrigerants (e.g., ammonia, CO2) or hydrofluoroolefins (HFOs), to avoid contributing to climate change.

1.2 Use of Sustainable Materials

Criteria: The cooling system must be manufactured using sustainable, recyclable, and non-toxic materials. Preference should be given to materials with a lower environmental footprint, such as those that are locally sourced or made from recycled content.

DNSH Consideration: Avoid using materials that are associated with significant environmental degradation, deforestation, or harmful mining practices. Recyclability should be considered to minimize waste at the end of the system's life cycle.

1.3 Waste Minimization and Recycling

Criteria: The design and production of cooling systems must include a plan for minimizing waste during manufacturing and installation. Systems should be designed for easy disassembly to facilitate recycling at the end of their life.

DNSH Consideration: Ensure that any hazardous materials (e.g., certain refrigerants, insulation) are safely managed and that the cooling systems do not generate significant waste during their operation and disposal.

2. Energy Efficiency and System Performance

2.1 High Energy Efficiency Performance

Criteria: The cooling system must meet or exceed internationally recognized energy efficiency standards, such as ISO 5151 (performance testing for air conditioners) or equivalent national standards. Systems should be optimized for energy efficiency through the use of high-efficiency compressors, fans, and heat exchangers.

DNSH Consideration: Ensure that the system is properly sized for the intended space to avoid over-consumption of energy. Inefficient cooling systems that operate at partial loads should be avoided.

2.2 Use of Variable Speed Drives (VSDs)

Criteria: Cooling systems must incorporate variable speed drives (VSDs) for compressors, fans, and pumps, allowing for precise control of energy use based on demand. This feature optimizes energy consumption and improves system efficiency.

DNSH Consideration: Ensure that VSDs are installed and calibrated correctly to avoid energy inefficiencies or unnecessary wear on system components.

2.3 Thermal Performance and Insulation

Criteria: Cooling systems must be designed with high-quality insulation to minimize heat gain or loss, reducing the cooling load on the system. The use of high-performance thermal insulation materials in ducts, pipes, and building envelopes is required.

DNSH Consideration: Ensure that insulation materials are non-toxic, have low environmental impact, and do not degrade indoor air quality. Avoid systems that lead to energy losses through poor insulation.

3. Social and Community Benefits

3.1 Affordability and Accessibility

Criteria: Energy-efficient cooling systems must be affordable and accessible to a wide range of consumers, including low-income households. Government incentives or subsidies should be made available to encourage the adoption of energy-efficient cooling technologies.

DNSH Consideration: Ensure that energy-efficient cooling systems are not prohibitively expensive for marginalized or low-income populations, limiting their access to energy savings and improved comfort.

3.2 Public Health and Indoor Environmental Quality

Criteria: The cooling system must improve indoor air quality and thermal comfort, particularly in hot climates. Systems should include air filtration and humidity control to ensure a healthy indoor environment. The system should reduce indoor temperature without increasing indoor air pollutants.

DNSH Consideration: Ensure that cooling systems do not negatively impact indoor air quality by emitting harmful substances or facilitating mold growth due to poor humidity control.

3.3 Job Creation and Local Economic Development

Criteria: The installation, maintenance, and manufacturing of energy-efficient cooling systems must create local employment opportunities, particularly in skilled trades such as HVAC installation and repair. Training programs should be provided to ensure that workers have the necessary skills to work with advanced energy-efficient systems.

DNSH Consideration: Ensure that job opportunities created by the adoption of energy-efficient cooling systems provide fair wages and safe working conditions, supporting local economic development.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Design

Criteria: Cooling systems must be designed to withstand extreme weather conditions such as heatwaves, flooding, and storms. Equipment should be robust, durable, and capable of maintaining high performance in the face of climate-related stress.

DNSH Consideration: Ensure that systems are not vulnerable to damage from climate-related risks, which could disrupt cooling capacity and result in higher energy consumption or system failures.

4.2 Adaptability to Future Technologies

Criteria: Cooling systems must be designed with future technological advancements in mind, such as integration with renewable energy sources (e.g., solar-powered HVAC systems) or smart grid technology to optimize energy use during off-peak hours.

DNSH Consideration: Avoid using outdated technologies that could become obsolete and necessitate costly upgrades or replacements in the near future.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Energy Performance

Criteria: Cooling systems must include features for continuous monitoring of energy performance, allowing building owners or operators to track energy consumption in real-time and optimize the system's efficiency. Smart systems should be capable of automatic adjustments based on environmental conditions or occupancy levels.

DNSH Consideration: Ensure that monitoring systems are properly installed, maintained, and accessible to users, avoiding data inaccuracies or lack of transparency.

5.2 Reporting on Environmental and Social Impact

Criteria: Manufacturers and operators must regularly report on the environmental and social impact of their cooling systems, including energy savings, emissions reductions, and improvements in indoor environmental quality.

DNSH Consideration: Ensure transparency and accuracy in reporting, avoiding greenwashing or misrepresenting the performance and benefits of the cooling system.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria: Cooling systems must comply with relevant national and international safety standards, such as ISO 5149 (safety requirements for refrigerating systems). The system must include safety features to prevent refrigerant leaks, fire hazards, and electrical faults.

DNSH Consideration: Ensure that all safety risks, such as refrigerant leakage or electrical issues, are addressed in the design, installation, and operation of the system.

6.2 Compliance with Environmental Regulations

Criteria: Cooling systems must comply with environmental regulations related to refrigerant use, emissions, and energy efficiency. Environmental impact assessments (EIAs) should be conducted before installing large-scale cooling systems.

DNSH Consideration: Ensure compliance with laws regulating refrigerants and hazardous substances, and minimize environmental harm during the production, installation, and disposal of the system.

7. End-of-Life and Circular Economy Considerations

7.1 Recyclability and Circular Economy Integration

Criteria: Cooling systems must be designed for easy disassembly, with components that are recyclable or reusable. Manufacturers must provide guidance on proper disposal and recycling of systems at the end of their operational life.

DNSH Consideration: Ensure that cooling systems do not contribute to landfill waste or environmental harm by facilitating the recycling and reuse of key materials, such as metals and refrigerants.

7.2 Safe Disposal and Waste Management

Criteria: A clear plan for the safe disposal of cooling systems, particularly refrigerants and other hazardous materials, must be in place. Recycling programs should be promoted to prevent environmental contamination.

DNSH Consideration: Ensure that systems are not improperly disposed of in ways that could release harmful chemicals into the environment or contribute to e-waste.

» ISO Standards

1. Energy Performance and Efficiency Standards

ISO 5151: Non-Ducted Air Conditioners and Heat Pumps – Testing and Rating for Performance

Application: Specifies testing methods and performance ratings for air conditioners and heat pumps, ensuring they meet energy efficiency requirements and operate effectively under various conditions.

ISO 16358-1: Air-Cooled Air Conditioners and Air-to-Air Heat Pumps – Testing and Calculation Methods for Seasonal Performance Factors – Part 1: Cooling Seasonal Performance Factor

Application: Establishes methods for calculating the seasonal energy performance of air conditioners, ensuring that the cooling system operates efficiently across different climate conditions.

ISO 16813: Building Environment Design – Indoor Air Quality, Thermal Environment, Lighting, and Acoustics

Application: Provides guidelines for designing HVAC systems that meet high standards for energy efficiency, indoor air quality, and thermal comfort. This standard supports energy-efficient cooling system design.

ISO 18292: Energy Performance of Fenestration Systems – Calculation of Energy Rating for Dynamic Glazing

Application: Applies to cooling systems where dynamic glazing (windows that adjust to light and heat) is used to improve energy efficiency by reducing cooling loads and optimizing building thermal performance.

ISO 23045: Building Environment Design – Guidelines to Assess Energy Efficiency of New Buildings

Application: Provides guidelines for assessing the energy efficiency of building designs, including energy-efficient cooling systems, ensuring compliance with energy performance requirements.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for establishing and maintaining an environmental management system that minimizes the environmental impact of cooling system production, operation, and disposal.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in assessing the environmental impacts of cooling systems throughout their lifecycle, from material extraction and production to operation and disposal, helping to minimize resource use and emissions.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Defines the methodology for calculating the carbon footprint of energy-efficient cooling systems, allowing manufacturers to measure and reduce the greenhouse gas emissions associated with their products.

ISO 14046: Environmental Management – Water Footprint

Application: Establishes methods for assessing the water footprint of cooling systems, particularly for systems that rely on water-cooled technology, ensuring responsible water use and management.

3. Refrigerant Management and Low-GWP Cooling

ISO 5149-1: Refrigerating Systems and Heat Pumps – Safety and Environmental Requirements – Part 1: Definitions, Classification, and Selection Criteria

Application: Specifies safety and environmental requirements for refrigerating systems, including the use of low global warming potential (GWP) refrigerants, to reduce environmental harm and improve the safety of cooling systems.

ISO 817: Refrigerants – Designation and Safety Classification

Application: Establishes a system for naming refrigerants and classifying them based on their safety, toxicity, and flammability, ensuring that cooling systems use environmentally friendly refrigerants that meet global safety standards.

ISO 21922: Refrigerating Systems and Heat Pumps – Valves – Requirements, Testing, and Marking

Application: Defines safety and performance requirements for valves used in refrigerating and cooling systems, including systems using low-GWP refrigerants, to ensure that cooling equipment is safe and efficient.

4. Safety and Operational Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides guidelines to ensure the health and safety of workers involved in the manufacturing, installation, and maintenance of cooling systems, reducing the risk of accidents and hazardous exposures.

ISO 5149-2: Refrigerating Systems and Heat Pumps – Safety and Environmental Requirements – Part 2: Design, Construction, Testing, Marking, and Documentation

Application: Specifies safety and environmental requirements for the design, construction, and operation of cooling systems, ensuring that they operate safely and with minimal environmental impact.

ISO 7730: Ergonomics of the Thermal Environment – Analytical Determination and Interpretation of Thermal Comfort

Application: Establishes criteria for designing energy-efficient cooling systems that enhance thermal comfort for occupants, ensuring that systems provide optimal indoor temperature and humidity control.

ISO 16890-1: Air Filters for General Ventilation – Part 1: Technical Specifications, Requirements, and Classification System Based on Particulate Matter Efficiency

Application: Specifies requirements for air filters used in cooling systems to ensure that indoor air quality is maintained while minimizing energy use.

5. Monitoring and Reporting Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for energy management systems, helping organizations improve energy efficiency in the operation of cooling systems, with continuous monitoring and optimization.

ISO 50006: Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators

Application: Defines methodologies for setting energy baselines and measuring energy performance, ensuring that energy-efficient cooling systems meet their performance targets over time.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Focuses on measuring and verifying the energy performance of cooling systems, ensuring that efficiency improvements are quantifiable and sustained over the system's lifetime.

6. End-of-Life and Circular Economy Considerations

ISO 22628: Road Vehicles – Recyclability and Recoverability – Calculation Method

Application: Provides methods for calculating the recyclability and recoverability rates of cooling system components, promoting the circular economy by enabling the reuse and recycling of materials at the end of the product's life.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Offers guidelines for communicating the environmental benefits of energy-efficient cooling systems, including emissions reductions, energy savings, and lifecycle impacts.

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works – Part 1: Buildings

Application: Establishes a framework for assessing the environmental performance of buildings, including the impact of energy-efficient cooling systems, promoting sustainable building practices.

7. Smart Systems and Automation

ISO 16484-5: Building Automation and Control Systems – Part 5: Data Communication Protocol

Application: Defines communication protocols for building automation systems, including energy-efficient cooling systems, ensuring compatibility with smart grid technology and enabling real-time energy optimization.

» ISICS Codes

1. Manufacture of Energy-Efficient Cooling Systems

ISIC Code 2825: Manufacture of Air-Conditioning, Refrigerating, and Ventilation Equipment

Application: Includes the manufacture of air-conditioning units, heat pumps, refrigerators, and ventilation systems, particularly those designed to be energy-efficient.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the production of electric motors, generators, and control apparatus used in energy-efficient cooling systems, including components for HVAC and refrigeration systems.

2. Installation and Maintenance of Cooling Systems

ISIC Code 4322: Plumbing, Heat, and Air Conditioning Installation

Application: Refers to the installation of energy-efficient cooling systems, such as HVAC systems, air conditioners, and refrigeration units, in residential, commercial, and industrial buildings.

ISIC Code 4321: Electrical Installation

Application: Includes the installation of electrical systems that support energy-efficient cooling systems, including wiring, control systems, and integration with renewable energy sources or smart grid systems.

ISIC Code 8110: Combined Facilities Support Activities

Application: Covers the maintenance and operation of facilities that include energy-efficient cooling systems, ensuring optimal performance and energy savings through regular system checks and servicing.

3. Wholesale and Retail Trade of Cooling Systems

ISIC Code 4659: Wholesale of Other Machinery and Equipment

Application: Involves the wholesale distribution of energy-efficient cooling systems, including air conditioners, refrigerators, and HVAC systems, to retailers and commercial buyers.

ISIC Code 4759: Retail Sale of Electrical Household Appliances, Furniture, Lighting Equipment, and Other Household Articles in Specialized Stores

Application: Covers the retail sale of energy-efficient air conditioning, refrigeration, and cooling systems for residential and commercial use, sold in specialized stores.

4. Research and Development for Energy-Efficient Cooling Systems

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities aimed at improving energy-efficient cooling technologies, such as developing more efficient compressors, refrigerants, and control systems.

5. Refrigerant and Component Recycling and Waste Management

ISIC Code 3830: Materials Recovery

Application: Includes the recovery and recycling of materials from cooling systems, particularly refrigerants, metals, and other components that can be reused in the production of new energy-efficient systems.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Involves the safe disposal and management of waste generated from energy-efficient cooling systems, including the handling of refrigerants and hazardous materials during system decommissioning and recycling.

6. Electricity Supply and Integration with Smart Systems

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Refers to the generation and distribution of electricity needed to power energy-efficient cooling systems, particularly in cases where these systems are integrated with renewable energy sources.

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Covers the construction of electrical and telecommunications infrastructure to support the deployment of energy-efficient cooling systems, including smart grid integration and energy management systems.

» Other international or adapted Certifications & Standards

ISO 50001, HVAC codes and standards.

Eurovent Certification

» Specific Government Policy (National Standards or Certification)

Ghana National Cooling Plan,National

Energy Transition Framework,Strateegic National Energy Plan. Ghana Refrigeration and Air Conditioning (RAC)

ROADMAP

» Responsible Agencies/ Regulators

Energy Commission

Sustainable Transportation

Electric vehicle manufacturing and infrastructure (including charging stations)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Emissions Reduction

Criteria: Electric vehicle manufacturing and infrastructure must demonstrate significant reductions in greenhouse gas (GHG) emissions compared to conventional internal combustion engine (ICE) vehicles. EVs should produce zero tailpipe emissions, and manufacturing processes must aim to reduce overall carbon footprints.

DNSH Consideration: Ensure that the production of EVs and charging infrastructure does not result in significant indirect emissions, such as those related to energy use in manufacturing or fossil fuel-powered charging stations.

1.2 Sustainable Materials and Battery Management

Criteria: EV manufacturing must prioritize the use of sustainable, low-carbon, and recyclable materials, including those used in batteries (such as lithium, cobalt, and nickel). Battery production must adhere to high environmental and ethical standards, ensuring sustainable sourcing of raw materials.

DNSH Consideration: Ensure that the extraction and processing of raw materials do not lead to environmental degradation, deforestation, or human rights violations. Battery disposal and recycling programs should be in place to minimize e-waste.

1.3 Lifecycle Environmental Impact and Waste Minimization

Criteria: The lifecycle environmental impact of EVs, including resource extraction, production, operation, and disposal, must be minimized. A clear plan for recycling materials, especially batteries, should be implemented.

DNSH Consideration: Ensure that waste generated during the manufacturing of EVs and the construction of charging infrastructure is minimized, and all hazardous materials are managed responsibly.

2. Energy Efficiency and Performance

2.1 High Energy Efficiency in EVs

Criteria: EVs must achieve high energy efficiency, with energy consumption per kilometer driven lower than that of comparable conventional vehicles. This includes efficient use of battery energy and regenerative braking systems to optimize energy use.

DNSH Consideration: Avoid the use of inefficient EV models that consume excessive amounts of electricity or have a short range, reducing the overall environmental benefit of transitioning to electric mobility.

2.2 Energy-Efficient Charging Infrastructure

Criteria: Charging stations must be energy-efficient and powered by renewable energy sources (e.g., solar, wind, or hydropower) where possible. Charging systems should minimize energy loss and integrate with smart grid technology to optimize charging during off-peak hours.

DNSH Consideration: Ensure that charging stations do not rely on fossil fuels or inefficient grid power sources, which could negate the environmental benefits of EVs.

2.3 Vehicle Battery Efficiency

Criteria: EV batteries must have high energy density and longevity, with efficient charging cycles that allow for extended vehicle range and minimized energy loss during charging and discharging. Battery recycling and repurposing options must be in place.

DNSH Consideration: Avoid the use of low-quality batteries that degrade quickly, resulting in the need for frequent replacement and increased environmental impact.

3. Social and Community Benefits

3.1 Job Creation and Local Economic Development

Criteria: EV manufacturing and infrastructure projects must create local employment opportunities, particularly in manufacturing, installation, and maintenance. Training programs should be provided to equip workers with the skills needed to operate, maintain, and service EVs and charging stations.

DNSH Consideration: Ensure fair labor practices, safe working conditions, and that job opportunities are equitably distributed, particularly in regions affected by the transition from traditional automotive manufacturing.

3.2 Social Equity and Accessibility

Criteria: EVs and charging infrastructure must be accessible to a broad segment of the population, including underserved or low-income communities. Affordable options should be provided, and charging stations should be located in both urban and rural areas.

DNSH Consideration: Ensure that the deployment of EV infrastructure does not disproportionately favor wealthy areas or leave behind marginalized communities. Consider providing subsidies or financial incentives to make EVs more affordable.

3.3 Public Health and Safety Improvements

Criteria: The adoption of EVs must contribute to improvements in public health by reducing air pollution and harmful emissions. Charging stations must be designed with safety features to protect users from electrical hazards, fire risks, or accidents.

DNSH Consideration: Ensure that charging stations are properly installed and maintained to avoid safety hazards, such as electrical fires or electrocution risks.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Infrastructure

Criteria: EV charging infrastructure must be designed to withstand extreme weather events and other climate-related impacts, such as heatwaves, flooding, and storms. Charging stations should incorporate protective features to ensure continued operation under adverse conditions.

DNSH Consideration: Ensure that the infrastructure is resilient and adaptable to future climate risks, avoiding disruptions to EV charging services.

4.2 Adaptability to Technological Advancements

Criteria: Charging stations and EVs must be designed to accommodate future technological advancements, such as faster charging times, wireless charging, or integration with renewable energy storage systems. Infrastructure should also support vehicle-to-grid (V2G) technology.

DNSH Consideration: Avoid deploying outdated technologies that will become obsolete in the near future, necessitating costly replacements or upgrades.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Energy Performance

Criteria: EV charging stations must be equipped with systems to monitor energy use and efficiency in real time, allowing operators to track and optimize energy consumption. Data on charging station usage and energy savings must be recorded and reported.

DNSH Consideration: Ensure that monitoring systems are properly installed and maintained, avoiding inefficiencies in energy usage and ensuring transparency.

5.2 Reporting on Environmental and Social Impact

Criteria: Manufacturers and infrastructure developers must regularly report on the environmental and social impacts of EV production and charging infrastructure, including metrics on emissions reductions, job creation, and energy performance.

DNSH Consideration: Ensure that reporting is transparent and accurate, avoiding greenwashing or misrepresentation of the environmental benefits of EV adoption.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria: EVs and charging infrastructure must comply with all relevant safety standards, such as those related to electrical safety, fire protection, and structural integrity. Charging stations must have safety features like surge protection and automatic shut-off mechanisms.

DNSH Consideration: Ensure that all safety risks are addressed, including fire and electrical hazards, during the manufacturing and installation of EVs and charging stations.

6.2 Compliance with Environmental Regulations

Criteria: EV manufacturing and infrastructure projects must comply with local and international environmental regulations, including those related to emissions, waste management, and land use. Environmental impact assessments (EIAs) should be conducted before installation.

DNSH Consideration: Ensure compliance with regulations related to hazardous materials (e.g., battery disposal) and minimize harm to local ecosystems during infrastructure development.

7. End-of-Life and Circular Economy Considerations

7.1 Battery Recycling and Repurposing

Criteria: EV manufacturers must have a plan in place for recycling and repurposing batteries at the end of their life. This includes partnerships with battery recycling facilities and secondary use options, such as repurposing EV batteries for stationary energy storage.

DNSH Consideration: Ensure that batteries are not disposed of improperly, leading to environmental harm. Battery recycling must be prioritized to minimize resource extraction and reduce waste.

7.2 Recyclability of EV Components

Criteria: EVs must be designed with recyclability in mind, using materials that can be easily disassembled, recovered, and reused. Manufacturers should strive for a high percentage of recyclable materials in the vehicle's design.

DNSH Consideration: Ensure that the design of EVs does not rely on components that are difficult to recycle or dispose of, such as hazardous materials.

» ISO Standards

1. Energy Performance and Efficiency Standards

ISO 15118: Road Vehicles – Vehicle to Grid Communication Interface

Application: Establishes standards for communication between electric vehicles and the grid. This ensures that EVs can interact with the grid efficiently, enabling smart charging and discharging (vehicle-to-grid or V2G) to optimize energy use.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use in EV manufacturing and charging infrastructure development. This standard helps organizations improve their energy efficiency during the production and operation of EVs and charging stations.

ISO 50002: Energy Audits

Application: Specifies guidelines for conducting energy audits, which are essential for identifying energy-saving opportunities in the production, operation, and installation of EVs and charging stations.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Defines methods for measuring and verifying the energy performance of EVs and charging infrastructure. This ensures that energy consumption is minimized and that efficiency improvements are quantifiable.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for developing environmental management systems in EV manufacturing and infrastructure projects, ensuring that environmental impacts are minimized and sustainability goals are met.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of EVs and charging infrastructure across their entire lifecycle, from material extraction and production to operation and end-of-life disposal.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products

Application: Offers guidelines for calculating the carbon footprint of EVs and charging infrastructure, helping to reduce greenhouse gas emissions throughout their lifecycle.

ISO 14046: Environmental Management – Water Footprint

Application: Defines methods for assessing the water footprint of EV manufacturing and infrastructure projects, ensuring responsible water use and minimizing water-related environmental impacts.

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability

Application: Promotes the use of design principles that facilitate the disassembly and recycling of EV components and charging infrastructure at the end of their life, supporting circular economy goals.

3. Product Design and Battery Management

ISO 18243: Electrically Propelled Road Vehicles – Test Specification for Lithium-Ion Traction Battery Packs and Systems

Application: Provides test specifications for lithium-ion batteries used in EVs, ensuring that battery systems meet safety, performance, and durability requirements.

ISO 6469-1: Electrically Propelled Road Vehicles – Safety Specifications – Part 1: Onboard Rechargeable Energy Storage System (RESS)

Application: Specifies safety requirements for rechargeable energy storage systems (RESS) in EVs, ensuring that the design, installation, and operation of batteries comply with international safety standards.

ISO 12405-4: Electrically Propelled Road Vehicles – Test Specifications for Lithium-Ion Traction Battery Packs and Systems – Part 4: Performance Testing

Application: Establishes methods for testing the performance of lithium-ion batteries in EVs, ensuring that batteries perform efficiently and safely throughout their lifecycle.

ISO 19642-1: Road Vehicles – Automotive Cables – Part 1: Definitions and General Requirements

Application: Defines the general requirements for cables used in EVs, ensuring that electrical systems in the vehicle are safe and reliable.

4. Charging Infrastructure Standards

ISO 15118: Road Vehicles – Vehicle to Grid Communication Interface

Application: Covers the communication interface between electric vehicles and charging stations, enabling bi-directional energy flow (vehicle-to-grid) and smart charging capabilities. It facilitates the integration of EVs with renewable energy systems.

ISO 61851: Electric Vehicle Conductive Charging System

Application: Provides standards for EV charging systems, including the safety and performance requirements for conductive charging stations. This standard applies to both residential and commercial charging installations.

ISO 17409: Electrically Propelled Road Vehicles – Connection to External Electric Power Supply – Safety Requirements

Application: Specifies the safety requirements for connecting EVs to external power supplies, ensuring safe charging processes and protecting users from electrical hazards.

ISO 15118-2: Road Vehicles – Communication Protocols Between Electric Vehicle and Charging Station

Application: Defines the communication protocols between EVs and charging stations, enabling secure and efficient energy transfer and data exchange during the charging process.

5. Safety and Health Standards

ISO 26262: Road Vehicles – Functional Safety

Application: Focuses on functional safety requirements for all electrical and electronic systems in EVs, ensuring that the systems perform reliably and safely under all conditions.

ISO 6469-2: Electrically Propelled Road Vehicles – Safety Specifications – Part 2: Vehicle Operational Safety

Application: Defines the operational safety requirements for EVs, ensuring that vehicles meet stringent safety standards during their operation, including electrical safety and protection from electrical shock.

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides guidelines to ensure the health and safety of workers involved in the manufacturing, installation, and maintenance of EVs and charging infrastructure, preventing workplace accidents and hazards.

ISO 6469-3: Electrically Propelled Road Vehicles – Safety Specifications – Part 3: Electrical Safety

Application: Specifies electrical safety requirements for EVs, including the protection of drivers, passengers, and service personnel from electrical hazards during the operation and charging of EVs.

6. Monitoring and Reporting

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Provides methods for measuring and verifying the energy performance of EVs and charging infrastructure, ensuring that energy consumption is minimized and that efficiency improvements are measurable.

ISO 50006: Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators

Application: Defines methodologies for setting energy baselines and performance indicators for EVs and charging stations, ensuring that improvements in energy efficiency can be tracked and evaluated.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating the environmental benefits of EVs and charging infrastructure to stakeholders, ensuring transparency about emissions reductions, energy savings, and resource efficiency.

7. End-of-Life and Recycling

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Establishes methods for evaluating the environmental performance of EVs and charging infrastructure throughout their lifecycle, including energy use, emissions reductions, and recyclability.

ISO 22628: Road Vehicles – Recyclability and Recoverability – Calculation Method

Application: Specifies a method for calculating the recyclability and recoverability rates of EV components, ensuring that vehicles are designed with circular economy principles in mind and that materials are reused or recycled at the end of the vehicle's life.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Offers guidelines for assessing and reporting the climate-related financial impacts of investments in EVs and charging infrastructure, ensuring alignment with sustainability and climate goals.

» ISICS Codes

1. Manufacture of Electric Vehicles (EVs) and Components

ISIC Code 2910: Manufacture of Motor Vehicles

Application: Includes the manufacturing of electric vehicles (EVs), including cars, trucks, buses, and other motor vehicles powered by electric batteries or fuel cells.

ISIC Code 2930: Manufacture of Parts and Accessories for Motor Vehicles

Application: Covers the production of parts and accessories for electric vehicles, such as batteries, electric motors, charging connectors, inverters, and control systems.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Involves the manufacturing of electric motors and components essential for powering EVs, including transformers and inverters used in EV powertrains.

ISIC Code 2720: Manufacture of Batteries and Accumulators

Application: Specifically relates to the production of batteries and energy storage systems for electric vehicles, including lithium-ion batteries, solid-state batteries, and other rechargeable battery technologies.

2. Charging Infrastructure Development and Operation

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Covers the construction of infrastructure for electric vehicle charging stations, including the installation of power supply systems, charging points, and electrical grids to support EV charging networks.

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Involves the generation and distribution of electricity required to power electric vehicles through charging infrastructure, including the integration of renewable energy sources to power EV charging stations.

ISIC Code 4321: Electrical Installation

Application: Includes the installation of electric vehicle charging systems, including wiring, grid connections, and the installation of charging stations in residential, commercial, and public spaces.

3. Wholesale and Retail Trade of EVs and Components

ISIC Code 4510: Sale of Motor Vehicles

Application: Covers the wholesale and retail sale of electric vehicles, including cars, buses, trucks, and other electric-powered vehicles. This also includes the sale of EV-specific parts and accessories.

ISIC Code 4659: Wholesale of Other Machinery and Equipment

Application: Includes the wholesale distribution of EV components such as batteries, electric motors, and charging systems to manufacturers and retailers.

4. Maintenance and Repair of Electric Vehicles and Charging Infrastructure

ISIC Code 4520: Maintenance and Repair of Motor Vehicles

Application: Refers to the repair and maintenance services for electric vehicles, including battery replacements, motor servicing, software updates, and diagnostics for EV-specific systems.

ISIC Code 8110: Combined Facilities Support Activities

Application: Includes the operation and maintenance of electric vehicle charging stations, ensuring that charging infrastructure operates efficiently and is regularly maintained.

5. Research and Development for EV Technology and Infrastructure

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities focused on improving electric vehicle technologies, such as battery efficiency, vehicle range, electric drivetrains, and charging infrastructure advancements.

6. Battery Recycling and Waste Management

ISIC Code 3830: Materials Recovery

Application: Refers to the recycling and recovery of materials from used electric vehicle batteries and other EV components, contributing to the circular economy by repurposing valuable metals and other materials.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes the management of hazardous waste related to electric vehicle batteries and other components, ensuring proper disposal and recycling of materials like lithium, cobalt, and nickel.

7. Support for EV Charging Networks and Grid Integration

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Involves the management of electricity distribution networks that support the deployment of electric vehicle charging stations, including grid integration with renewable energy sources.

ISIC Code 5229: Other Transportation Support Activities

Application: Includes logistics and support services related to the installation and operation of electric vehicle charging infrastructure, such as vehicle-to-grid (V2G) services.

» Other international or adapted Certifications & Standards

Ensure compatibility with international charging standards like CCS and CHAdeMO for interoperability with EVs from various manufacturers. IEC 61851 – EV Conductive Charging Systems: Specifies safety and operational requirements for charging stations.

» Specific Government Policy (National Standards or Certification)

National Energy Policy on Renewable Energy Act, 2011 (Act 832)

Production of biofuels.

Biofuels offers a pathway for reducing greenhouse gas (GHG) emissions and promoting sustainable energy use by replacing fossil fuels with renewable alternatives.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Greenhouse Gas (GHG) Emissions Reduction

Criteria: Biofuel production must result in at least a 65% reduction in GHG emissions compared to conventional fossil fuels, calculated on a life cycle basis. This includes emissions from feedstock cultivation, processing, and transportation.

DNSH Consideration: Ensure that indirect emissions, such as land-use change (e.g., deforestation or peatland conversion), are minimized to avoid undermining the GHG savings. Proper assessments should be conducted to prevent significant land-use change emissions.

1.2 Use of Sustainable Feedstock

Criteria: Biofuels must be produced from sustainable feedstock, including waste materials, residues, or non-food crops such as algae or agricultural by-products. The use of crops grown on degraded or marginal lands should be prioritized to avoid competition with food production.

DNSH Consideration: Ensure that biofuel production does not lead to significant biodiversity loss, food insecurity, or land degradation. Avoid feedstocks that require significant deforestation, pesticide use, or water consumption.

1.3 Water and Resource Efficiency

Criteria: Biofuel production facilities must use water-efficient processes and should minimize water consumption during feedstock cultivation and fuel production. The use of closed-loop water systems or water recycling technology should be implemented.

DNSH Consideration: Avoid biofuel production methods that deplete local water resources or cause water pollution. Proper management of wastewater and runoff is essential to prevent contamination of nearby water bodies.

1.4 Waste Minimization and Recycling

Criteria: Biofuel production must include waste minimization strategies, including the use of by-products or co-products in other industrial processes. Residual biomass, carbon dioxide (CO_2), and other outputs should be reused or recycled where possible.

DNSH Consideration: Ensure that waste generated during biofuel production, including toxic chemicals or hazardous materials, is properly managed to avoid environmental contamination.

2. Energy Efficiency and System Performance

2.1 High Energy Efficiency in Production Processes

Criteria: Biofuel production facilities must operate with high energy efficiency, achieving at least a 30% reduction in energy use compared to conventional fuel production processes. Energy-efficient equipment, heat recovery, and process optimization should be prioritized.

DNSH Consideration: Avoid energy-intensive biofuel production methods that offset the environmental benefits of using biofuels.

2.2 Integration of Renewable Energy

Criteria: Production facilities must aim to integrate renewable energy sources (e.g., solar, wind, or biogas) to power operations. The use of renewable energy should account for a significant portion of the energy used in the production process.

DNSH Consideration: Ensure that biofuel production is not reliant on non-renewable energy sources, which would undermine the potential environmental benefits.

2.3 Carbon Capture and Utilization

Criteria: Where applicable, biofuel production facilities should incorporate carbon capture and utilization (CCU) technologies to reduce CO_2 emissions during the production process. Captured carbon should be reused in industrial processes or stored safely.

DNSH Consideration: Ensure that CCU technologies do not result in additional energy use or emissions that negate the benefits of biofuel production.

3. Social and Community Benefits

3.1 Job Creation and Local Economic Development

Criteria: Biofuel production must create local employment opportunities in the cultivation, production, and distribution of biofuels. Local hiring and capacity-building initiatives should be prioritized to maximize social benefits.

DNSH Consideration: Ensure that jobs created are safe, provide fair wages, and contribute to local economic development, particularly in rural areas where biofuel feedstock is grown.

3.2 Social Equity and Food Security

Criteria: Biofuel production must not compete with food production or threaten local food security. The use of non-food crops, marginal lands, and waste feedstocks should be prioritized to avoid diverting resources from food production.

DNSH Consideration: Ensure that biofuel production does not increase food prices or limit access to agricultural land for food production, particularly in regions with vulnerable populations.

3.3 Community Engagement and Environmental Justice

Criteria: Biofuel production projects must engage local communities and stakeholders in planning and decision-making processes. The potential social and environmental impacts must be communicated transparently, and benefits should be equitably distributed.

DNSH Consideration: Ensure that marginalized or vulnerable communities are not disproportionately impacted by biofuel production activities, including land use changes or resource allocation.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Feedstock

Criteria: Biofuels must be produced using climate-resilient feedstock that can withstand extreme weather conditions, such as drought-resistant crops or algae. This will ensure a stable supply of biofuels despite changing climate conditions.

DNSH Consideration: Avoid feedstocks that are highly vulnerable to climate change impacts, which could reduce biofuel availability and increase the need for resource-intensive irrigation or fertilization.

4.2 Adaptability to Future Technologies

Criteria: Biofuel production facilities must be designed with flexibility to integrate future technological advancements, such as improved biofuel conversion processes or next-generation biofuels (e.g., advanced biofuels from lignocellulosic materials).

DNSH Consideration: Avoid locking biofuel production facilities into outdated technologies that may become inefficient or obsolete, leading to higher emissions or resource use in the future.

5. Monitoring and Reporting

5.1 Monitoring of GHG Emissions and Energy Performance

Criteria: Biofuel production facilities must include continuous monitoring systems to track GHG emissions and energy performance. Real-time data on fuel conversion efficiency, energy consumption, and emissions should be collected and reported regularly.

DNSH Consideration: Ensure that monitoring systems are accurate, regularly maintained, and accessible for third-party verification to avoid underreporting of emissions or performance data.

5.2 Reporting on Environmental and Social Impact

Criteria: Regular reporting on the environmental and social impacts of biofuel production must be conducted, including information on land use, water use, emissions reductions, job creation, and community benefits.

DNSH Consideration: Ensure transparency in reporting and avoid greenwashing or misrepresenting the environmental and social benefits of biofuel production.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria: Biofuel production facilities must comply with all relevant national and international safety standards, including those related to handling hazardous materials, fire protection, and worker safety. This includes compliance with ISO standards on occupational safety and environmental management.

DNSH Consideration: Ensure that all safety protocols are followed during the production, storage, and transport of biofuels to prevent accidents or environmental contamination.

6.2 Compliance with Environmental Regulations

Criteria: Biofuel production must comply with environmental regulations related to emissions, water use, land use, and waste management. Environmental impact assessments (EIAs) must be conducted for large-scale biofuel production projects.

DNSH Consideration: Ensure that biofuel projects maintain compliance with all environmental laws and regulations throughout their lifecycle, avoiding adverse environmental impacts such as habitat destruction or water pollution.

7. End-of-Life and Circular Economy Considerations

7.1 Recyclability and Reuse of By-products

Criteria: By-products from biofuel production, such as waste biomass, glycerin, or CO_2, must be reused or recycled where possible. Biofuel producers should explore opportunities to sell or repurpose by-products in other industrial processes.

DNSH Consideration: Ensure that by-products are not disposed of in ways that cause environmental harm, such as contributing to landfill waste or pollution of water sources.

7.2 Safe Decommissioning of Biofuel Production Facilities

Criteria: A decommissioning plan must be in place for biofuel production facilities at the end of their operational life. This includes the safe disposal of any hazardous materials and the restoration of the site to its natural condition where possible.

DNSH Consideration: Ensure that decommissioning does not lead to environmental contamination or the improper disposal of biofuel production equipment and materials.

» ISO Standards

1. Energy Management and Efficiency Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for establishing, maintaining, and improving energy management systems in biofuel production facilities. It helps optimize energy use, reduce consumption, and improve overall energy efficiency in biofuel production.

ISO 50002: Energy Audits

Application: Specifies guidelines for conducting energy audits, enabling biofuel producers to assess and identify opportunities for energy efficiency improvements in the production process.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Establishes guidelines for measuring and verifying energy performance improvements in biofuel production facilities. It ensures the effectiveness of energy-saving measures implemented in biofuel production.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for implementing environmental management systems that minimize the environmental impact of biofuel production. It covers resource management, waste reduction, and compliance with environmental regulations.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of biofuel production throughout its life cycle, from feedstock cultivation to processing, distribution, and end use. It helps assess the overall sustainability of biofuel production.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides detailed guidelines for conducting life cycle assessments (LCA) in biofuel production. It helps producers measure and minimize environmental impacts at each stage of the biofuel production process.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification and Communication

Application: Defines the methodology for calculating the carbon footprint of biofuels, allowing producers to assess and report their greenhouse gas (GHG) emissions throughout the production life cycle.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Specifies guidelines for assessing the water footprint of biofuel production, ensuring that water use is managed sustainably throughout the process and that biofuel production does not deplete local water resources.

3. Sustainability and Product Quality Standards for Biofuels

ISO 13065: Sustainability Criteria for Bioenergy

Application: Provides sustainability criteria for bioenergy production, including biofuels. It addresses environmental, social, and economic aspects of biofuel production, ensuring that biofuels are produced sustainably, with minimal adverse effects on the environment and society.

ISO 17225-1: Solid Biofuels – Fuel Specifications and Classes – Part 1: General Requirements

Application: Establishes specifications for solid biofuels, ensuring product quality in terms of fuel characteristics such as moisture content, ash content, and calorific value. This standard is relevant for biofuels made from solid feedstocks, such as agricultural residues or wood.

ISO 20675: Biogas – Biogas Production, Conditioning, Upgrading, and Utilization – Terms, Definitions, and Classification

Application: Provides guidelines for the production and upgrading of biogas as a form of biofuel. It ensures that biogas is produced sustainably and can be used efficiently as a renewable energy source.

4. Health, Safety, and Risk Management Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for ensuring worker safety in biofuel production facilities. It helps identify and mitigate risks associated with hazardous materials, equipment, and processes in biofuel production.

ISO 31000: Risk Management – Guidelines

Application: Offers guidelines for risk management, including identifying, assessing, and managing risks related to biofuel production, such as safety risks, environmental impacts, and financial uncertainties.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Assists biofuel producers in evaluating their environmental performance by setting environmental performance indicators. It supports continuous improvement in managing the environmental impacts of biofuel production.

5. Monitoring and Reporting Standards

ISO 50047: Energy Savings – Determination of Energy Savings in Organizations

Application: Provides guidelines for determining and reporting energy savings achieved through energy efficiency measures in biofuel production. It helps track energy reductions and evaluate the effectiveness of energy-saving initiatives.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for environmental communication, helping biofuel producers report on their environmental impacts, including GHG emissions, water use, and overall sustainability. It ensures transparency and clear communication with stakeholders.

6. End-of-Life and Circular Economy Standards

ISO 22628: Road Vehicles – Recyclability and Recoverability – Calculation Method

Application: Provides methodologies for calculating the recyclability and recoverability of materials used in biofuel production equipment and infrastructure. It supports circular economy practices by ensuring that materials used in biofuel production can be repurposed or recycled.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Evaluates the environmental performance of biofuel production, including waste management, recyclability, and the circular use of resources, ensuring that the biofuel industry minimizes its environmental footprint.

» ISICS Codes

1. Agriculture and Feedstock Production for Biofuels

ISIC Code 0111: Growing of Cereals (Except Rice), Leguminous Crops, and Oil Seeds

Application: Covers the cultivation of crops such as maize, sorghum, soybeans, and other oilseeds used as feedstock for biofuel production, including biodiesel and bioethanol.

ISIC Code 0112: Growing of Rice

Application: Applies to rice cultivation, particularly when the crop's residues (such as rice husks or straw) are used for biofuel production.

ISIC Code 0127: Growing of Beverage Crops

Application: Includes the cultivation of sugarcane and sugar beets, which are used as feedstock for bioethanol production.

ISIC Code 0163: Post-Harvest Crop Activities

Application: Includes post-harvest activities such as cleaning, drying, and processing of biomass used in biofuel production.

2. Manufacture of Biofuels

ISIC Code 2011: Manufacture of Basic Chemicals

Application: Covers the manufacture of bio-based chemicals, such as ethanol, methanol, or biodiesel, through the chemical conversion of biomass. It also includes fermentation and distillation processes for bioethanol production.

ISIC Code 2029: Manufacture of Other Chemical Products

Application: Includes the production of biofuels through chemical processes not classified elsewhere, such as advanced biofuels from algae or lignocellulosic feedstocks.

ISIC Code 3520: Manufacture of Gas; Distribution of Gaseous Fuels Through Mains

Application: Involves the production of biogas and biomethane, including upgrading and conditioning of biogas for use as a renewable fuel in power generation, heating, and transportation.

3. Processing and Distribution of Biofuels

ISIC Code 1920: Manufacture of Refined Petroleum Products

Application: Includes the blending of biofuels (e.g., bioethanol, biodiesel) with fossil fuels for distribution in fuel supply chains. This covers biofuel processing and refining facilities.

ISIC Code 4730: Retail Sale of Automotive Fuel in Specialized Stores

Application: Covers the retail sale of biofuels at service stations, including biodiesel and ethanol blends (e.g., E10, E85).

ISIC Code 4610: Wholesale on a Fee or Contract Basis

Application: Includes the wholesale distribution of biofuels, such as ethanol, biodiesel, or biogas, for industrial, commercial, and transportation use.

4. Waste Management and Biomass Recovery for Biofuels

ISIC Code 3830: Materials Recovery

Application: Involves the recovery and recycling of organic materials, agricultural waste, and other biomass used as feedstock for biofuel production, including biogas plants using organic waste.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes the collection, management, and processing of agricultural and municipal waste used as feedstock for biofuel production, particularly for biogas and waste-to-energy processes.

5. Electricity Generation and Supply for Biofuel Production

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Refers to electricity generation, including bioenergy power plants that use biofuels (such as biogas or biodiesel) to generate electricity for grid distribution or on-site power for biofuel production facilities.

6. Research and Development in Biofuels

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities focused on improving biofuel production technologies, such as advanced biofuel production, algal biofuels, and next-generation biofuels from non-food feedstocks.

7. Transport and Storage of Biofuels

ISIC Code 4923: Freight Transport by Road

Application: Involves the transportation of biofuels, such as biodiesel, bioethanol, or biogas, from production facilities to distribution centers, fuel stations, or industrial users.

ISIC Code 5210: Warehousing and Storage

Application: Includes the storage of biofuels, such as liquid biofuels (e.g., biodiesel, ethanol) or gaseous biofuels (e.g., biogas) in tanks or other storage facilities.

» Other international or adapted Certifications & Standards

Monitoring and Reporting: Continuous monitoring of lifecycle GHG emissions and environmental impacts is required, with certification from schemes like RSB or ISCC.

» Specific Government Policy (National Standards or Certification)

National Energy Policy

» Responsible Agencies/ Regulators

Ministry of Energy

Non motorised transport

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Greenhouse Gas Emission Reduction

Criteria: Non-motorized transport infrastructure must promote alternatives to motorized transport, contributing to a significant reduction in GHG emissions by encouraging walking, cycling, and other active modes of transport.

Key Actions: Develop safe, continuous, and accessible pedestrian and cycling networks; integrate NMT with public transport to reduce car dependency.

DNSH Consideration: Ensure that the development of NMT infrastructure does not contribute to environmental degradation, such as deforestation or loss of biodiversity.

1.2 Promotion of Energy Efficiency

Criteria: NMT infrastructure and services must be designed to promote energy efficiency by reducing reliance on motorized transport, thus minimizing energy consumption in urban mobility.

Key Actions: Establish extensive bicycle lanes, walkways, and pedestrian zones, encouraging human-powered mobility.

DNSH Consideration: Ensure that the construction of NMT infrastructure does not disrupt existing ecosystems or lead to excessive resource use during development.

1.3 Reduction of Air and Noise Pollution

Criteria: NMT must contribute to the reduction of air and noise pollution by reducing the number of motorized vehicles on roads, especially in urban areas.

Key Actions: Prioritize NMT-friendly streetscapes in high-traffic areas, pedestrianize certain urban zones, and create green corridors along cycling routes.

DNSH Consideration: Ensure that the infrastructure development process itself does not cause short-term environmental harm, such as increased dust or noise pollution during construction.

2. Resource Efficiency and Circular Economy

2.1 Use of Sustainable Materials

Criteria: NMT infrastructure (e.g., bike lanes, pedestrian paths) must be built using sustainable materials, ensuring the efficient use of resources.

Key Actions: Use recycled, locally sourced, or low-carbon materials in the construction of NMT infrastructure, including pavements, cycle tracks, and associated amenities.

DNSH Consideration: Avoid the use of materials that could lead to resource depletion or environmental degradation.

2.2 Incorporation of Green Infrastructure

Criteria: NMT projects must incorporate green infrastructure such as green spaces, urban trees, and bioswales to enhance environmental benefits.

Key Actions: Design green corridors, plant trees along NMT routes, and include water-absorbing surfaces to mitigate urban heat island effects and manage stormwater.

DNSH Consideration: Ensure that green infrastructure does not require excessive water or maintenance resources, or lead to the introduction of invasive species.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Design

Criteria: NMT infrastructure must be designed to be resilient to climate change impacts, including extreme weather events, flooding, and heatwaves.

Key Actions: Use permeable materials for pathways to manage stormwater, elevate walkways and bike paths in flood-prone areas, and include shade structures to mitigate heat.

DNSH Consideration: Ensure that NMT projects do not increase the vulnerability of surrounding areas to climate-related hazards, such as flooding due to poor drainage design.

3.2 Integration with Climate Adaptation Measures

Criteria: NMT systems must be integrated with broader climate adaptation strategies, enhancing the mobility system's resilience to climate-related disruptions.

Key Actions: Incorporate NMT into urban mobility plans designed to withstand extreme weather events, such as designing evacuation routes or ensuring access during floods or heatwaves.

DNSH Consideration: Ensure that adaptation measures do not compromise the environment or increase GHG emissions during construction.

4. Social and Economic Benefits

4.1 Inclusivity and Accessibility

Criteria: NMT infrastructure must be accessible to all individuals, including vulnerable groups such as people with disabilities, elderly persons, and low-income populations.

Key Actions: Ensure that NMT infrastructure (e.g., pedestrian paths, cycle lanes) complies with universal design principles, including ramps, wide sidewalks, and tactile paving for visually impaired users.

DNSH Consideration: Avoid designs that exclude certain demographic groups or exacerbate inequalities in access to transportation.

4.2 Job Creation and Local Economic Development

Criteria: NMT projects should contribute to local job creation through construction, operation, and maintenance activities, as well as indirectly by supporting local businesses and sustainable tourism.

Key Actions: Encourage cycling and walking routes that connect to local commercial areas, parks, and cultural sites, creating economic opportunities for small businesses and vendors.

DNSH Consideration: Ensure that jobs created are fairly compensated, safe, and equitably distributed.

4.3 Public Health and Safety

Criteria: NMT infrastructure must improve public health by encouraging physical activity, reducing traffic accidents, and improving urban safety.

Key Actions: Develop pedestrian and cycling paths that are well-lit, protected from traffic, and designed to enhance user safety. Encourage active travel to reduce sedentary lifestyles and associated health risks.

DNSH Consideration: Ensure that NMT infrastructure does not inadvertently create hazards, such as poorly maintained paths or unsafe crossings.

5. Monitoring and Reporting

5.1 Monitoring of Environmental and Social Impacts

Criteria: NMT projects must include mechanisms for monitoring their environmental and social impacts, including GHG emissions reductions, air quality improvements, and public health benefits.

Key Actions: Implement systems to track the usage of NMT infrastructure, monitor changes in air quality, and assess improvements in road safety and public health outcomes.

DNSH Consideration: Ensure that monitoring systems are transparent and include feedback from local communities.

5.2 Reporting on GHG Emissions and Energy Savings

Criteria: NMT projects must report on their contributions to GHG emissions reductions and energy savings, highlighting the environmental benefits of reduced motorized transport use.

Key Actions: Report annually on emissions savings from NMT usage and publish data on air quality improvements and reductions in urban noise levels.

DNSH Consideration: Ensure that reporting is accurate and avoids overstating environmental benefits.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria: NMT infrastructure must comply with international safety standards to protect users, particularly in high-traffic areas.

Key Actions: Implement traffic calming measures, clear signage, safe pedestrian crossings, and protected bike lanes to ensure user safety.

DNSH Consideration: Ensure that safety measures do not create barriers to access or lead to unintended conflicts between pedestrians, cyclists, and motor vehicles.

6.2 Compliance with Land Use and Environmental Regulations

Criteria: NMT infrastructure must comply with local and international land-use and environmental regulations, ensuring that projects are legally and environmentally sound.

Key Actions: Obtain necessary permits for construction, follow land-use planning guidelines, and adhere to environmental impact assessments (EIA) requirements.

DNSH Consideration: Ensure that projects do not violate land-use rights, particularly for marginalized communities, or disrupt sensitive ecosystems.

» ISO Standards

1. Urban Mobility and Infrastructure Standards

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: Provides a set of indicators to assess the sustainability of urban services, including the promotion and integration of non-motorized transport (NMT) systems. It covers metrics related to transportation, air quality, and public health, which are important for evaluating the effectiveness of NMT infrastructure in cities.

ISO 21542: Building Construction – Accessibility and Usability of the Built Environment

Application: Establishes requirements and recommendations for ensuring that urban infrastructure, including NMT pathways like sidewalks and bike lanes, is accessible to all users, including people with disabilities, the elderly, and others with reduced mobility.

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Provides a framework for developing and managing sustainable communities, with a focus on incorporating NMT into urban planning. It encourages the creation of walkable and bike-friendly environments that contribute to reduced emissions and improved public health.

2. Environmental and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental aspects of NMT infrastructure projects. It ensures that the planning, construction, and maintenance of NMT systems are aligned with sustainability goals, such as reducing urban pollution and conserving resources.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in conducting life cycle assessments (LCA) for NMT infrastructure, such as bike lanes, pedestrian walkways, and cycling facilities. It helps assess the environmental impact of materials, energy use, and long-term benefits of reduced motor vehicle dependency.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for optimizing energy use in NMT projects, especially where energy-efficient street lighting, signaling, and electric bicycle infrastructure are used. It promotes energy efficiency in the design and operation of NMT systems.

3. Safety and Traffic Management Standards

ISO 39001: Road Traffic Safety (RTS) Management Systems – Requirements with Guidance for Use

Application: Provides a framework for improving road traffic safety, including measures to protect NMT users such as pedestrians and cyclists. It encourages cities and organizations to integrate safety features like bike lanes, pedestrian crossings, and traffic calming measures to minimize accidents and injuries.

ISO 20474: Earth-Moving Machinery – Safety

Application: Although designed for earth-moving machinery, this standard is relevant for the construction of NMT infrastructure (e.g., sidewalks, bike lanes) to ensure that the materials and methods used in construction meet safety requirements.

ISO 16528: Boilers and Pressure Vessels – Performance Requirements

Application: While related to industrial systems, it has relevance when designing systems for NMT facilities that may include sustainable technologies, such as heating systems for bike-sharing docks or water management in pedestrian pathways.

4. Accessibility and Inclusivity Standards

ISO 17966: Assistive Products for Personal Hygiene – Requirements and Test Methods

Application: Focuses on inclusivity, ensuring that NMT infrastructure is designed to be accessible to all users, particularly those with disabilities. It helps guide the design of accessible features in public spaces, including bike-sharing stations and pedestrian pathways.

ISO 7176: Wheelchairs

Application: Provides guidelines to ensure that NMT pathways, such as sidewalks and pedestrian zones, are accessible to wheelchair users. It includes specifications on gradients, surface materials, and widths to accommodate wheelchairs and other mobility aids.

5. Monitoring and Performance Reporting Standards

ISO 37122: Sustainable Cities and Communities – Indicators for Smart Cities

Application: Specifies performance indicators for smart cities, including those relevant to NMT systems. It provides metrics for evaluating the effectiveness and efficiency of smart infrastructure, such as real-time data collection from bike-sharing systems or monitoring of pedestrian traffic.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating the environmental benefits of NMT projects, such as reduced air pollution, lower GHG emissions, and improved public health. It encourages transparency and public awareness about the advantages of non-motorized transport.

6. Water and Stormwater Management in NMT Infrastructure

ISO 24516-1: Guidelines for the Management of Assets of Water Supply and Wastewater Systems – Part 1: Drinking Water Distribution Networks

Application: Ensures that water management systems, including stormwater management in pedestrian and cycling infrastructure, are designed to reduce flooding and ensure the sustainability of NMT infrastructure.

ISO 16075-1: Guidelines for Treated Wastewater Use for Irrigation Projects – Part 1: The Basis of a Project for the Use of Treated Wastewater

Application: Supports the use of treated wastewater for irrigation in NMT corridors, such as green spaces along cycling paths or pedestrian zones, reducing reliance on freshwater resources.

7. Risk Management Standards

ISO 31000: Risk Management – Guidelines

Application: Provides guidelines for identifying, assessing, and managing risks related to the design, construction, and operation of NMT infrastructure. It helps ensure that NMT projects are resilient to environmental, social, and financial risks.

» ISICS Codes

1. Infrastructure Construction and Maintenance

ISIC Code 4210: Construction of Roads and Railways

Application: Includes the construction of roadways and railways that may incorporate or connect with non-motorized transport (NMT) infrastructure, such as dedicated bike lanes and pedestrian paths alongside or integrated with roads and railways.

ISIC Code 4290: Construction of Other Civil Engineering Projects n.e.c.

Application: Covers the construction of urban infrastructure projects such as cycling paths, pedestrian walkways, bridges, and tunnels specifically for non-motorized transport, as well as NMT-specific civil engineering projects like greenways.

ISIC Code 4312: Site Preparation

Application: Includes activities related to site preparation for the construction of NMT infrastructure, such as clearing land for bike lanes, walkways, or other human-powered transport systems.

2. Transport Infrastructure Operation and Support Services

ISIC Code 5221: Service Activities Incidental to Land Transportation

Application: Covers service activities related to the maintenance and operation of NMT infrastructure, such as managing bicycle-sharing systems, maintaining pedestrian pathways, and providing repair services for NMT infrastructure.

ISIC Code 5222: Service Activities Incidental to Water Transportation

Application: Involves services related to non-motorized water transport, such as kayak rentals or ferrying services for pedestrians and cyclists.

3. Rental and Leasing of Bicycles and Related Equipment

ISIC Code 7721: Renting and Leasing of Recreational and Sports Goods

Application: Refers to the rental and leasing of bicycles, scooters, and other non-motorized transport equipment. This includes bicycle-sharing systems, e-scooter rentals, and similar services in urban areas that promote non-motorized transport.

4. Retail and Repair Services for Bicycles

ISIC Code 4540: Sale, Maintenance, and Repair of Motorcycles and Related Parts and Accessories

Application: Includes retail, maintenance, and repair services for bicycles and related equipment, such as cycle shops, maintenance stations, and repair services that support non-motorized transport.

5. Public Administration and Regulatory Activities

ISIC Code 8413: Regulation of and Contribution to More Efficient Operation of Businesses

Application: Refers to public administration activities that regulate, manage, or promote non-motorized transport systems, including urban mobility planning, NMT-friendly policies, and the development of bike and pedestrian infrastructure.

ISIC Code 9499: Activities of Other Membership Organizations n.e.c.

Application: Involves activities by non-governmental organizations (NGOs), advocacy groups, and associations that promote non-motorized transport, including bicycle advocacy organizations, pedestrian rights groups, and public campaigns supporting NMT infrastructure development.

6. Construction of Sustainable and Green Transport Infrastructure

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes activities related to the design and planning of sustainable NMT infrastructure, such as greenways, bike paths, pedestrian bridges, and other projects that incorporate sustainable urban mobility and environmental considerations.

7. Educational and Community Engagement for NMT

ISIC Code 8530: Higher Education

Application: Involves the provision of courses, workshops, and training programs related to sustainable transport and urban planning, including the design and implementation of non-motorized transport systems.

ISIC Code 8559: Other Education n.e.c.

Application: Covers training programs, workshops, and community initiatives aimed at educating the public on the benefits of NMT, cycling safety, and sustainable urban transport practices.

Electric Rail projects

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Greenhouse Gas (GHG) Emissions Reduction

Criteria: Electric rail projects must achieve at least a 30% reduction in GHG emissions compared to conventional diesel-powered rail or road transport systems. This includes emissions during construction and operation phases.

DNSH Consideration: Ensure that the electric rail system is powered by renewable energy sources (e.g., wind, solar, hydropower) or that plans are in place to transition to renewable energy over time, thereby avoiding reliance on fossil fuels.

1.2 Sustainable Construction Practices

Criteria: The construction of electric rail infrastructure must use sustainable materials with a low environmental footprint, such as recycled steel, concrete with low-carbon cement, and eco-friendly materials for track and station construction.

DNSH Consideration: Avoid significant deforestation, habitat destruction, or the disruption of ecosystems during the construction of rail infrastructure. Conduct environmental impact assessments (EIAs) to identify and mitigate potential environmental risks.

1.3 Efficient Land Use and Biodiversity Protection

Criteria: Rail project routes must be planned to minimize land-use change, and avoid high-biodiversity areas, such as wetlands or protected forests. The design should prioritize using existing transport corridors (e.g., highways or disused rail lines) where possible.

DNSH Consideration: Ensure that the development of new tracks does not lead to habitat fragmentation, displacement of wildlife, or significant degradation of natural areas. Mitigation plans should be in place to restore affected ecosystems.

2. Energy Efficiency and System Performance

2.1 High Energy Efficiency

Criteria: Electric rail systems must use energy-efficient technologies, including regenerative braking systems that recover and reuse energy, as well as energy-efficient locomotives, signaling, and lighting systems in stations and tracks.

DNSH Consideration: Ensure that the energy efficiency of the system is not compromised by excessive energy use in auxiliary systems (e.g., station lighting or cooling), which could offset the environmental benefits.

2.2 Integration with Renewable Energy

Criteria: Electric rail projects should integrate renewable energy sources where possible, such as solar panels installed on station rooftops, renewable energy-powered charging stations, and grid integration with wind or solar power.

DNSH Consideration: Ensure that the integration of renewable energy is feasible and that the rail system is not overly reliant on non-renewable energy sources, which could undermine the sustainability goals.

2.3 Smart Grid Integration and Electrification

Criteria: Rail systems must be designed to integrate with smart grid technology to optimize energy consumption and ensure efficient electricity use during peak and off-peak hours. Electrification of rail lines should include advanced energy management systems to optimize power usage.

DNSH Consideration: Avoid excessive energy consumption from poorly managed electrification systems or lack of coordination with the broader electricity grid.

3. Social and Community Benefits

3.1 Job Creation and Local Economic Development

Criteria: Electric rail projects must create local employment opportunities during construction, operation, and maintenance, particularly in areas such as civil engineering, transportation, and technical support. Training programs should be provided to local communities to develop skills for long-term employment in rail operations.

DNSH Consideration: Ensure that job opportunities provide fair wages and are equitably distributed, particularly in disadvantaged or marginalized communities. Avoid creating jobs that have negative social or environmental impacts.

3.2 Social Equity and Accessibility

Criteria: The design of electric rail systems must ensure accessibility for all passengers, including persons with disabilities, the elderly, and low-income populations. Rail services should be affordable and equitable, with stops in both urban and underserved rural areas.

DNSH Consideration: Ensure that the project does not disproportionately benefit affluent areas or exclude disadvantaged communities. Prioritize inclusive public transportation planning to ensure equal access.

3.3 Community Engagement and Stakeholder Consultation

Criteria: Rail projects must engage local communities, stakeholders, and civil society in the planning and decision-making process. Transparent communication about the project's social and environmental impacts should be provided to affected communities.

DNSH Consideration: Ensure that marginalized communities, especially those near construction sites, are not disproportionately impacted by noise, air pollution, or displacement. Compensation or mitigation measures should be provided for any adverse impacts.

4. Climate Resilience and Adaptation

4.1 Climate-Resilient Infrastructure

Criteria: Electric rail infrastructure must be designed to withstand climate-related risks, including extreme heat, flooding, storms, and sea-level rise. Rail tracks, bridges, and tunnels should be built with materials and designs that are resilient to long-term climate change impacts.

DNSH Consideration: Avoid siting infrastructure in areas highly vulnerable to climate risks, which could lead to costly damage and system failures in the future.

4.2 Adaptability to Future Technologies

Criteria: Electric rail systems must be designed with flexibility for future upgrades, including electrification improvements, battery storage, or renewable energy integration. The design should accommodate the future transition to more advanced or greener technologies.

DNSH Consideration: Ensure that the infrastructure is not locked into outdated technologies, which could become inefficient or obsolete in the near future, requiring costly upgrades or limiting environmental benefits.

5. Monitoring and Reporting

5.1 Monitoring of Energy Use and GHG Emissions

Criteria: Electric rail systems must include continuous monitoring of energy consumption and emissions reductions. Rail operators should track energy usage, GHG emissions savings, and environmental performance over time, using this data to optimize the rail system.

DNSH Consideration: Ensure that monitoring systems are accurate, regularly maintained, and accessible for third-party verification to prevent underreporting of energy usage and emissions data.

5.2 Reporting on Environmental and Social Impacts

Criteria: Regular reporting on the environmental and social impacts of the electric rail project must be conducted, including GHG emissions reductions, land use, community benefits, and job creation. Public access to these reports is essential for transparency and accountability.

DNSH Consideration: Ensure transparency in reporting, and avoid greenwashing or misrepresenting the environmental and social benefits of the project.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria: Electric rail projects must comply with all relevant national and international safety standards, including those for passenger safety, rail operations, and emergency response systems. Rail infrastructure must be equipped with safety features such as emergency stop systems, fire protection, and safety signage.

DNSH Consideration: Ensure that safety protocols are strictly enforced and that rail operators are trained to handle emergencies or accidents. Regular maintenance of infrastructure and safety systems is essential.

6.2 Compliance with Environmental Regulations

Criteria: Rail projects must comply with environmental regulations related to land use, emissions, waste management, and water use. Environmental impact assessments (EIAs) must be conducted to identify and mitigate potential risks.

DNSH Consideration: Ensure that all environmental regulations are followed throughout the project lifecycle, from construction to operation and decommissioning.

7. End-of-Life and Circular Economy Considerations

7.1 Recyclability and Reuse of Materials

Criteria: Rail infrastructure, including tracks, stations, and trains, must be designed with recyclability in mind, prioritizing the use of materials that can be easily dismantled, recycled, or reused at the end of their life. Consideration should be given to sourcing materials that support circular economy principles.

DNSH Consideration: Ensure that construction materials and rail equipment are not disposed of improperly, contributing to landfill waste or environmental degradation.

7.2 Safe Decommissioning of Rail Infrastructure

Criteria: A decommissioning plan must be in place for electric rail infrastructure, including the removal of tracks, stations, and overhead electric systems. The site should be restored to its natural or previous condition, and any hazardous materials must be safely disposed of.

DNSH Consideration: Ensure that decommissioning does not lead to environmental contamination or adverse effects on nearby communities.

» ISO Standards

1. Energy Efficiency and Performance Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for establishing, implementing, maintaining, and improving energy management systems (EMS) in electric rail projects. It helps optimize energy use, reduce consumption, and improve overall energy efficiency in rail operations.

ISO 50002: Energy Audits

Application: Defines guidelines for conducting energy audits, enabling electric rail operators to assess and identify opportunities for energy efficiency improvements in the rail system, stations, and auxiliary systems.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Establishes guidelines for measuring and verifying energy performance improvements in rail systems, ensuring accurate monitoring of energy use and effectiveness of energy-saving measures.

ISO 50006: Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators

Application: Provides methodologies for setting energy baselines and defining energy performance indicators to track and improve energy efficiency in electric rail systems.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for implementing environmental management systems that minimize the environmental impact of electric rail projects. It includes resource management, waste reduction, and compliance with environmental regulations.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of electric rail infrastructure throughout its lifecycle, from construction to operation and eventual decommissioning. It helps identify areas where environmental impacts can be reduced.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides detailed guidelines for conducting life cycle assessments (LCA) of rail systems, including the environmental impacts of materials, energy consumption, emissions, and waste management.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification and Communication

Application: Defines the methodology for calculating the carbon footprint of electric rail infrastructure and operations, allowing rail operators to assess and report their greenhouse gas (GHG) emissions throughout the lifecycle of the project.

3. Safety and Risk Management Standards

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for ensuring the health and safety of workers involved in the construction, operation, and maintenance of electric rail infrastructure. It includes identifying and mitigating risks related to hazardous materials, equipment, and processes.

ISO 31000: Risk Management – Guidelines

Application: Offers guidelines for risk management in electric rail projects, including identifying, assessing, and managing risks related to safety, environmental impacts, and operational uncertainties.

ISO 22163: Railway Applications – Quality Management System – Business Management System Requirements for Rail Organizations

Application: Specifies requirements for a quality management system in rail transport, ensuring consistent and reliable rail operations while maintaining safety, performance, and customer satisfaction.

4. Railway-Specific Standards

ISO 14837-1: Mechanical Vibration – Ground-Borne Noise and Vibration Arising from Rail Systems – Part 1: General Guidance

Application: Provides guidelines for controlling ground-borne noise and vibration caused by rail systems, ensuring that the environmental impacts of vibration are minimized and do not affect nearby communities or structures.

ISO 3095: Acoustics – Railway Applications – Measurement of Noise Emitted by Railbound Vehicles

Application: Specifies the measurement methods and requirements for assessing the noise levels emitted by rail vehicles during operation, ensuring that noise pollution is minimized in residential or environmentally sensitive areas.

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: Provides a set of indicators related to sustainable urban mobility, including the integration of electric rail systems within broader urban infrastructure, public transport, and quality of life improvements.

ISO 21215: Railway Applications – Energy Efficiency of Rolling Stock

Application: Focuses on the energy efficiency of rolling stock (trains, locomotives), including guidelines for improving energy use, optimizing power consumption, and reducing energy losses in electric rail vehicles.

5. Monitoring and Reporting Standards

ISO 50047: Energy Savings – Determination of Energy Savings in Organizations

Application: Provides guidelines for determining and reporting energy savings achieved through energy efficiency measures in electric rail operations. It helps track energy reductions and evaluate the effectiveness of energy-saving initiatives.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for environmental communication, helping rail operators report on their environmental impacts, including GHG emissions, energy use, and overall sustainability. It ensures transparency and clear communication with stakeholders.

6. End-of-Life and Circular Economy Standards

ISO 22628: Road Vehicles – Recyclability and Recoverability – Calculation Method

Application: Provides methodologies for calculating the recyclability and recoverability of materials used in electric rail infrastructure, including tracks, trains, and stations. It supports circular economy practices by ensuring that materials can be repurposed or recycled at the end of the project’s life.

ISO 14031: Environmental Management – Environmental Performance Evaluation

Application: Evaluates the environmental performance of rail infrastructure and operations, ensuring that waste is minimized and materials are recycled or reused wherever possible in the construction, operation, and decommissioning of electric rail projects.

» ISICS Codes

1. Construction of Electric Rail Infrastructure

ISIC Code 4210: Construction of Roads and Railways

Application: Covers the construction of electric railway tracks, bridges, tunnels, stations, and other rail infrastructure, including both urban rail (e.g., light rail or metro systems) and intercity rail.

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Includes the construction of overhead electric lines, substations, and other electrical infrastructure necessary to power electric rail systems, as well as telecommunications systems used for train control and signaling.

2. Manufacture of Rolling Stock and Rail Equipment

ISIC Code 3020: Manufacture of Railway Locomotives and Rolling Stock

Application: Refers to the manufacturing of electric trains, locomotives, railcars, and other rolling stock used in electric rail systems, including light rail, metro, and intercity trains.

ISIC Code 2710: Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus

Application: Covers the manufacture of electric motors, transformers, and other control equipment used in electric rail systems, including power supply systems for rolling stock.

3. Operation and Maintenance of Electric Rail Systems

ISIC Code 4911: Passenger Rail Transport, Interurban

Application: Includes the operation of interurban passenger rail services, including electric trains that transport passengers between cities and regions.

ISIC Code 4912: Freight Rail Transport

Application: Refers to the operation of electric freight trains used for transporting goods and cargo over long distances.

ISIC Code 5221: Service Activities Incidental to Land Transportation

Application: Covers the maintenance and repair of electric rail systems, including track maintenance, station upkeep, and other support activities necessary for rail transport operations.

ISIC Code 8110: Combined Facilities Support Activities

Application: Involves the operation and maintenance of railway stations, train depots, and other facilities that support electric rail systems, including cleaning, safety inspections, and energy management.

4. Electricity Supply for Rail Systems

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Refers to the generation, transmission, and distribution of electricity required to power electric rail systems, including renewable energy sources (e.g., solar, wind) used for powering electric trains and stations.

5. Research and Development for Rail Technology

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers research and development activities focused on improving electric rail technologies, such as energy-efficient locomotives, smart grid integration, and renewable energy-powered rail systems.

6. Passenger Transport and Related Services

ISIC Code 4931: Urban and Suburban Passenger Land Transport

Application: Includes the operation of urban and suburban electric rail systems, such as metros, trams, and light rail, which serve passengers within cities and metropolitan areas.

ISIC Code 4922: Other Passenger Land Transport

Application: Refers to other forms of electric land transportation for passengers, such as specialized or niche electric rail services not covered by other codes.

» Other international or adapted Certifications & Standards

International Electrotechnical Commission (IEC) Standards: Compliance with IEC standards for electric rail systems, including electrical safety, interoperability, and compatibility with national regulations.

» Specific Government Policy (National Standards or Certification)

Ghana National Transport Policy (2020)

» Responsible Agencies/ Regulators

Ministry of Transport

Sustainable Agriculture, Agroforestry and Forestry

Sustainable agriculture practices and technologies

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Greenhouse Gas (GHG) Emissions Reduction

Criteria: Agricultural practices must demonstrate a reduction in GHG emissions compared to conventional methods. Practices such as precision farming, conservation tillage, agroforestry, and the use of renewable energy in farming operations should be prioritized.

DNSH Consideration: Ensure that activities do not lead to significant deforestation, land degradation, or the release of carbon from soil or vegetation.

1.2 Efficient Use of Water Resources

Criteria: Farming practices must improve water use efficiency through techniques such as drip irrigation, rainwater harvesting, and water recycling. Technologies that reduce water consumption in agriculture, such as moisture sensors, must be implemented.

DNSH Consideration: Avoid over-extraction of water resources that could lead to the depletion of local water bodies, aquifers, or harm aquatic ecosystems.

1.3 Protection and Enhancement of Soil Health

Criteria: Practices must promote soil health through organic farming, reduced use of chemical inputs (pesticides, fertilizers), cover cropping, crop rotation, and composting. Technologies that enhance soil fertility and reduce soil erosion must be adopted.

DNSH Consideration: Ensure that practices do not cause soil degradation, erosion, or contamination through excessive use of synthetic fertilizers or harmful chemicals.

1.4 Biodiversity Protection and Ecosystem Conservation

Criteria: Agricultural practices must enhance biodiversity, both in terms of crops and surrounding ecosystems. Agroecological practices such as agroforestry, crop diversification, integrated pest management (IPM), and buffer zones around sensitive habitats must be used.

DNSH Consideration: Ensure that activities do not disrupt local ecosystems, lead to habitat loss, or contribute to the extinction of species.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Inputs

Criteria: Sustainable agriculture must focus on reducing the use of synthetic fertilizers, pesticides, and herbicides through integrated approaches such as precision agriculture and organic farming. Nutrient management technologies and practices that reduce input waste and enhance nutrient recycling should be adopted.

DNSH Consideration: Avoid excessive use of chemical inputs that can lead to water pollution (e.g., eutrophication) and soil degradation.

2.2 Waste Minimization and Recycling

Criteria: Agriculture operations must adopt circular economy practices such as recycling agricultural waste, composting organic material, and converting biomass into bioenergy. Technologies such as anaerobic digestion and biogas production should be considered.

DNSH Consideration: Ensure that waste disposal practices do not harm the environment, such as through open burning of agricultural residues or improper disposal of non-organic materials.

2.3 Sustainable Mechanization and Renewable Energy Use

Criteria: Mechanized farming operations must use energy-efficient and low-emission machinery. The integration of renewable energy technologies (e.g., solar-powered irrigation systems, wind energy for powering equipment) should be prioritized.

DNSH Consideration: Avoid practices that rely heavily on fossil fuels, which would negate the environmental benefits of sustainable agriculture.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Crop Varieties

Criteria: Farming operations must adopt climate-resilient crop varieties that are drought-tolerant, flood-resistant, or heat-resistant to minimize losses due to climate variability and extreme weather events.

DNSH Consideration: Ensure that the adoption of new varieties does not lead to biodiversity loss or negative impacts on local ecosystems.

3.2 Adaptive Farming Practices

Criteria: Farmers must adopt practices that enhance resilience to climate change, such as agroforestry, conservation agriculture, and mixed cropping systems. Technologies that support climate adaptation, such as weather forecasting tools and early warning systems, must be used.

DNSH Consideration: Ensure that adaptation measures do not compromise long-term sustainability, such as over-reliance on irrigation in water-scarce regions.

3.3 Improved Water Management for Climate Resilience

Criteria: Water management practices must be climate-resilient, focusing on strategies to cope with drought, floods, and variable rainfall patterns. Techniques such as water conservation, rainwater harvesting, and water-efficient irrigation must be employed.

DNSH Consideration: Avoid water-intensive crops or farming methods in regions vulnerable to water scarcity.

4. Social and Economic Benefits

4.1 Job Creation and Rural Development

Criteria: Sustainable agriculture practices must contribute to local economic development and create jobs in rural areas, particularly for smallholder farmers, women, and marginalized groups. Support for local farmers' cooperatives and access to finance should be included.

DNSH Consideration: Ensure that job creation and economic benefits do not come at the expense of environmental degradation or exploitation of workers.

4.2 Food Security and Nutritional Benefits

Criteria: Sustainable agriculture must contribute to food security by improving crop yields, diversifying food production, and promoting practices that enhance the nutritional quality of food (e.g., crop rotation, biofortification).

DNSH Consideration: Ensure that agricultural practices do not compromise long-term food security by depleting soil health, water resources, or biodiversity.

4.3 Gender Equity and Social Inclusion

Criteria: Sustainable agricultural projects must actively promote gender equity and social inclusion, providing equal access to resources, training, and decision-making opportunities for women and marginalized communities.

DNSH Consideration: Avoid reinforcing existing inequalities, and ensure that social benefits are equitably distributed across communities.

5. Innovation and Technology Adoption

5.1 Precision Agriculture and Smart Technologies

Criteria: Precision agriculture technologies such as GPS-guided machinery, drones, and sensors must be used to optimize input use (e.g., water, fertilizers) and improve crop management efficiency. These technologies can also help monitor crop health and soil conditions in real-time.

DNSH Consideration: Ensure that the deployment of smart technologies does not lead to the exclusion of smallholder farmers or increase the digital divide.

5.2 Research and Development (R&D) for Sustainable Agriculture

Criteria: Investments must be made in R&D to develop innovative solutions for sustainable agriculture, including breeding climate-resilient crops, improving pest management techniques, and enhancing soil health. Partnerships with agricultural research institutes and universities should be encouraged.

DNSH Consideration: Ensure that technological innovations are appropriate for the local context and do not disrupt traditional farming practices or knowledge systems.

5.3 Access to Sustainable Agricultural Inputs

Criteria: Farmers must have access to sustainable inputs, such as organic fertilizers, certified seeds, and biological pest control agents. Initiatives that improve access to sustainable inputs and reduce dependency on harmful chemicals should be promoted.

DNSH Consideration: Ensure that access to inputs does not create dependencies on specific suppliers, which could harm local farmers' autonomy and economic viability.

6. Monitoring and Reporting

6.1 Monitoring of Environmental and Social Impacts

Criteria: Sustainable agriculture projects must include systems for continuous monitoring of environmental impacts, such as soil health, water use, and biodiversity. Social impacts, such as job creation and food security, must also be monitored.

DNSH Consideration: Ensure that monitoring systems are transparent and allow for third-party verification, to prevent underreporting or misrepresentation of the project's impacts.

6.2 Reporting on GHG Emissions and Resource Efficiency

Criteria: Farmers and agricultural operators must regularly report on their GHG emissions, energy consumption, water use, and input efficiency. Tools such as carbon accounting and water footprint assessments should be used to track performance.

DNSH Consideration: Ensure that reporting is accurate, and avoid greenwashing or overstating the environmental benefits of sustainable agriculture practices.7.2 Sustainable Decommissioning of Agricultural Technologies

Criteria: A plan must be in place for the decommissioning of agricultural infrastructure (e.g., greenhouses, irrigation systems) at the end of its life cycle. This includes recycling materials and restoring land to its natural condition where appropriate.

» ISO Standards

1. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems

Application: Provides a framework for implementing environmental management systems in agriculture, ensuring that farming operations minimize their environmental impact, optimize resource use, and comply with environmental regulations.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of agricultural practices throughout their lifecycle, including energy use, emissions, water consumption, and waste production. This standard helps identify areas for improvement to reduce the environmental footprint.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides detailed guidelines for conducting life cycle assessments (LCA) in agriculture. It helps farmers and agricultural companies assess and mitigate the environmental impacts of their operations, from cultivation to post-harvest.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification and Communication

Application: Defines the methodology for calculating the carbon footprint of agricultural products. It enables farmers and agricultural businesses to assess and report their greenhouse gas (GHG) emissions, contributing to climate change mitigation.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Establishes guidelines for assessing the water footprint of agricultural operations. It ensures sustainable water use, helping farmers monitor and reduce water consumption and manage water resources efficiently.

2. Sustainability and Resource Efficiency Standards

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on incorporating social responsibility in agriculture. This standard covers sustainable practices that benefit local communities, improve labor conditions, and ensure the fair distribution of benefits from sustainable farming.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for establishing and maintaining energy management systems in agricultural operations, optimizing energy use, improving efficiency, and reducing energy consumption throughout the farming process.

ISO 50002: Energy Audits

Application: Defines the methodology for conducting energy audits in agricultural operations, enabling farmers and agribusinesses to identify opportunities for energy efficiency improvements.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Provides guidance for measuring and verifying energy performance improvements in agriculture, ensuring that energy savings and efficiency gains are accurately tracked and reported.

ISO 22000: Food Safety Management Systems

Application: Provides a framework for managing food safety throughout the agricultural production process, ensuring that agricultural practices not only promote sustainability but also ensure food safety, quality, and traceability.

3. Water and Soil Management Standards

ISO 16075-1: Guidelines for Treated Wastewater Use for Irrigation Projects – Part 1: The Basis of a Project for the Use of Treated Wastewater

Application: Specifies guidelines for the safe and sustainable use of treated wastewater in agricultural irrigation, ensuring that water resources are conserved and managed efficiently while protecting public health and the environment.

ISO 10381: Soil Quality – Sampling

Application: Provides guidelines for sampling soil in agricultural operations to assess soil health, contamination levels, and fertility. This standard helps farmers monitor and improve soil quality while reducing the risk of soil degradation.

ISO 25177: Soil Quality – Field Soil Description

Application: Establishes methods for describing and assessing soil conditions in the field, supporting sustainable land use and agricultural practices by providing critical data on soil quality and fertility.

4. Sustainable Agriculture and Organic Farming Standards

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Provides requirements for the certification of organic agricultural products, ensuring that certification bodies meet standards for verifying organic farming practices and products, enhancing consumer trust and market access.

ISO 34101-1: Sustainable and Traceable Cocoa – Part 1: Requirements for Sustainability Management Systems

Application: Specifies requirements for sustainable cocoa farming, including management systems that promote environmental sustainability, social responsibility, and economic viability.

ISO 34101-4: Sustainable and Traceable Cocoa – Part 4: Requirements for Traceability

Application: Establishes guidelines for ensuring the traceability of agricultural products, particularly in sustainable and organic farming, enabling transparency throughout the supply chain.

5. Climate Resilience and Adaptation Standards

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides guidance on how agricultural systems can adapt to climate change, focusing on building resilience to climate risks such as droughts, floods, and extreme weather. It helps farmers develop strategies to cope with climate variability.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Establishes methods for assessing the vulnerability of agricultural systems to climate change impacts, helping farmers identify risks and develop adaptation measures to protect their crops and livelihoods.

6. Waste Management and Circular Economy Standards

ISO 14051: Environmental Management – Material Flow Cost Accounting

Application: Assists in identifying opportunities for improving material flow and reducing waste in agricultural operations. This standard supports the implementation of circular economy principles in agriculture by optimizing the use of inputs and minimizing waste.

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Provides guidelines for evaluating environmental impacts at agricultural sites, helping farmers and agribusinesses assess their operations' environmental performance and identify areas for improvement.

» ISICS Codes

ISIC Codes for Sustainable Agriculture Practices and Technologies:

1. Crop Production and Sustainable Farming Practices

ISIC Code 0111: Growing of Cereals (Except Rice), Leguminous Crops, and Oil Seeds

Application: Includes sustainable cultivation of crops such as maize, wheat, soybeans, and other legumes and oil seeds, using practices that conserve water, improve soil health, and reduce the use of synthetic fertilizers and pesticides.

ISIC Code 0112: Growing of Rice

Application: Covers the cultivation of rice using sustainable practices like alternate wetting and drying (AWD) irrigation methods, which conserve water and reduce methane emissions.

ISIC Code 0113: Growing of Vegetables and Melons, Roots, and Tubers

Application: Refers to the sustainable production of vegetables and root crops, employing techniques such as crop rotation, organic farming, and integrated pest management (IPM) to improve yields and reduce environmental impacts.

ISIC Code 0119: Growing of Other Non-Perennial Crops

Application: Involves sustainable farming of non-perennial crops such as spices, medicinal plants, and floriculture using organic or low-input practices to protect ecosystems.

ISIC Code 0121: Growing of Grapes

Application: Covers the cultivation of grapes using sustainable agriculture practices such as organic farming, water-efficient irrigation, and reduced pesticide use to minimize environmental impact.

ISIC Code 0122: Growing of Tropical and Subtropical Fruits

Application: Includes sustainable production of fruits such as bananas, pineapples, and mangoes using agroforestry, organic farming, and other environmentally friendly techniques.

ISIC Code 0127: Growing of Beverage Crops

Application: Refers to the sustainable cultivation of crops like coffee, tea, and cocoa using shade-grown techniques, organic inputs, and biodiversity-enhancing practices.

2. Livestock Farming and Sustainable Animal Husbandry

ISIC Code 0141: Raising of Cattle and Buffaloes

Application: Covers sustainable livestock farming practices such as rotational grazing, integrated crop-livestock systems, and the use of sustainable feed to reduce methane emissions and improve animal welfare.

ISIC Code 0142: Raising of Horses and Other Equines

Application: Involves sustainable management practices for raising equines, including pasture management, water conservation, and minimizing the environmental impact of feed production.

ISIC Code 0144: Raising of Sheep and Goats

Application: Includes the sustainable raising of sheep and goats, employing grazing management techniques and integrated land use systems to reduce land degradation and improve biodiversity.

ISIC Code 0145: Raising of Swine/Pigs

Application: Refers to sustainable pig farming practices that reduce water and feed waste, employ waste-to-energy systems for manure management, and enhance resource efficiency in livestock operations.

ISIC Code 0149: Raising of Other Animals

Application: Includes the sustainable raising of other animals such as poultry, bees, and fish using organic and regenerative practices that reduce resource consumption and improve environmental outcomes.

3. Agricultural Support Activities and Sustainable Practices

ISIC Code 0161: Support Activities for Crop Production

Application: Covers support activities such as soil preparation, planting, fertilizing, and pest control using sustainable techniques like precision agriculture, organic inputs, and resource-efficient irrigation.

ISIC Code 0162: Support Activities for Animal Production

Application: Includes veterinary services, animal breeding, and feed supply services, focusing on sustainable practices that improve animal health, reduce environmental impact, and enhance resource efficiency in livestock production.

ISIC Code 0163: Post-Harvest Crop Activities

Application: Refers to activities such as cleaning, grading, drying, and packing of agricultural products using energy-efficient technologies, reducing food loss, and ensuring sustainable handling of produce.

ISIC Code 0164: Seed Processing for Reproduction

Application: Involves the sustainable processing of seeds for agricultural use, including organic seed production, ensuring biodiversity conservation, and minimizing the use of synthetic treatments.

4. Forestry and Agroforestry

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Refers to sustainable forest management, reforestation, and afforestation activities that enhance carbon sequestration, protect biodiversity, and improve water quality.

ISIC Code 0220: Logging

Application: Covers sustainable logging activities, including reduced-impact logging (RIL), agroforestry, and selective harvesting techniques that protect forest ecosystems and support long-term sustainability.

ISIC Code 0240: Support Services to Forestry

Application: Includes support services such as forest management consulting, reforestation planning, and monitoring, promoting sustainable forestry practices and ensuring compliance with environmental standards.

5. Water and Irrigation Management

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Involves activities related to the sustainable collection, treatment, and distribution of water for agricultural use, including efficient irrigation systems such as drip irrigation and rainwater harvesting.

ISIC Code 3700: Sewerage

Application: Includes wastewater management services for agriculture, such as treating and recycling agricultural wastewater, supporting circular water use, and reducing water pollution from farm operations.

6. Waste Management and Recycling in Agriculture

ISIC Code 3830: Materials Recovery

Application: Refers to activities focused on recycling and composting agricultural waste, converting organic waste into biogas or biofertilizers, and promoting circular economy practices in agriculture.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes agricultural waste management services such as waste collection, treatment, and disposal, with an emphasis on sustainable waste handling and minimizing environmental impacts.

7. Renewable Energy and Sustainable Mechanization

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Covers the generation and distribution of renewable energy (e.g., solar, wind, biogas) used in agricultural operations to power machinery, irrigation systems, and processing facilities.

ISIC Code 3320: Installation of Industrial Machinery and Equipment

Application: Includes the installation of sustainable agricultural machinery and renewable energy systems, such as solar-powered irrigation, energy-efficient tractors, and precision farming technologies.

Irrigation systems (basic, Intermediate and advanced)

Irrigation systems play a critical role in increasing agricultural productivity, especially in regions where water availability is a limiting factor. However, it is essential that these systems are designed and managed sustainably to optimize water use, reduce energy consumption, and minimize environmental impact.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Water Use Efficiency

Criteria (All Levels): Irrigation systems must demonstrate improved water-use efficiency compared to traditional methods such as flood irrigation. Water-efficient practices and technologies must be implemented to reduce water consumption per unit of agricultural output.

Basic: Hand-operated systems or furrow irrigation that use manual control but employ practices like water scheduling or mulching to reduce water loss.

Intermediate: Motorized or gravity-fed systems with some degree of automation, using scheduling and moderate control over water distribution.

Advanced: Precision irrigation systems (e.g., drip or sprinkler) with sensors and automation for real-time monitoring and control of water distribution, minimizing water use.

DNSH Consideration: Ensure that irrigation does not result in over-extraction of water resources, leading to depletion of aquifers, reduced water availability for downstream users, or harm to aquatic ecosystems.

1.2 Prevention of Soil Degradation

Criteria (All Levels): Irrigation systems must minimize the risk of soil degradation, such as salinization or erosion, through proper design and management. This includes ensuring proper drainage, avoiding waterlogging, and using irrigation techniques that maintain soil health.

Basic: Simple systems with drainage to prevent waterlogging and soil erosion.

Intermediate: Systems with controlled water flow and slope management to reduce erosion and soil loss.

Advanced: Precision systems that deliver water directly to the root zone, preventing surface runoff and maintaining soil structure and fertility.

DNSH Consideration: Ensure that irrigation practices do not contribute to soil degradation, salinization, or erosion, which could reduce long-term land productivity and ecosystem health.

1.3 Integration of Renewable Energy

Criteria (Intermediate and Advanced Levels): Irrigation systems should incorporate renewable energy sources (e.g., solar, wind) to reduce reliance on fossil fuels and minimize the system's carbon footprint.

Intermediate: Incorporation of renewable energy for water pumping, such as solar-powered pumps.

Advanced: Fully integrated systems using renewable energy for both water distribution and monitoring.

DNSH Consideration: Ensure that energy use in irrigation systems does not lead to increased GHG emissions from fossil fuels, which would negate the environmental benefits of efficient water use.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Water Resources

Criteria (All Levels): Irrigation systems must optimize water use through practices such as scheduling, monitoring, and reduced losses due to evaporation, runoff, or leaks.

Basic: Simple, manual systems with scheduled watering times and use of local water sources.

Intermediate: Systems with moderate automation, such as motorized pumps and timers to regulate water flow.

Advanced: Fully automated systems with sensors and controllers that adjust water use based on real-time data such as soil moisture, weather conditions, and crop needs.

DNSH Consideration: Avoid inefficient irrigation practices that waste water, contributing to water scarcity or reduced water availability for other uses.

2.2 Use of Recycled Water

Criteria (Advanced Level): Where feasible, advanced irrigation systems must integrate recycled or treated wastewater for irrigation to reduce dependence on freshwater resources.

Advanced: Use of treated greywater, wastewater, or rainwater harvesting systems as supplementary water sources for irrigation.

DNSH Consideration: Ensure that the use of recycled or treated water is safe and does not pose risks to crops, soil, or human health due to contaminants.

2.3 Adaptability to Climate Variability

Criteria (Intermediate and Advanced Levels): Irrigation systems must be designed to adapt to changing climate conditions, such as fluctuating water availability, increased temperatures, and erratic rainfall patterns.

Intermediate: Systems that can be adjusted to changing water availability and climatic conditions.

Advanced: Systems with advanced monitoring and control capabilities that allow real-time adaptation to climate variability, optimizing water use during droughts or floods.

DNSH Consideration: Ensure that irrigation systems are adaptable and resilient to future climate risks, preventing long-term water scarcity or crop losses.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Design

Criteria (All Levels): Irrigation systems must be designed to withstand climate-related risks such as droughts, floods, and extreme temperatures. Systems should prioritize water conservation and efficiency in regions prone to water scarcity.

Basic: Simple systems with basic water conservation measures, such as scheduling during cooler hours to reduce evaporation.

Intermediate: Systems with water conservation techniques that adjust to moderate changes in water availability and climatic conditions.

Advanced: Systems equipped with advanced technology, such as weather-based controllers, that optimize water use based on climate forecasts and real-time conditions.

DNSH Consideration: Ensure that irrigation systems do not exacerbate vulnerability to climate change by depleting water resources or creating reliance on unsustainable water sources.

3.2 Resilience to Natural Disasters

Criteria (Advanced Level): Advanced irrigation systems should be designed to remain operational during natural disasters such as floods or droughts, providing stability to agricultural systems in times of climate stress.

Advanced: Use of backup power systems (e.g., solar, battery storage) and flood-resilient designs that prevent damage to irrigation infrastructure during extreme weather events.

DNSH Consideration: Ensure that irrigation infrastructure is resilient to extreme weather events and does not contribute to long-term agricultural or ecological harm.

4. Social and Economic Benefits

4.1 Job Creation and Local Economic Development

Criteria (All Levels): Irrigation projects must contribute to local job creation and economic development by employing local workers for installation, maintenance, and operation of systems.

Basic: Simple irrigation systems that can be easily installed and maintained by local labor.

Intermediate: Systems requiring more technical expertise for installation and maintenance, creating jobs for skilled workers.

Advanced: Systems that generate long-term employment through ongoing management, monitoring, and technical maintenance.

DNSH Consideration: Ensure that jobs created through irrigation projects provide fair wages and equitable access to training and employment opportunities.

4.2 Food Security and Improved Yields

Criteria (All Levels): Irrigation systems must contribute to increased food production, particularly in regions prone to water scarcity, by improving crop yields through reliable and efficient water supply.

Basic: Systems that provide consistent water supply during critical growth periods.

Intermediate: Systems that optimize water distribution and reduce crop stress, leading to higher yields.

Advanced: Systems that precisely monitor and adjust water use, optimizing crop growth and productivity while minimizing resource inputs.

DNSH Consideration: Ensure that irrigation practices do not reduce long-term soil fertility or water availability, which could undermine food security.

5. Monitoring and Reporting

5.1 Monitoring of Water Use and Efficiency

Criteria (Intermediate and Advanced Levels): Irrigation systems must include continuous monitoring of water use and efficiency. Water meters, soil moisture sensors, and remote sensing technologies should be used to track and optimize water application.

Intermediate: Manual or semi-automated monitoring systems that allow farmers to track water use.

Advanced: Fully automated systems with sensors and remote monitoring, providing real-time data on water usage, soil moisture levels, and weather conditions.

DNSH Consideration: Ensure that monitoring systems are accessible and user-friendly, preventing misuse or underreporting of water use.

5.2 Reporting on Environmental and Social Impacts

Criteria (Intermediate and Advanced Levels): Irrigation projects must report on their environmental and social impacts, including water use efficiency, crop yields, and the impact on local communities. Transparency in reporting helps stakeholders assess the sustainability of irrigation systems.

Intermediate: Periodic reporting on water use, crop productivity, and social benefits.

Advanced: Continuous, real-time reporting on system performance, including water use efficiency, GHG emissions reductions, and the impacts on food security.

DNSH Consideration: Ensure that reporting is accurate and transparent, avoiding underreporting or overstating the benefits of irrigation systems.

6. Safety and Regulatory Compliance

6.1 Compliance with Water and Environmental Regulations

Criteria (All Levels): Irrigation systems must comply with local and national regulations regarding water use, environmental protection, and resource management.

Basic: Adherence to local water extraction limits and basic environmental standards.

Intermediate: Compliance with more stringent water management and environmental impact regulations.

Advanced: Full integration with water management frameworks, adhering to all local and international environmental standards.

DNSH Consideration: Ensure that water extraction for irrigation does not violate local or regional water rights or environmental protection laws.

6.2 Safety Protocols for System Operation

Criteria (All Levels): Irrigation systems must have safety protocols in place to ensure the safe operation of equipment, including pumps, motors, and monitoring devices. Proper training and maintenance should be provided to prevent accidents.

Basic: Basic safety training for system operators.

Intermediate: Safety protocols for motorized equipment and periodic maintenance checks.

Advanced: Comprehensive safety programs, including remote monitoring and automated safety features.

DNSH Consideration: Ensure that safety protocols are enforced, particularly when systems involve complex machinery or renewable energy integration.

» ISO Standards

ISO 46001 – Water Efficiency Management Systems: Optimizes water use and improves water-use efficiency in irrigation systems.

ISO 14046 – Water Footprint: Assesses the water footprint and overall impact on water resources.

ISO 50001 – Energy Management Systems: Improves energy efficiency in irrigation systems, including integration of renewable energy sources.

ISO 14001 – Environmental Management Systems: Ensures sustainable environmental practices in irrigation systems, reducing resource use and minimizing pollution.

ISO 14067 – Carbon Footprint of Products: Measures and reports the carbon footprint of irrigation systems, focusing on energy use and GHG emissions.

ISO 31000 – Risk Management: Provides a framework for managing risks related to water resources, climate change, and operational reliability in irrigation projects.

» ISICS Codes

1. Water Management and Efficiency Standards

ISO 46001: Water Efficiency Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing water resources efficiently in irrigation systems. It helps optimize water use, reduce consumption, and ensure sustainable water management practices.

ISO 16075-1: Guidelines for Treated Wastewater Use for Irrigation Projects – Part 1: The Basis of a Project for the Use of Treated Wastewater

Application: Specifies guidelines for the safe and sustainable use of treated wastewater in irrigation systems, ensuring that water reuse minimizes health risks and environmental impacts.

ISO 9261: Agricultural Irrigation Equipment – Emitting Pipe Systems – Specifications and Test Methods

Application: Sets performance requirements for drip irrigation systems, including emission uniformity, durability, and resistance to environmental factors. It ensures that irrigation systems deliver water efficiently and evenly across agricultural fields.

ISO 11446: Equipment for Irrigation – Center Pivot and Moving Lateral Irrigation Machines with Sprayers or Sprinklers – Requirements and Test Methods

Application: Establishes performance standards for intermediate and advanced irrigation systems such as center pivots and lateral move systems, ensuring efficient water distribution and operational reliability.

2. Soil and Water Quality Standards

ISO 10381-1: Soil Quality – Sampling – Part 1: Guidance on the Design of Sampling Programmes

Application: Provides guidelines for soil sampling and monitoring in irrigated lands, ensuring that soil health is maintained and that irrigation does not lead to soil degradation or salinization.

ISO 11074: Soil Quality – Vocabulary

Application: Defines terminology related to soil quality, providing a framework for assessing and maintaining soil health in irrigated agricultural systems.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Specifies guidelines for assessing the water footprint of irrigation systems. It ensures sustainable water use and helps in tracking the environmental impact of water withdrawals and consumption in agriculture.

3. Sustainability and Environmental Management Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for implementing environmental management systems in irrigation projects, ensuring that water use, energy consumption, and environmental impacts are managed sustainably.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of irrigation systems throughout their lifecycle, including the use of materials, energy consumption, and the impact on water resources and ecosystems.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides detailed guidelines for conducting life cycle assessments (LCA) in irrigation systems, enabling farmers and engineers to assess the environmental impacts and resource efficiency of their irrigation methods.

4. Energy and Efficiency Standards for Irrigation Systems

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use in irrigation systems, especially in intermediate and advanced systems that rely on electric or solar-powered pumps. It helps optimize energy consumption and improve overall energy efficiency.

ISO 50002: Energy Audits

Application: Defines guidelines for conducting energy audits in irrigation systems, helping farmers and irrigation managers identify energy-saving opportunities and improve system performance.

ISO 50015: Energy Management Systems – Measurement and Verification of Energy Performance

Application: Provides methods for measuring and verifying energy performance in irrigation systems, ensuring that energy-efficient technologies deliver expected energy savings.

5. Risk Management and Resilience Standards

ISO 31000: Risk Management – Guidelines

Application: Offers a framework for managing risks associated with irrigation systems, including drought, floods, and system failures. It helps ensure that irrigation projects are designed to mitigate risks and are resilient to climate variability.

ISO 14091: Adaptation to Climate Change – Guidelines on Vulnerability, Impacts, and Risk Assessment

Application: Provides guidelines for assessing the vulnerability of irrigation systems to climate change impacts, helping farmers and water managers design systems that are resilient to changing climate conditions.

6. Irrigation System Safety and Performance Standards

ISO 7749-2: Equipment for Irrigation – Sprayers – Part 2: Test Methods

Application: Specifies test methods for evaluating the performance and safety of irrigation sprayers. It ensures that irrigation equipment operates safely and delivers water efficiently.

ISO 15099: Thermal Performance of Windows, Doors, and Shading Devices – Detailed Calculations

Application: Although primarily for building applications, this standard can be adapted for advanced irrigation systems that use shading or cooling mechanisms for water conservation in hot climates.

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for managing worker safety in irrigation projects, ensuring that the installation, operation, and maintenance of irrigation systems are performed safely, especially in large-scale operations using mechanized systems.

7. Monitoring and Reporting Standards

ISO 50047: Energy Savings – Determination of Energy Savings in Organizations

Application: Provides guidelines for determining energy savings achieved through energy-efficient irrigation systems, helping farmers and engineers track performance improvements and system optimization.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for reporting the environmental performance of irrigation systems, including water use efficiency, energy consumption, and environmental impacts.

» Other international or adapted Certifications & Standards

Global G.A.P. Certification: Standards for good agricultural practices ensuring food safety, environmental sustainability, and worker welfare.

» Applicable Tax Incentives

Any applicable tax incentive should align with the Income Tax Act 2015, (Act 896), the VAT Act 2013, (Act 870) and the Exemptions Act 2022 (Act 1083).

» Specific Government Policy (National Standards or Certification)

National Irrigation Policy, Strategies and Regulatory Measures

» Responsible Agencies/ Regulators

Ministry of Food and Agriculture (MoFA), and Ghana Irrigation Development Authority (GIDA)

Control and Management of Pest and Disease (basic, Intermediate and advanced)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Reduction of Chemical Pesticide Use

Criteria (All Levels): Pest and disease management must prioritize reducing or replacing harmful chemical pesticides with more sustainable alternatives to minimize environmental contamination and negative impacts on biodiversity.

Basic: Use of minimal chemical inputs and emphasis on manual/mechanical control, such as handpicking pests or traps.

Intermediate: Integrated Pest Management (IPM) approaches with a balanced use of chemical, biological, and mechanical controls.

Advanced: Reliance on advanced biological controls, precision agriculture, and organic alternatives, with minimal or no chemical inputs.

DNSH Consideration: Ensure that chemical pesticides, if used, do not lead to soil degradation, water contamination, or harm to non-target species, including pollinators.

1.2 Promotion of Biodiversity

Criteria (All Levels): Pest and disease management strategies must support and enhance biodiversity by encouraging natural predators, beneficial insects, and crop diversification.

Basic: Simple strategies like crop rotation and mixed cropping to reduce pest pressure and encourage natural predators.

Intermediate: Use of biological pest control agents such as beneficial insects (e.g., ladybugs, parasitoid wasps) and targeted chemical applications.

Advanced: Ecosystem-based approaches such as agroforestry, polycultures, and habitat creation to foster natural pest control.

DNSH Consideration: Ensure that pest management practices do not result in the loss of beneficial species or harm biodiversity through broad-spectrum pesticide use.

1.3 Soil and Water Conservation

Criteria (All Levels): Pest and disease control methods must not degrade soil or water quality. Proper management of runoff, soil health, and nutrient cycles is critical to long-term sustainability.

Basic: Use of basic soil conservation techniques such as mulching and manual pest removal to reduce water contamination.

Intermediate: IPM strategies with minimal chemical inputs and improved soil management through targeted application methods.

Advanced: Precision technologies that optimize pesticide application and reduce leaching or runoff into waterways.

DNSH Consideration: Avoid pest control methods that increase soil erosion, water contamination, or harm aquatic ecosystems through chemical runoff.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Inputs

Criteria (All Levels): Inputs such as pesticides, fertilizers, and biological agents must be used efficiently to minimize waste and environmental impact.

Basic: Limited and targeted application of pesticides with manual or mechanical techniques to reduce overuse.

Intermediate: Use of monitoring tools such as pest scouting or pheromone traps to apply inputs only when needed.

Advanced: Precision agriculture technologies, such as drones and sensors, to ensure precise and minimal use of pesticides or biological controls.

DNSH Consideration: Ensure that inputs are not overused or misapplied, leading to unnecessary waste or contamination.

2.2 Adoption of Biological Control Methods

Criteria (Intermediate and Advanced Levels): Biological control methods, such as introducing natural predators or biological pesticides, must be integrated into pest management systems to reduce reliance on chemical products.

Intermediate: Use of natural predators (e.g., predatory insects or nematodes) in combination with selective chemical applications.

Advanced: Full reliance on biological controls, such as microbial pesticides (e.g., Bacillus thuringiensis), beneficial insects, or fungi.

DNSH Consideration: Ensure that biological control agents do not pose a risk to non-target species or disrupt local ecosystems.

2.3 Circular Economy in Pest Management

Criteria (Advanced Level): Advanced pest control systems should incorporate circular economy principles, using farm by-products, compost, or organic waste to create natural pest control solutions.

Advanced: Use of compost teas, biofertilizers, and organic waste to encourage soil health and reduce pest pressure naturally.

DNSH Consideration: Ensure that circular approaches to pest management do not inadvertently introduce pests or pathogens into the system.

3. Climate Resilience and Adaptation

3.1 Adaptation to Climate-Driven Pest and Disease Outbreaks

Criteria (All Levels): Pest management strategies must be adaptable to increasing pest and disease pressures driven by climate change, such as the proliferation of pests due to warmer temperatures or changing rainfall patterns.

Basic: Manual monitoring and simple pest control practices that can be adapted to changing pest pressures.

Intermediate: IPM approaches with regular pest monitoring, predictive pest models, and targeted interventions based on climate data.

Advanced: Use of advanced technologies such as climate-based pest forecasting models and adaptive IPM systems that respond in real time to pest pressures.

DNSH Consideration: Ensure that pest management strategies are resilient and do not cause long-term harm to ecosystems under changing climatic conditions.

3.2 Pest-Resilient Crop Varieties

Criteria (All Levels): Pest and disease management must include the use of crop varieties that are resistant or tolerant to pests and diseases to minimize the need for external inputs.

Basic: Use of locally adapted varieties with natural resistance to common pests and diseases.

Intermediate: Introduction of improved crop varieties through selective breeding programs.

Advanced: Use of advanced pest-resistant varieties, including those developed through genetic engineering or modern breeding techniques.

DNSH Consideration: Ensure that the adoption of pest-resistant varieties does not lead to reduced biodiversity or increased vulnerability to other environmental factors.

4. Social and Economic Benefits

4.1 Job Creation and Capacity Building

Criteria (All Levels): Pest and disease management systems must create local employment and build farmer capacity for sustainable pest control techniques.

Basic: Manual pest control methods that create jobs for local labor.

Intermediate: Training programs for farmers in IPM and biological pest control methods.

Advanced: Specialized training in precision agriculture and pest monitoring technologies.

DNSH Consideration: Ensure that job opportunities are equitably distributed and that capacity-building initiatives reach marginalized or vulnerable farming communities.

4.2 Improved Food Security and Crop Yields

Criteria (All Levels): Pest and disease control systems must lead to improved crop yields and enhanced food security by reducing crop losses.

Basic: Simple pest control methods that reduce crop damage and improve yields.

Intermediate: IPM systems that balance pest control with crop productivity improvements.

Advanced: Advanced precision pest control systems that optimize yields and minimize input use.

DNSH Consideration: Ensure that pest management practices do not compromise long-term crop productivity by harming soil health or biodiversity.

5. Monitoring and Reporting

5.1 Monitoring of Pest Populations and Disease Spread

Criteria (Intermediate and Advanced Levels): Systems must include regular monitoring of pest populations and disease outbreaks using appropriate tools and technologies.

Intermediate: Use of manual pest scouting, pheromone traps, and crop monitoring to track pest populations.

Advanced: Use of drones, remote sensing, and precision tools to monitor pest and disease levels in real time.

DNSH Consideration: Ensure that monitoring systems are accurate, accessible, and provide real-time data to minimize unnecessary pesticide use.

5.2 Reporting on Environmental and Social Impacts

Criteria (Intermediate and Advanced Levels): Pest management systems must include reporting on environmental impacts, including pesticide use, biodiversity protection, and social benefits such as improved yields or job creation.

Intermediate: Periodic reporting on pesticide use, pest populations, and crop yields.

Advanced: Continuous reporting on system performance, including environmental impacts, biodiversity gains, and social benefits.

DNSH Consideration: Ensure that reporting is transparent and prevents underreporting or overstating of environmental and social benefits.

6. Safety and Regulatory Compliance

6.1 Compliance with Safety Standards

Criteria (All Levels): Pest management systems must comply with national and international safety standards for pesticide use, worker safety, and environmental protection.

Basic: Compliance with local pesticide regulations and worker safety protocols.

Intermediate: IPM systems that comply with both local and international safety standards for chemical use and worker health.

Advanced: Full compliance with organic or agroecological certification standards, focusing on non-toxic inputs and worker safety.

DNSH Consideration: Ensure that all safety protocols are followed, particularly when dealing with toxic chemicals or complex biological agents.

6.2 Certification and Regulatory Compliance

Criteria (Advanced Level): Advanced pest management systems should aim for certification under recognized sustainable agriculture or organic farming standards.

Advanced: Certification through programs such as GlobalGAP, Organic Certification, or Rainforest Alliance.

DNSH Consideration: Ensure that certification processes are accessible to smallholder farmers and that regulatory compliance is maintained.

» ISO Standards

1. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for implementing environmental management systems (EMS) to ensure that pest and disease control methods minimize environmental impact. This standard helps organizations integrate sustainable pest management into their broader environmental strategies.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of pest and disease control strategies, including pesticide use and biological control. This standard ensures that the full lifecycle of inputs, such as chemical pesticides and biological agents, is considered in environmental impact assessments.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Provides guidelines for conducting life cycle assessments (LCA) for pest management systems. This allows pest control methods to be evaluated in terms of their environmental sustainability and long-term impacts.

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on social responsibility, ensuring that pest management practices benefit local communities and ecosystems without harming human health or biodiversity.

2. Integrated Pest Management (IPM) and Agricultural Standards

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Covers food safety management systems in agricultural practices, including pest and disease management. It ensures that pest control methods used in food production are safe and compliant with food safety regulations.

ISO 16140-2: Microbiology of the Food Chain – Method Validation – Part 2: Protocol for the Validation of Alternative (Proprietary) Methods Against a Reference Method

Application: Applies to the testing and validation of biological control agents in agriculture, ensuring that microbial or biological pest control methods are safe and effective.

ISO 22002-3: Prerequisite Programmes on Food Safety – Part 3: Farming

Application: Provides guidelines for implementing prerequisite programs in food production, which include the management of pests and diseases. This standard helps ensure that pest control is integrated into broader farming practices safely and sustainably.

3. Pesticide and Agrochemical Safety Standards

ISO 19932-1: Equipment for Crop Protection – Knapsack Sprayers – Part 1: Safety and Environmental Requirements

Application: Specifies safety and environmental requirements for manually operated sprayers used for pesticide application in pest control, ensuring that pesticide distribution is safe for the user and minimizes environmental contamination.

ISO 19932-2: Equipment for Crop Protection – Knapsack Sprayers – Part 2: Test Methods

Application: Provides test methods for ensuring that knapsack sprayers used in pesticide application meet safety and performance standards, minimizing leakage and overapplication of chemicals.

ISO 10625: Equipment for Crop Protection – Sprayer Nozzles – Colour Coding for Identification

Application: Provides standardized color coding for sprayer nozzles used in pest and disease control, ensuring accurate pesticide application rates and minimizing waste and environmental harm.

ISO 1750: Pesticides and Other Agrochemicals – Common Names

Application: Standardizes the nomenclature of pesticides and agrochemicals to avoid confusion and ensure that pesticide use is regulated and controlled according to established guidelines.

ISO 18512: Soil Quality – Guidance on Long and Short Term Storage of Soil Samples

Application: Provides guidelines for soil quality monitoring, especially relevant for understanding the impact of pesticide use and biological control agents on soil health over time.

4. Biological Pest Control Standards

ISO 17088: Specifications for Compostable Plastics

Application: Provides specifications for biodegradable materials, which can include biological control delivery systems such as traps or biopesticide carriers. This ensures that biological pest control methods minimize waste and environmental harm.

ISO 17687: Tractors and Machinery for Agriculture and Forestry – Equipment for Crop Protection – Tractor-Mounted Sprayers – Nozzle Guards

Application: Covers the requirements for nozzle guards on tractor-mounted sprayers used in pest control. It ensures that pesticide application is targeted and minimizes off-target spray drift, reducing environmental contamination.

ISO 22369-1: Crop Protection Equipment – Drift Classification of Spraying Equipment – Part 1: Classes

Application: Defines classes of spray drift control for equipment used in pest control, helping to reduce the spread of pesticides to non-target areas and protecting sensitive ecosystems.

5. Occupational Health and Safety in Pest Control

ISO 45001: Occupational Health and Safety Management Systems

Application: Provides a framework for managing worker safety during pest and disease control operations, particularly for those involved in applying pesticides or biological agents. It helps ensure the safe handling of chemicals and the protection of workers' health.

ISO 11014: Safety Data Sheet for Chemical Products – Content and Order of Sections

Application: Specifies the format and content of safety data sheets for chemical pesticides and other agrochemicals, ensuring that farmers, workers, and pest control operators have access to critical safety information when handling hazardous substances.

6. Monitoring, Reporting, and Risk Management Standards

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for identifying, assessing, and managing risks associated with pest and disease control, including the use of chemical pesticides, biological agents, and IPM systems. This ensures that potential risks to the environment, human health, and crops are minimized.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Offers guidelines for assessing the water footprint of pest and disease management activities, particularly for pesticide use that could contaminate water resources. It helps ensure that pest management strategies are water-efficient and environmentally sustainable.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating the environmental impacts of pest management practices, ensuring transparency in reporting and promoting public awareness of sustainable pest control measures.

7. Standards for Data-Driven Pest Management Systems

ISO 19156: Geographic Information – Observations and Measurements

Application: Supports data collection and monitoring for pest and disease control using geographic information systems (GIS) and precision agriculture technologies. It enables real-time monitoring of pest populations and disease outbreaks to inform decision-making.

ISO 22003: Food Safety Management Systems – Requirements for Bodies Providing Audit and Certification of Food Safety Management Systems

Application: Ensures that certification bodies overseeing pest management in agriculture comply with rigorous food safety standards, helping to promote the adoption of safe and sustainable pest control practices in certified food production systems.

» ISICS Codes

1. Crop and Animal Production Activities Involving Pest and Disease Control

ISIC Code 0111: Growing of Cereals (Except Rice), Leguminous Crops, and Oil Seeds

Application: Involves sustainable pest and disease management for crops such as maize, wheat, soybeans, and other cereals, using manual, IPM, or advanced biological controls.

ISIC Code 0112: Growing of Rice

Application: Includes the control of pests and diseases in rice cultivation through integrated or advanced pest management techniques.

ISIC Code 0113: Growing of Vegetables and Melons, Roots, and Tubers

Application: Refers to pest and disease control in vegetable farming, including using organic pest control methods, IPM, or precision technologies.

ISIC Code 0119: Growing of Other Non-Perennial Crops

Application: Covers pest management for non-perennial crops such as spices, medicinal plants, and floriculture through sustainable methods like crop rotation, mechanical controls, or biological agents.

ISIC Code 0121: Growing of Grapes

Application: Involves pest and disease control for grape cultivation through sustainable agricultural practices, including organic treatments or advanced monitoring systems.

ISIC Code 0122: Growing of Tropical and Subtropical Fruits

Application: Includes sustainable pest management practices for crops like bananas, mangoes, and pineapples using biological controls or precision farming techniques.

ISIC Code 0127: Growing of Beverage Crops

Application: Involves pest and disease management for crops like coffee, tea, and cocoa using integrated approaches or advanced IPM systems.

ISIC Code 0141: Raising of Cattle and Buffaloes

Application: Refers to disease control in cattle and buffalo farming through veterinary services, integrated health management, and advanced biosecurity measures.

ISIC Code 0145: Raising of Swine/Pigs

Application: Includes pest and disease control measures in pig farming, focusing on integrated health management systems and advanced disease monitoring.

2. Support Activities for Pest and Disease Control in Agriculture

ISIC Code 0161: Support Activities for Crop Production

Application: Includes services related to pest and disease control in crop production, such as IPM consulting, spraying services, and biological pest control.

ISIC Code 0162: Support Activities for Animal Production

Application: Covers pest and disease control services for livestock, including veterinary services and disease prevention activities.

ISIC Code 0163: Post-Harvest Crop Activities

Application: Refers to pest control activities in post-harvest handling, such as fumigation and biological control to prevent pests from damaging stored crops.

3. Production of Pest and Disease Control Products

ISIC Code 2021: Manufacture of Pesticides and Other Agrochemical Products

Application: Covers the production of chemical pesticides, herbicides, fungicides, and other agrochemicals used in pest and disease control for crops and livestock.

ISIC Code 2029: Manufacture of Other Chemical Products n.e.c.

Application: Includes the production of biological pest control products such as biopesticides, microbial pesticides, and natural repellents.

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves research activities related to the development of new pest management technologies, such as biological controls, genetically modified pest-resistant crops, or advanced IPM systems.

4. Pest Control and Management Services

ISIC Code 8129: Other Cleaning Activities

Application: Refers to professional pest control services, including fumigation, rodent control, and other pest management services for both agricultural and non-agricultural settings.

ISIC Code 8130: Landscape Care and Maintenance Service Activities

Application: Includes the provision of pest management services as part of landscape maintenance, particularly in maintaining healthy ecosystems by controlling pests through biological or mechanical means.

5. Wholesale and Retail Trade of Pest Management Products

ISIC Code 4690: Non-Specialized Wholesale Trade

Application: Involves the wholesale distribution of pesticides, biological pest control agents, and other agricultural inputs for pest and disease management.

ISIC Code 4789: Retail Sale via Stalls and Markets of Other Goods

Application: Refers to the retail sale of pest control products, including pesticides, biological agents, and pest control devices for agricultural use.

» Other international or adapted Certifications & Standards

Organic Certification: Certification according to standards from organisations like IFOAM for organic farming.

» Applicable Tax Incentives

Any applicable tax incentive should align with the Income Tax Act 2015, (Act 896), the VAT Act 2013, (Act 870) and the Exemptions Act 2022 (Act 1083).

» Specific Government Policy (National Standards or Certification)

Integrated Pest Managment Plan

» Responsible Agencies/ Regulators

Ministry of Food and Agriculture (MoFA)

Conservation of Biodiversity (basic, Intermediate and advanced)

The conservation of biodiversity is essential for maintaining healthy ecosystems, supporting sustainable livelihoods, and mitigating climate change impacts. Biodiversity conservation strategies can vary in complexity, from basic efforts focusing on habitat preservation to advanced approaches involving data-driven monitoring and ecosystem restoration.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Habitat Protection and Restoration

Criteria (All Levels): Biodiversity conservation must prioritize the protection and restoration of natural habitats. These efforts ensure that species populations are maintained or restored, and ecosystems can function without human-induced pressures.

Basic: Establishment of protected areas and simple conservation measures, such as setting aside land to prevent further degradation.

Intermediate: Implementation of targeted habitat restoration activities such as reforestation, wetland rehabilitation, and soil erosion control.

Advanced: Use of advanced restoration techniques such as ecosystem-based adaptation (EBA), green infrastructure, and landscape-scale habitat connectivity restoration.

DNSH Consideration: Ensure that conservation activities do not lead to unintended negative consequences, such as the displacement of local communities or increased pressure on surrounding ecosystems.

1.2 Protection of Endangered Species

Criteria (All Levels): Efforts must focus on the protection of endangered and vulnerable species through habitat conservation, legal protections, and targeted conservation actions.

Basic: Implement basic protective measures for endangered species, such as anti-poaching patrols or community awareness programs.

Intermediate: Development of species recovery plans, captive breeding programs, and the establishment of wildlife corridors.

Advanced: Genetic rescue programs, advanced monitoring systems (e.g., satellite tracking), and comprehensive species action plans that integrate climate resilience and habitat restoration.

DNSH Consideration: Ensure that efforts to protect endangered species do not negatively impact other species or ecosystems.

1.3 Pollution Control and Reduction

Criteria (All Levels): Pollution control must be integrated into biodiversity conservation efforts to prevent degradation of ecosystems due to pollutants such as chemicals, plastics, and air pollutants.

Basic: Simple actions such as litter collection, proper waste disposal, and pollution awareness campaigns.

Intermediate: Implementation of pollution control measures, such as waste treatment facilities and runoff reduction techniques to limit contaminants entering natural habitats.

Advanced: Use of advanced technologies such as bioremediation and water purification systems to remove pollutants from the environment.

DNSH Consideration: Ensure that pollution control efforts do not lead to secondary environmental impacts, such as the release of toxins during cleanup processes.

2. Resource Efficiency and Circular Economy

2.1 Sustainable Land Use and Resource Management

Criteria (All Levels): Biodiversity conservation must be integrated with sustainable land use practices that promote efficient resource use, such as agroforestry, sustainable agriculture, and conservation-based land management.

Basic: Promotion of simple land-use practices like rotational grazing and minimal tillage that prevent habitat loss.

Intermediate: Implementation of sustainable land management plans and agroforestry systems that integrate biodiversity conservation with agricultural activities.

Advanced: Use of precision farming, land-use planning, and payment for ecosystem services (PES) to optimize land use and resource management for biodiversity conservation.

DNSH Consideration: Ensure that land-use changes do not negatively impact ecosystems or displace local communities.

2.2 Promotion of Circular Economy Practices

Criteria (Intermediate and Advanced Levels): Biodiversity conservation should be linked to circular economy practices that minimize waste, optimize resource use, and support ecosystem regeneration.

Intermediate: Adoption of circular economy practices, such as recycling organic waste for soil enrichment or using biodegradable materials to reduce pollution in natural habitats.

Advanced: Integration of circular economy models such as closed-loop agriculture, eco-industrial parks, and bio-based economies that actively support biodiversity conservation through reduced resource extraction.

DNSH Consideration: Ensure that circular economy initiatives do not introduce invasive species or disrupt local ecosystems.

3. Climate Resilience and Adaptation

3.1 Ecosystem-Based Adaptation (EBA)

Criteria (Intermediate and Advanced Levels): Biodiversity conservation efforts must incorporate ecosystem-based adaptation strategies that enhance the resilience of ecosystems to climate change impacts such as droughts, floods, and temperature fluctuations.

Intermediate: Incorporation of EBA strategies such as mangrove restoration, watershed protection, and riparian buffer zones to enhance ecosystem resilience.

Advanced: Large-scale, data-driven EBA approaches, such as integrating biodiversity corridors, habitat connectivity planning, and coastal ecosystem protection with advanced modeling tools to predict climate impacts.

DNSH Consideration: Ensure that adaptation strategies do not unintentionally harm ecosystems or exacerbate vulnerabilities in other regions.

3.2 Climate-Resilient Species Conservation

Criteria (All Levels): Biodiversity conservation must focus on preserving species that are resilient to climate change, while also protecting vulnerable species from climate-related pressures such as habitat loss and extreme weather events.

Basic: Implementation of basic species protection measures, such as creating protected areas for climate-vulnerable species.

Intermediate: Use of climate models to inform conservation planning and establish migration corridors that allow species to move to more suitable habitats as climate conditions change.

Advanced: Development of climate-resilient species action plans that integrate advanced forecasting models, ecosystem monitoring, and long-term species survival strategies.

DNSH Consideration: Ensure that climate adaptation strategies do not displace species or lead to monoculture solutions that reduce biodiversity.

4. Social and Economic Benefits

4.1 Community Engagement and Capacity Building

Criteria (All Levels): Biodiversity conservation efforts must engage local communities and build their capacity to participate in and benefit from conservation activities.

Basic: Community awareness programs and involvement in basic conservation activities, such as tree planting or anti-poaching patrols.

Intermediate: Capacity-building programs for community-based natural resource management (CBNRM), including training in sustainable land use, ecotourism, and participatory biodiversity monitoring.

Advanced: Development of biodiversity-based enterprises, such as ecotourism ventures, that provide economic benefits to local communities while promoting biodiversity conservation.

DNSH Consideration: Ensure that biodiversity conservation efforts do not alienate local communities or limit their access to traditional lands and resources.

4.2 Job Creation and Sustainable Livelihoods

Criteria (All Levels): Conservation efforts must create jobs and promote sustainable livelihoods through biodiversity-friendly activities such as ecotourism, sustainable agriculture, and ecosystem restoration.

Basic: Jobs created through basic conservation activities like reforestation, community-led anti-poaching initiatives, and habitat monitoring.

Intermediate: Employment through sustainable land management, agroforestry, and ecotourism ventures that support biodiversity conservation.

Advanced: Creation of green jobs in biodiversity-based sectors such as ecosystem services markets, conservation finance, and advanced restoration projects.

DNSH Consideration: Ensure that job creation does not come at the expense of environmental integrity or social equity.

5. Monitoring and Reporting

5.1 Monitoring of Biodiversity Health

Criteria (Intermediate and Advanced Levels): Systems must be in place to monitor biodiversity health through indicators such as species richness, population trends, and ecosystem integrity.

Intermediate: Regular monitoring of biodiversity indicators such as species diversity, habitat quality, and ecosystem services using manual or semi-automated methods.

Advanced: Use of advanced technologies such as remote sensing, satellite imagery, and biodiversity databases to track ecosystem health and detect changes in real time.

DNSH Consideration: Ensure that monitoring systems are accurate, transparent, and accessible to local stakeholders and conservation authorities.

5.2 Reporting on Conservation Impacts

Criteria (Intermediate and Advanced Levels): Conservation efforts must include transparent reporting on biodiversity outcomes, including impacts on species conservation, habitat restoration, and community benefits.

Intermediate: Periodic reporting on the success of biodiversity conservation initiatives, including the number of species protected, habitat restored, and community members engaged.

Advanced: Continuous, real-time reporting using data-driven platforms that communicate biodiversity gains, ecosystem service improvements, and the long-term resilience of ecosystems.

DNSH Consideration: Ensure that reporting is transparent and provides an accurate reflection of biodiversity outcomes, avoiding overstating conservation achievements.

6. Safety and Regulatory Compliance

6.1 Compliance with International Biodiversity Conservation Agreements

Criteria (All Levels): Conservation efforts must comply with international agreements such as the Convention on Biological Diversity (CBD), the Ramsar Convention, and the Convention on International Trade in Endangered Species (CITES).

Basic: Ensure compliance with basic biodiversity protection regulations, such as no-hunting zones and anti-poaching laws.

Intermediate: Alignment with national biodiversity strategies and action plans (NBSAPs) and compliance with the requirements of the CBD and other international agreements.

Advanced: Full integration of biodiversity conservation efforts with international conventions, including developing collaborative international programs for transboundary biodiversity conservation.

DNSH Consideration: Ensure that international biodiversity conservation agreements are implemented without undermining local land rights or traditional resource use.

6.2 Certification and Best Practice Standards

Criteria (Advanced Level): Advanced biodiversity conservation projects should aim for certification under recognized international conservation standards, such as the IUCN Green List, Forest Stewardship Council (FSC), or Rainforest Alliance.

Advanced: Attainment of certification for conservation practices, ensuring the highest standards of biodiversity protection and management are met.

DNSH Consideration: Ensure that certification processes are accessible and do not impose undue financial or regulatory burdens on smallholder farmers or local communities.

» ISO Standards

1. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for implementing environmental management systems (EMS) to ensure that biodiversity conservation efforts are integrated with broader environmental objectives. It ensures that organizations adopt practices that minimize negative impacts on biodiversity and promote ecosystem health.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for preventing and managing land degradation and desertification, crucial for biodiversity conservation in affected regions. This standard promotes sustainable land use practices that conserve ecosystems and support biodiversity.

ISO 26000: Guidance on Social Responsibility

Application: Provides guidelines for incorporating biodiversity conservation into corporate social responsibility (CSR) strategies. It ensures that organizations take responsibility for the environmental impacts of their activities on ecosystems and biodiversity.

2. Biodiversity Monitoring and Reporting Standards

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Establishes a framework for assessing the environmental impacts of projects and organizations on biodiversity. This standard helps in identifying risks to ecosystems and integrating biodiversity conservation into decision-making processes.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Provides guidance for evaluating an organization's environmental performance, including its impact on biodiversity. It sets out methodologies for monitoring key biodiversity indicators and reporting on conservation outcomes.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Ensures that water use in biodiversity-sensitive areas is sustainable, helping organizations assess and minimize the impacts of water extraction on aquatic ecosystems and biodiversity.

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: This standard includes biodiversity indicators relevant to urban environments, ensuring that cities implement strategies to protect and enhance urban biodiversity, such as green spaces and urban forests.

3. Land Use and Ecosystem Conservation Standards

ISO 14055-2: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 2: Regional Case Studies

Application: Provides case studies and examples of good practices in land use and restoration efforts to conserve biodiversity in degraded ecosystems.

ISO 1750: Pesticides and Other Agrochemicals – Common Names

Application: Standardizes the nomenclature for pesticides, ensuring that harmful substances that could affect biodiversity are controlled and regulated in land management practices.

ISO 14064-1: Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

Application: Assists organizations in quantifying and reporting their GHG emissions and removals, particularly from land-use activities. It helps evaluate the role of ecosystems and biodiversity in carbon sequestration and climate mitigation strategies.

4. Sustainable Agriculture and Forestry Standards

ISO 34101-1: Sustainable and Traceable Cocoa – Part 1: Requirements for Sustainability Management Systems

Application: Provides guidelines for managing sustainable agriculture systems that promote biodiversity conservation, particularly for crops like cocoa. It integrates biodiversity-friendly practices such as agroforestry and ecosystem services management.

ISO 38200: Chain of Custody of Wood and Wood-Based Products

Application: This standard ensures traceability in the supply chain for wood and wood-based products, promoting sustainable forest management that supports biodiversity conservation in forestry operations.

ISO 14093: Mechanisms for Financing Climate Action – Carbon Pricing

Application: Facilitates the financing of climate action projects, including those focused on ecosystem restoration and biodiversity conservation. This standard helps align biodiversity protection with climate finance mechanisms like carbon credits and offsets.

5. Risk Management and Resilience Standards

ISO 31000: Risk Management – Guidelines

Application: Provides guidelines for managing risks related to biodiversity conservation, including the risks posed by climate change, habitat loss, and ecosystem degradation. It ensures that biodiversity conservation strategies are resilient and adaptable to environmental changes.

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Offers guidelines for incorporating biodiversity conservation into climate adaptation strategies. It ensures that ecosystems and species are protected from the impacts of climate change through adaptive management and ecosystem-based approaches.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Assists organizations in assessing the vulnerability of ecosystems and biodiversity to climate change impacts, enabling the development of targeted conservation and adaptation measures.

6. Social and Community Engagement Standards

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Provides a framework for engaging local communities in biodiversity conservation efforts, ensuring that sustainable development initiatives include biodiversity protection and the sustainable use of ecosystem services.

ISO 26000: Social Responsibility

Application: Ensures that organizations involve local communities in biodiversity conservation efforts and respect the rights of indigenous people in biodiversity-rich areas.

7. Restoration and Conservation Standards

ISO 20887: Sustainability in Buildings and Civil Engineering Works – Design for Disassembly and Adaptability – Principles, Requirements, and Guidance

Application: Ensures that construction projects and civil engineering works are designed with minimal impact on biodiversity. It encourages sustainable building practices that promote the conservation of natural habitats and ecosystems.

ISO 37123: Sustainable Cities and Communities – Indicators for Resilient Cities

Application: Provides resilience indicators for biodiversity in cities, ensuring that urban biodiversity conservation is part of broader resilience planning, including green infrastructure and ecosystem-based adaptation.

8. Certification and Best Practice Standards

ISO 14020: Environmental Labels and Declarations – General Principles

Application: Assists organizations in certifying biodiversity-friendly products and services through eco-labels and declarations, promoting sustainable practices that protect biodiversity.

ISO 14024: Environmental Labels and Declarations – Type I Environmental Labelling – Principles and Procedures

Application: Facilitates the certification of products that support biodiversity conservation through the use of environmental labels, helping consumers identify products that promote sustainability and biodiversity protection.

» ISICS Codes

1. Land Use and Habitat Conservation Activities

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Refers to the management of forested areas, including the protection of biodiversity through sustainable forestry practices, reforestation, and habitat conservation efforts.

ISIC Code 0240: Support Services to Forestry

Application: Covers support services related to sustainable forestry management, including biodiversity monitoring, conservation planning, and ecosystem restoration in forest ecosystems.

ISIC Code 0129: Growing of Other Perennial Crops

Application: Involves biodiversity-friendly practices in the cultivation of perennial crops such as agroforestry, where diverse plant species are used to enhance ecosystem resilience and support biodiversity.

ISIC Code 0161: Support Activities for Crop Production

Application: Includes activities that promote sustainable agriculture and biodiversity conservation through integrated land management practices, organic farming, and agroecology.

2. Wildlife and Natural Resource Conservation

ISIC Code 0150: Mixed Farming

Application: Refers to farming systems that integrate both crops and livestock, which can include biodiversity-friendly practices such as agroforestry, rotational grazing, and habitat conservation within agricultural landscapes.

ISIC Code 0170: Hunting, Trapping, and Related Service Activities

Application: Involves regulated hunting and trapping activities, often within biodiversity conservation areas, focusing on wildlife management and maintaining population balance for species conservation.

ISIC Code 9103: Botanical and Zoological Gardens and Nature Reserves Activities

Application: Covers the management of botanical gardens, zoos, and nature reserves dedicated to species conservation, habitat restoration, and public awareness regarding biodiversity protection.

3. Environmental Protection and Restoration Activities

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Involves activities that support biodiversity conservation through the removal and proper disposal of waste that can harm ecosystems, such as in protected areas, forests, or wetlands.

ISIC Code 3830: Materials Recovery

Application: Covers recycling activities that help prevent environmental degradation by reducing pollution and conserving biodiversity in areas affected by industrial or agricultural waste.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes environmental remediation activities that restore ecosystems impacted by pollution, industrial activities, or habitat degradation, contributing to biodiversity conservation and habitat recovery.

4. Marine and Aquatic Ecosystem Conservation

ISIC Code 0311: Marine Fishing

Application: Involves sustainable fishing practices that aim to conserve marine biodiversity by protecting fish stocks, reducing bycatch, and maintaining the health of marine ecosystems.

ISIC Code 0321: Marine Aquaculture

Application: Covers the cultivation of aquatic organisms in a way that protects marine ecosystems and promotes biodiversity by using sustainable methods such as habitat enhancement or protection of marine species.

ISIC Code 0500: Mining of Coal and Lignite

Application: Activities that contribute to biodiversity conservation by implementing habitat restoration and pollution control measures in areas affected by mining activities.

5. Conservation-Related Research and Development

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Refers to R&D activities focused on biodiversity conservation, including research on ecosystem services, species conservation, climate resilience, and the development of new technologies for ecosystem restoration.

ISIC Code 7220: Research and Experimental Development on Social Sciences and Humanities

Application: Includes research on the social and economic dimensions of biodiversity conservation, such as the impact of conservation efforts on local communities, land use, and traditional knowledge systems.

6. Recreational Activities and Ecotourism

ISIC Code 7912: Tour Operator Activities

Application: Involves the promotion of ecotourism activities that support biodiversity conservation by encouraging sustainable tourism in natural areas, such as protected parks and wildlife reserves, while contributing to local conservation efforts.

ISIC Code 7721: Renting and Leasing of Recreational and Sports Goods

Application: Covers the rental and leasing of equipment for activities such as wildlife observation, bird watching, and ecotourism that promote biodiversity awareness and conservation.

7. Community and Social Services Related to Conservation

ISIC Code 8413: Regulation of and Contribution to More Efficient Operation of Businesses

Application: Refers to government and regulatory activities that involve creating policies and programs to conserve biodiversity, manage protected areas, and regulate environmental practices that affect ecosystems.

ISIC Code 9499: Activities of Other Membership Organizations n.e.c.

Application: Involves the work of non-governmental organizations (NGOs) and conservation groups that advocate for and implement biodiversity conservation projects, including community-based conservation and habitat protection programs.

» Other international or adapted Certifications & Standards

Integrated Pest Management (IPM) Certification

» Specific Government Policy (National Standards or Certification)

Integrated Pest Management Plan

» Responsible Agencies/ Regulators

Ministry of Lands and Natural Resources, and Ministry of Food and Agriculture (MoFA)

Climate Resillient Crops (basic, Intermediate and advanced)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Crop Selection and Breeding

Basic:

Focus on the selection of local or indigenous crop varieties that have proven resilience to local climatic conditions such as drought or heat.

Use traditional and low-impact methods of crop breeding to improve resilience to drought, heat, and flood conditions without relying heavily on chemical inputs.

Ensure that selected crops do not contribute to invasive species problems or disrupt local ecosystems.

Intermediate:

Develop or adopt crop varieties through participatory plant breeding techniques that enhance resistance to pests, diseases, and climate-related stresses (e.g., heat, drought, salinity).

Integrate practices that promote biodiversity, such as polycropping or agroforestry, to increase resilience and reduce the need for synthetic fertilizers and pesticides.

Ensure that selected crops contribute to ecosystem restoration and land rehabilitation, particularly in degraded or marginal areas.

Advanced:

Utilize advanced plant breeding technologies, such as CRISPR gene-editing or marker-assisted selection, to accelerate the development of crops that can thrive under extreme climate conditions (e.g., high temperatures, drought, salinity, and waterlogging).

Ensure that resilient crops are compatible with regenerative agricultural practices that enhance soil health, sequester carbon, and increase water retention.

Prioritize crops that promote carbon sequestration and reduce greenhouse gas emissions (e.g., perennial grains, legumes).

DNSH Consideration: Ensure that the selection and breeding of crops do not negatively impact biodiversity, cause genetic contamination, or lead to unsustainable farming practices.

1.2 Sustainable Water Use

Basic:

Implement water-saving techniques such as rainwater harvesting or the use of drought-resistant crops that require minimal irrigation.

Avoid crops that are water-intensive in areas experiencing water scarcity, ensuring that water resources are used efficiently.

Intermediate:

Use advanced irrigation techniques such as drip irrigation or smart irrigation systems to minimize water use and prevent water waste.

Select crops that can thrive on minimal irrigation or brackish water, enhancing the efficiency of water use in agriculture.

Advanced:

Integrate precision agriculture technologies (e.g., sensors, drones, and satellite imagery) to optimize water use and monitor soil moisture levels in real-time, reducing water consumption to near-zero levels in water-scarce areas.

Develop rain-fed agriculture systems that can support climate-resilient crops and reduce dependence on external water inputs.

DNSH Consideration: Ensure that water management practices do not lead to over-extraction of water resources, harm local water bodies, or increase water scarcity in vulnerable regions.

2. Resource Efficiency and Circular Economy

2.1 Soil Management and Nutrient Use

Basic:

Use organic soil amendments such as compost or manure to improve soil fertility and reduce the reliance on synthetic fertilizers.

Practice crop rotation to improve soil health and reduce soil erosion.

Intermediate:

Employ conservation agriculture techniques, such as minimum tillage and cover cropping, to enhance soil structure, reduce erosion, and improve nutrient retention.

Use soil testing and monitoring to optimize nutrient use, ensuring that fertilizers are applied only when necessary and in appropriate quantities.

Advanced:

Implement regenerative agricultural practices, such as agroforestry or permaculture, that enhance soil health, promote carbon sequestration, and improve the nutrient cycling capacity of the land.

Use biofertilizers and mycorrhizal fungi to improve plant nutrient uptake, reduce the need for chemical inputs, and promote long-term soil fertility.

DNSH Consideration: Ensure that nutrient management practices do not lead to soil degradation, water pollution from runoff, or excessive reliance on chemical inputs.

2.2 Waste Minimization and Resource Use

Basic:

Minimize on-farm waste by composting agricultural residues and using them as mulch or organic fertilizer.

Avoid practices that lead to overproduction or excess waste in the supply chain.

Intermediate:

Integrate circular economy principles into farming systems, such as using agricultural waste for bioenergy production or converting residues into biochar for soil improvement.

Promote value-added processing of crops to reduce post-harvest losses and enhance the economic value of climate-resilient crops.

Advanced:

Develop closed-loop farming systems that recycle all inputs, including nutrients and water, while minimizing waste production to near-zero levels.

Implement innovative packaging and distribution systems to reduce post-harvest food loss and increase the market value of climate-resilient crops.

DNSH Consideration: Ensure that waste management practices do not contribute to environmental pollution or resource depletion, and prioritize recycling and reuse of agricultural by-products.

3. Climate Resilience and Adaptation

3.1 Crop Adaptation to Climate Risks

Basic:

Select crops that have natural tolerance to local climatic conditions such as drought, heat, and unpredictable rainfall patterns.

Practice mixed cropping or intercropping to reduce risks from climate variability, ensuring that farmers are not overly dependent on a single crop.

Intermediate:

Develop cropping systems that incorporate climate forecasting and early warning systems to optimize planting and harvesting schedules based on predicted climate conditions.

Promote integrated pest management (IPM) practices to enhance crop resilience to climate-induced pests and diseases without the overuse of chemicals.

Advanced:

Use climate-smart digital tools (e.g., precision agriculture, AI-based decision tools) to optimize crop performance and manage climate risks in real-time, allowing for proactive adaptation measures such as irrigation adjustments and pest management.

Cultivate perennial climate-resilient crops that can sequester carbon, enhance biodiversity, and improve ecosystem resilience in the face of climate change.

DNSH Consideration: Ensure that adaptation strategies do not result in negative environmental impacts, such as increased use of chemical pesticides, loss of biodiversity, or unsustainable land use practices.

3.2 Climate-Smart Farming Practices

Basic:

Implement basic climate adaptation measures, such as adjusting planting dates to match expected weather patterns and avoiding areas prone to flooding or drought.

Use traditional climate-resilient farming practices, such as terracing or mulching, to protect crops from extreme weather events.

Intermediate:

Use agroecological practices that promote ecosystem resilience, such as agroforestry or silvopasture, to enhance the resilience of farming systems to climate change.

Develop community-based approaches to climate adaptation, where farmers share knowledge and collaborate on sustainable land management practices.

Advanced:

Integrate cutting-edge climate-smart agriculture technologies, such as real-time climate data monitoring, precision irrigation, and automated pest control systems, to maximize crop resilience to extreme weather events.

Use ecosystem-based adaptation (EbA) strategies to protect agricultural landscapes from climate impacts, such as planting climate-resilient crops in buffer zones to reduce soil erosion and restore degraded land.

DNSH Consideration: Ensure that climate adaptation strategies do not cause unintended negative consequences for ecosystems, such as increasing land degradation, deforestation, or habitat destruction.

4. Social and Economic Impact

4.1 Inclusive and Equitable Access to Climate-Resilient Crops

Basic:

Ensure that smallholder farmers have access to climate-resilient seeds and agricultural inputs through community seed banks, extension services, or cooperatives.

Promote knowledge-sharing and training to help farmers adopt climate-resilient crops and practices.

Intermediate:

Develop public-private partnerships to expand access to climate-resilient crops and technologies, ensuring that vulnerable communities are prioritized.

Create inclusive finance mechanisms, such as micro-loans or grants, to support smallholder farmers in transitioning to climate-resilient agriculture.

Advanced:

Promote gender-sensitive climate-resilient farming programs, ensuring that women and marginalized groups have equal access to seeds, resources, and decision-making roles in climate-resilient agriculture projects.

Develop national or regional policies that support the widespread adoption of climate-resilient crops, focusing on building resilient agricultural value chains that benefit smallholder farmers.

DNSH Consideration: Ensure that climate-resilient crop programs do not exacerbate social inequalities, exclude vulnerable groups, or result in land grabs or displacement of local communities.

4.2 Economic Viability and Market Access

Basic:

Provide access to local markets for climate-resilient crops, ensuring that farmers can sell surplus production and receive fair prices.

Develop basic supply chains to support the sale and distribution of climate-resilient crops.

Intermediate:

Promote value-added processing and branding of climate-resilient crops to increase their market value and provide additional income streams for farmers.

Establish linkages between smallholder farmers and larger agricultural markets to increase access to buyers, processors, and distributors.

Advanced:

Develop export markets for climate-resilient crops, focusing on high-value crops that can compete in global markets while contributing to climate mitigation and adaptation efforts.

Implement digital platforms and blockchain technology to enhance market transparency and traceability for climate-resilient crops, ensuring fair trade and sustainable sourcing.

DNSH Consideration: Ensure that the development of markets for climate-resilient crops does not lead to unsustainable agricultural expansion, overuse of resources, or exploitation of smallholder farmers.

» ISICS Codes

ISIC Codes for Climate Resilient Crops:

1. Crop Production

ISIC Code 0111: Growing of Cereals (Except Rice), Leguminous Crops, and Oil Seeds

Application: Covers the cultivation of cereals, legumes, and oilseed crops that can be bred or selected for climate resilience, such as drought-resistant maize, heat-tolerant soybeans, and resilient pulses.

ISIC Code 0112: Growing of Rice

Application: Refers to the production of rice, including varieties that are more resistant to floods, drought, and saline soils, which are key climate adaptation strategies in rice farming.

ISIC Code 0113: Growing of Vegetables and Melons, Roots and Tubers

Application: Includes the cultivation of climate-resilient vegetables, melons, roots, and tubers, such as drought-tolerant cassava or heat-resistant sweet potatoes, which are essential for food security in changing climates.

ISIC Code 0114: Growing of Sugar Cane

Application: Relevant for the cultivation of climate-resilient sugar cane varieties that can withstand higher temperatures or irregular rainfall patterns.

ISIC Code 0115: Growing of Tobacco

Application: Covers tobacco production, although this may have limited application for food security, the development of resilient crops can contribute to overall agricultural resilience.

ISIC Code 0116: Growing of Fibre Crops

Application: Involves the production of fiber crops like cotton, jute, or hemp, with climate-resilient varieties that can tolerate drought or high temperatures, helping to sustain fiber production under changing climatic conditions.

ISIC Code 0119: Growing of Other Non-Perennial Crops

Application: Covers the cultivation of non-perennial crops such as climate-resilient herbs, spices, and medicinal plants, which are increasingly important in agroecological systems and climate adaptation.

ISIC Code 0121: Growing of Grapes

Application: Includes climate-adaptive grape farming, where grape varieties are selected to thrive in higher temperatures or changing rainfall patterns.

ISIC Code 0122: Growing of Tropical and Subtropical Fruits

Application: Covers the cultivation of tropical fruits like bananas, mangoes, and citrus, including varieties that are more resilient to climate impacts such as drought or pests.

ISIC Code 0123: Growing of Citrus Fruits

Application: Focuses on climate-resilient citrus fruits that can withstand changes in water availability and temperature fluctuations.

ISIC Code 0124: Growing of Pome Fruits and Stone Fruits

Application: Refers to the production of fruits like apples, pears, peaches, and plums that can be bred for resilience to extreme weather events such as frost, heatwaves, or drought.

ISIC Code 0125: Growing of Other Tree and Bush Fruits and Nuts

Application: Includes climate-resilient varieties of nuts and fruits from trees and bushes, such as almonds, walnuts, and berries, which are important for biodiversity and climate adaptation.

ISIC Code 0126: Growing of Oleaginous Fruits

Application: Covers the production of oil-bearing fruits like olives and oil palm, focusing on varieties that are more resilient to heat and drought.

ISIC Code 0127: Growing of Beverage Crops

Application: Relevant for climate-resilient coffee, tea, and cocoa production, where crop varieties are developed to adapt to higher temperatures and changing precipitation patterns.

ISIC Code 0128: Growing of Spices, Aromatic, Drug, and Pharmaceutical Crops

Application: Involves the cultivation of herbs, spices, and medicinal plants that are climate-resilient, ensuring the sustainability of these valuable crops in changing climates.

ISIC Code 0129: Growing of Other Permanent Crops

Application: Refers to other permanent crops such as climate-resilient fruit trees and perennial crops that contribute to sustainable agricultural practices.

2. Support Services and Inputs for Climate Resilient Crops

ISIC Code 0161: Support Activities for Crop Production

Application: Includes activities supporting climate-resilient agriculture, such as the provision of seeds, irrigation systems, soil improvement services, and pest control that enhance the resilience of crops to climate change.

ISIC Code 0163: Post-Harvest Crop Activities

Application: Refers to post-harvest processes that ensure climate-resilient crops are properly stored, processed, and packaged, reducing post-harvest losses and ensuring that food systems remain stable under changing climate conditions.

ISIC Code 0164: Seed Processing for Propagation

Application: Involves the development and processing of climate-resilient seeds for planting, ensuring that farmers have access to resilient crop varieties that can withstand drought, heat, and other climate stresses.

3. Scientific and Technical Services Related to Agriculture

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Includes research and development on climate-resilient crops, such as breeding programs, genetic research, and field trials that contribute to the development of crops that can withstand climate impacts.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Refers to technical consulting and support services for climate-resilient agriculture, including agronomy consulting, soil management, and water conservation strategies that enhance crop resilience.

» Other international or adapted Certifications & Standards

Global G.A.P. Certification: Standards for good agricultural practices ensuring food safety, environmental sustainability, and worker welfare.

» Applicable Tax Incentives

Import duty exemption on the equipment and technology used for waste management and recycling.

» Specific Government Policy (National Standards or Certification)

Ghana’s Nationally Determined Contributions (NDCs) under the Paris Agreement, Food and Agriculture Sector Development Policy (FASDEP II) and, National Climate Change and Food Security Action Plan.

» Responsible Agencies/ Regulators

Environmental Protection Agency (EPA), Ministry of Environment, Science ,Technology and Innovation (MESTI), Ministry of Finance and Ministry of Food and Agriculture (MoFA)

Packaging and Dissemination of Climate related Data (basic, Intermediate and advanced)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Climate Action

Criteria: The packaging and dissemination of climate-related data must aim to provide actionable insights that contribute to climate mitigation, adaptation, and resilience strategies.

Basic: Collection and dissemination of general climate data to inform broad climate action.

Intermediate: Contextualized climate data, including regional climate risks and specific adaptation strategies for stakeholders.

Advanced: Data analytics, forecasting models, and tailored climate services that support detailed climate risk assessments and adaptation plans.

DNSH Consideration: Ensure that data dissemination supports mitigation and adaptation without promoting unsustainable practices or actions that harm the environment.

1.2 Data on Climate Vulnerabilities and Ecosystem Impacts

Criteria: Climate-related data packaging should include information on ecosystem vulnerabilities and biodiversity risks due to climate change, helping to protect natural habitats and resources.

Basic: General data on climate change's impacts on ecosystems.

Intermediate: Specific data on vulnerable ecosystems, including trends in biodiversity loss, habitat degradation, and climate-related risks.

Advanced: Advanced monitoring systems that use satellite data, remote sensing, and AI to predict ecosystem changes and alert stakeholders to potential risks.

DNSH Consideration: Ensure that ecosystem data is used responsibly and does not result in actions that inadvertently harm biodiversity.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources for Data Collection and Dissemination

Criteria: The systems used for collecting and disseminating climate-related data should be energy-efficient and minimize resource use, especially in data centers and ICT infrastructure.

Basic: Use of existing platforms and simple data-sharing tools for wide dissemination.

Intermediate: Implementation of resource-efficient cloud storage, using energy-efficient servers and data centers.

Advanced: Use of cutting-edge technologies such as green cloud computing, blockchain for data integrity, and decentralized data-sharing systems to optimize energy and resource use.

DNSH Consideration: Ensure that the energy consumption of data processing and dissemination is minimized and does not contribute to increased GHG emissions.

2.2 Data Circularity and Accessibility

Criteria: The packaging and dissemination of climate-related data must prioritize open access and reusability to promote widespread use and application by various stakeholders.

Basic: Simple reports and data files made publicly available in open formats.

Intermediate: Development of platforms for data sharing, including APIs and open-source tools that allow users to access and integrate climate data.

Advanced: Data marketplaces and platforms that allow for real-time sharing, analysis, and repurposing of climate-related data, ensuring data circularity across sectors.

DNSH Consideration: Ensure that data dissemination systems are secure, transparent, and do not exclude underserved or vulnerable communities from accessing climate-related information.

3. Climate Resilience and Adaptation

3.1 Timely and Accurate Climate Risk Data

Criteria: Climate-related data must be disseminated in a timely and accurate manner to inform climate resilience and adaptation efforts, helping stakeholders respond effectively to changing climate conditions.

Basic: Dissemination of annual or periodic climate reports with general trends and predictions.

Intermediate: Quarterly or monthly data updates, including early warning systems for climate risks such as floods, droughts, and heatwaves.

Advanced: Real-time data services that provide actionable insights and forecasts using machine learning, remote sensing, and advanced analytics to predict climate-related risks.

DNSH Consideration: Ensure that climate data systems do not cause delays or inaccuracies in risk assessments, which could lead to maladaptation or increase vulnerabilities.

3.2 Integration with Climate Adaptation Strategies

Criteria: Climate-related data must be integrated with adaptation planning frameworks, ensuring that the data is used to inform climate-resilient urban planning, agriculture, water management, and disaster preparedness.

Basic: General guidance on how climate data can inform adaptation efforts at the national or regional level.

Intermediate: Sector-specific climate data and tools that support planning for agriculture, water management, and infrastructure resilience.

Advanced: Comprehensive data-driven platforms that integrate climate models with urban and rural planning tools, disaster risk reduction strategies, and financial planning for climate adaptation.

DNSH Consideration: Ensure that the use of climate data for adaptation planning does not result in exclusionary practices or negative social or environmental consequences.

4. Social and Economic Benefits

4.1 Inclusivity and Accessibility

Criteria: Climate-related data must be packaged and disseminated in ways that are accessible and useful to diverse stakeholders, including local communities, governments, businesses, and vulnerable populations.

Basic: General public access to climate data via online portals and government websites.

Intermediate: Development of tools and dashboards that allow for user-friendly access to data by different sectors, including local governments, farmers, and businesses.

Advanced: Tailored climate data services that offer insights based on the needs of specific sectors, such as agriculture, insurance, or urban planning, with special attention to accessibility for underserved communities and marginalized groups.

DNSH Consideration: Ensure that climate data platforms are inclusive, avoid digital divides, and do not exclude vulnerable populations from accessing critical information.

4.2 Job Creation and Economic Opportunities

Criteria: The packaging and dissemination of climate-related data should create jobs in data management, analytics, and climate services, as well as support innovation in climate-related technologies and services.

Basic: Basic data management roles for collecting, analyzing, and disseminating climate data.

Intermediate: Creation of specialized roles in data science, climate analytics, and risk assessment to improve the quality and utility of climate data.

Advanced: Job creation in climate tech startups, innovation hubs, and advanced climate data services that support the development of new tools and platforms for climate resilience.

DNSH Consideration: Ensure that job creation is sustainable and does not contribute to inequality or environmental degradation.

5. Monitoring and Reporting

5.1 Monitoring the Use and Impact of Climate Data

Criteria: The use of climate-related data must be monitored to assess its impact on decision-making, resilience planning, and sustainable development.

Basic: General reporting on the distribution and use of climate data by government agencies and key stakeholders.

Intermediate: Monitoring systems that track how climate data is used in decision-making processes across sectors, such as agriculture, infrastructure, and urban planning.

Advanced: Real-time feedback loops that allow for tracking the effectiveness of climate data dissemination in enhancing resilience and supporting climate mitigation and adaptation efforts.

DNSH Consideration: Ensure that monitoring systems are transparent and accessible to all stakeholders, and that the results are used to improve the packaging and dissemination process.

5.2 Reporting on GHG Emissions and Climate Impact

Criteria: Climate-related data must include comprehensive information on greenhouse gas (GHG) emissions, climate impacts, and adaptation progress to support transparency and accountability in climate action.

Basic: Annual or periodic reports on GHG emissions and general climate impacts.

Intermediate: Detailed sector-specific GHG emissions data, including emissions reductions from specific mitigation projects.

Advanced: Dynamic reporting platforms that allow for real-time tracking of GHG emissions, adaptation progress, and the overall climate impact of different sectors and policies.

DNSH Consideration: Ensure that reporting is accurate, transparent, and widely accessible to support informed decision-making.

6. Safety and Regulatory Compliance

6.1 Compliance with Data Privacy and Security Regulations

Criteria: Climate data systems must comply with data privacy and security regulations to ensure that sensitive information is protected, especially when dealing with personal or proprietary data.

Basic: Compliance with national data protection laws and standards for general climate data dissemination.

Intermediate: Implementation of secure data platforms with encryption and access controls to protect user data and sensitive information.

Advanced: Use of advanced cybersecurity protocols, such as blockchain, to ensure the integrity and security of climate data, especially in systems involving large-scale data sharing across borders.

DNSH Consideration: Ensure that data security systems do not create barriers to access or overly restrict the use of climate-related data for public good. 6.2 Adherence to International Climate Reporting Standards

Criteria: Climate-related data dissemination must comply with international standards for climate reporting, such as those established by the IPCC, UNFCCC, and other global organizations. compatibility with global climate reporting systems such as the Global Stocktake under the Paris Agreement.

DNSH Consideration: Ensure that compliance with international standards does not lead to exclusion or disproportionate burdens on vulnerable communities or developing nations.

» ISO Standards

1. Environmental Management and Climate Reporting

ISO 14064-1: Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

Application: Provides a standardized approach for organizations to quantify, monitor, and report GHG emissions and removals. It is essential for climate-related data packaging, especially when reporting on GHG emissions and reductions.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Offers guidance on environmental communication, including the dissemination of climate-related data. This standard ensures that information is communicated clearly, transparently, and effectively to stakeholders.

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Establishes a framework for environmental management systems, supporting the packaging and dissemination of climate-related data as part of broader environmental performance reporting. It ensures that data is collected, managed, and disseminated within a sustainable and structured system.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides principles for assessing the water footprint of projects, which is relevant when packaging climate-related data that involves water use or impacts, such as in agriculture, water management, or industrial processes.

2. Information Management and Data Quality

ISO 8000-1: Data Quality – Part 1: Overview

Application: Offers guidelines for managing data quality, ensuring that climate-related data is accurate, consistent, and reliable throughout its lifecycle, from collection to dissemination.

ISO 19115-1: Geographic Information – Metadata – Part 1: Fundamentals

Application: Specifies how to describe geographic information and associated services, important for climate-related data that includes geographic or spatial data, such as weather patterns, flood zones, or ecosystem vulnerabilities.

ISO 19156: Geographic Information – Observations and Measurements

Application: Supports the collection and standardization of climate-related data, particularly for meteorological or environmental observations. It ensures that data measurements are reliable and can be effectively shared and analyzed.

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: Provides indicators relevant to the sustainability of urban environments, which can be integrated into the packaging and dissemination of climate-related data for urban planning and climate resilience strategies.

3. Information Security and Data Protection

ISO/IEC 27001: Information Security Management Systems – Requirements

Application: Establishes a framework for managing information security risks, which is crucial for ensuring that climate-related data, especially sensitive or proprietary data, is securely managed and disseminated.

ISO/IEC 27002: Information Security Controls

Application: Provides guidelines for implementing information security controls, ensuring that climate-related data is protected from unauthorized access, breaches, or misuse during dissemination.

ISO/IEC 27017: Code of Practice for Information Security Controls Based on ISO/IEC 27002 for Cloud Services

Application: Offers guidance on security measures specific to cloud-based services, which is essential for disseminating climate-related data via cloud platforms. This standard ensures the data is securely stored and shared.

ISO/IEC 27018: Code of Practice for Protection of Personally Identifiable Information (PII) in Public Clouds Acting as PII Processors

Application: Focuses on the protection of personal data in cloud environments, relevant when climate-related data includes or is linked to personal data, ensuring compliance with data privacy laws.

4. Data Sharing and Open Access

ISO/IEC 20944-1: Information Technology – Open Distributed Processing – Part 1: General

Application: Provides a framework for open distributed data systems, supporting the sharing and dissemination of climate-related data across platforms and ensuring interoperability between different systems.

ISO/IEC 19763-1: Information Technology – Metamodel Framework for Interoperability – Part 1: Framework

Application: Focuses on the interoperability of data-sharing platforms, ensuring that climate-related data can be shared across different systems and used effectively by various stakeholders.

ISO 19157: Geographic Information – Data Quality

Application: Ensures the quality of geographic data, which is crucial for disseminating accurate climate-related data, especially for mapping climate impacts, risk zones, and adaptation measures.

5. Risk Management and Resilience

ISO 31000: Risk Management – Guidelines

Application: Provides principles and guidelines for managing risks, which is important for identifying and mitigating potential risks in the collection, packaging, and dissemination of climate-related data.

ISO 22320: Security and Resilience – Emergency Management – Guidelines for Incident Management

Application: Offers guidelines for emergency management and disaster response, particularly for disseminating real-time climate-related data during natural disasters, such as floods, hurricanes, or droughts.

6. Sustainability and Social Responsibility

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on how to operate in a socially responsible manner, ensuring that climate-related data dissemination promotes transparency, inclusivity, and equity, especially when communicating climate risks and impacts to vulnerable communities.

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with

Guidance for Use

Application: Helps integrate climate-related data into broader sustainable development strategies, ensuring that the data informs community resilience and sustainability planning.

» ISICS Codes

1. Data Processing, Hosting, and Related Activities

ISIC Code 6311: Data Processing, Hosting, and Related Activities

Application: Includes activities related to the processing and hosting of data, which is crucial for managing and disseminating climate-related data. This covers cloud services, data hosting platforms, and other IT infrastructure that store and manage large datasets related to climate conditions, risks, and mitigation.

ISIC Code 6202: Computer Consultancy and Computer Facilities Management Activities

Application: Refers to the provision of consultancy services related to the management of data systems, including those used for climate data collection, processing, and dissemination. It includes services that ensure the technical infrastructure for climate data dissemination is well-maintained and efficient.

2. Research and Experimental Development

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves R&D activities related to the natural sciences and engineering, including the collection and analysis of climate data. This code is relevant to institutions conducting climate research, developing climate models, and generating data for policy, adaptation, and mitigation efforts.

ISIC Code 7220: Research and Experimental Development on Social Sciences and Humanities

Application: Includes research in social sciences, particularly relevant to the study of climate impacts on communities, socio-economic resilience, and public awareness. This is important for packaging and disseminating climate data in ways that are useful for social adaptation to climate change.

3. Environmental Consulting and Management

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Covers professional and technical activities that do not fall into other categories, including environmental consultancy services. This is relevant for companies and organizations involved in the dissemination of climate-related data to support environmental policies, adaptation strategies, and corporate sustainability.

ISIC Code 7120: Technical Testing and Analysis

Application: Includes services related to environmental testing and analysis, which are key to verifying climate data. These activities support the accuracy of climate models and datasets before they are disseminated to stakeholders.

4. Publishing, Broadcasting, and Information Dissemination

ISIC Code 5811: Book Publishing

Application: Refers to the publishing of books, reports, and other printed material, including climate reports, scientific publications, and guides on climate resilience. This is relevant for organizations that package and disseminate climate-related information in physical or digital formats.

ISIC Code 5813: Publishing of Newspapers, Journals, and Periodicals

Application: Includes the publishing of scientific journals and periodicals that focus on climate-related topics, which are crucial channels for disseminating research findings and climate data to a broader audience.

ISIC Code 6020: Television Programming and Broadcasting Activities

Application: Refers to broadcasting climate-related information through television channels, including weather forecasting, climate documentaries, and public awareness campaigns about climate risks and adaptation measures.

ISIC Code 6010: Radio Broadcasting

Application: Covers the broadcasting of climate-related data, updates, and programs through radio channels, which is essential for reaching remote and underserved populations that rely on radio for critical information about climate impacts.

5. Telecommunications and Information Services

ISIC Code 6110: Wired Telecommunications Activities

Application: Involves the transmission of data through wired telecommunications systems, supporting the dissemination of climate-related data through internet and wired network systems.

ISIC Code 6120: Wireless Telecommunications Activities

Application: Refers to wireless communication services, including mobile networks that are used to disseminate real-time climate data, weather alerts, and emergency climate-related information.

6. Public Administration and Policy

ISIC Code 8413: Regulation of and Contribution to More Efficient Operation of Businesses

Application: Involves government activities related to regulation and policy-making, particularly in areas such as environmental protection, climate change adaptation, and sustainability. This is relevant for public institutions that regulate or facilitate the dissemination of climate data.

7. Educational and Training Services

ISIC Code 8530: Higher Education

Application: Refers to the provision of higher education services that include climate-related studies, research, and data packaging. Universities and research institutions play a crucial role in producing and disseminating climate data to support scientific inquiry and policy development.

ISIC Code 8549: Other Education n.e.c.

Application: Covers non-formal educational activities, including climate-related training programs, workshops, and public education initiatives aimed at improving understanding of climate data and its implications for society and the environment.

» Other international or adapted Certifications & Standards

Global Framework for Climate Services (GFCS): Packaging and dissemination of climate data to ensure it meets the needs of various stakeholders4.

» Specific Government Policy (National Standards or Certification)

Ghana's Nationally Determined Contributions (NDCs) under the Paris Agreement, Food and Agriculture Sector Development Policy (FASDEP II) and, National Climate Change and Food Security Action Plan.

» Responsible Agencies/ Regulators

Ghana Meteorological Agency (GMet), Ministry of Environment, Science, Technology and Innovation (MESTI)

Livestock Production and Husbandary Practices (basic, Intermediate and advanced)

» Other international or adapted Certifications & Standards

Animal Welfare Approved (AWA): Certification ensuring high welfare standards for livestock and poultry.

» Specific Government Policy (National Standards or Certification)

Ghana Livestock Development Policy and Strategy

» Responsible Agencies/ Regulators

CSIR- Animal Research Institute, and Ministry of Food and Agriculture (MoFA)

Post Harvest Management Services and Technologies (basic, Intermediate and advanced)

Post-harvest management services and technologies aim to reduce losses, enhance quality, and increase the marketability of agricultural products after they have been harvested.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Reduction of Food Waste and Loss

Criteria: Post-harvest management must focus on minimizing food losses during handling, storage, processing, and transportation, contributing to improved food security and resource efficiency.

Basic: Use of basic storage methods (e.g., traditional barns, sun drying) and low-cost techniques to reduce spoilage.

Intermediate: Improved storage technologies (e.g., hermetic bags, ventilated storage) and basic processing facilities to extend shelf life and reduce spoilage.

Advanced: Deployment of high-efficiency cold storage, automated packaging, and advanced drying technologies (e.g., solar dryers, refrigeration systems) that minimize losses.

DNSH Consideration: Ensure that post-harvest management practices do not lead to the generation of harmful waste or pollution during storage and transportation.

1.2 Use of Environmentally Friendly Materials and Practices

Criteria: Packaging and storage materials used in post-harvest management must be sustainable, recyclable, or biodegradable to reduce environmental impact.

Basic: Use of simple, locally sourced materials for packaging and storage.

Intermediate: Introduction of biodegradable packaging materials and eco-friendly pest control methods (e.g., organic pest repellents).

Advanced: Use of recyclable or compostable packaging materials and adoption of sustainable energy sources for post-harvest technologies (e.g., solar-powered refrigeration).

DNSH Consideration: Ensure that packaging and storage materials do not contribute to long-term environmental degradation or harm biodiversity.

1.3 Energy Efficiency

Criteria: Post-harvest technologies must be energy-efficient, reducing energy consumption and lowering greenhouse gas (GHG) emissions in line with climate goals.

Basic: Minimal energy use through simple, manual methods such as traditional drying and storage.

Intermediate: Introduction of energy-efficient storage and processing systems, such as solar-powered drying or hybrid-powered cooling.

Advanced: High-efficiency cold storage systems, automated monitoring of storage environments, and integration of renewable energy sources (e.g., solar, biogas) in processing facilities.

DNSH Consideration: Ensure that energy consumption in post-harvest operations does not contribute to excessive GHG emissions or environmental degradation.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources

Criteria: Post-harvest management must ensure the efficient use of resources such as water, energy, and materials, reducing waste and promoting resource circularity.

Basic: Efficient use of traditional resources with minimal waste generation (e.g., air drying, manual processing).

Intermediate: Introduction of technologies that reduce resource waste, such as water-efficient washing systems and improved storage techniques that optimize space.

Advanced: Use of high-tech solutions for resource management, such as IoT-enabled systems that optimize energy, water, and material use in storage and processing operations.

DNSH Consideration: Ensure that resource use is sustainable and does not deplete natural resources or harm the environment.

2.2 Valorization of Agricultural Waste

Criteria: Agricultural waste from post-harvest operations must be reused or recycled to promote circularity and reduce waste generation.

Basic: Simple composting of organic waste or its use in local animal feed.

Intermediate: Utilization of agricultural by-products for value-added products, such as biomass energy or organic fertilizers.

Advanced: Establishment of circular economy practices, such as biogas production from organic waste, and conversion of crop residues into bio-based products or bioenergy.

DNSH Consideration: Ensure that waste management practices do not lead to environmental pollution or contribute to climate change.

3. Climate Resilience and Adaptation

3.1 Adaptation to Climate Variability

Criteria: Post-harvest management must be resilient to climate variability, including temperature fluctuations, rainfall changes, and extreme weather events.

Basic: Basic protective measures, such as covered storage and simple techniques to shield crops from weather impacts.

Intermediate: Use of improved storage and processing systems that can withstand moderate climate shocks, such as insulated storage or small-scale cold chains.

Advanced: Climate-resilient infrastructure, such as temperature-controlled storage, remote monitoring of environmental conditions, and integration with climate forecast systems.

DNSH Consideration: Ensure that adaptation measures do not have unintended negative impacts on local ecosystems or exacerbate climate risks.

3.2 Integration with Climate-Smart Agriculture

Criteria: Post-harvest management should complement climate-smart agricultural practices, ensuring that harvested crops are stored and processed in ways that maximize their climate resilience and reduce vulnerabilities.

Basic: Integration with traditional, climate-smart practices such as rotating crops and using natural pest management.

Intermediate: Development of localized storage solutions tailored to the specific climate risks of the region.

Advanced: Use of climate analytics and smart storage systems to dynamically adapt storage conditions based on real-time climate data.

DNSH Consideration: Ensure that climate-smart technologies are scalable and accessible to all farmers, avoiding the exclusion of smallholder farmers or marginalized communities.

4. Social and Economic Benefits

4.1 Inclusivity and Access to Technology

Criteria: Post-harvest management services and technologies must be accessible to all farmers, including smallholder farmers, and promote gender equity and social inclusion.

Basic: Provision of simple and affordable post-harvest tools accessible to smallholder farmers and rural communities.

Intermediate: Deployment of medium-scale technologies (e.g., mobile processing units) that can be shared by farming communities.

Advanced: Introduction of advanced post-harvest technologies, such as digital platforms for storage and logistics, ensuring they are accessible to marginalized groups through training and financial support.

DNSH Consideration: Ensure that technology access does not exacerbate existing inequalities or exclude vulnerable populations from benefiting from post-harvest advancements.

4.2 Job Creation and Economic Opportunities

Criteria: Post-harvest management should create jobs and economic opportunities, particularly for women, youth, and rural populations.

Basic: Jobs created through traditional post-harvest handling and processing, such as manual drying and storage activities.

Intermediate: New employment opportunities in operating and maintaining improved storage facilities, small-scale processing centers, and transport services.

Advanced: High-value jobs created in technology-driven post-harvest industries, including logistics management, data analytics for supply chain optimization, and operation of high-tech processing facilities.

DNSH Consideration: Ensure that job creation efforts are equitable, sustainable, and inclusive, particularly for rural and marginalized communities.

4.3 Improvement of Food Security and Market Access

Criteria: Post-harvest management must contribute to food security by reducing losses and improving the quality of agricultural products, increasing market access and revenues for farmers.

Basic: Reduction in losses due to basic improvements in storage and handling.

Intermediate: Enhanced market access through improved product quality, shelf life, and transport efficiency enabled by better storage and processing technologies.

Advanced: Integration of digital platforms and supply chain analytics that provide real-time market data and improve the distribution of agricultural products to reduce food insecurity.

DNSH Consideration: Ensure that market access improvements benefit all farmers, particularly smallholder and marginalized groups.

5. Monitoring and Reporting

5.1 Monitoring of Post-Harvest Losses

Criteria: Systems must be in place to monitor post-harvest losses and track the effectiveness of interventions in reducing these losses.

Basic: Simple manual tracking of losses during storage and transport.

Intermediate: Use of digital tools to track storage conditions and monitor the volume of crops lost at various stages of post-harvest handling.

Advanced: IoT-enabled monitoring systems that provide real-time data on post-harvest losses and predict future storage needs based on environmental conditions and market demand.

DNSH Consideration: Ensure that monitoring systems are accessible, cost-effective, and appropriate for the context in which they are used.

5.2 Reporting on Environmental and Social Impact

Criteria: Post-harvest management systems must report on their environmental and social impacts, including resource use, job creation, and food security improvements.

Basic: Simple reports on storage volumes, crop losses, and local market conditions.

Intermediate: Regular reporting on energy use, waste generation, and employment impacts of post-harvest technologies.

Advanced: Comprehensive sustainability reporting that includes life-cycle assessments, GHG emissions reductions, and detailed social impact metrics (e.g., increased incomes, improved gender equity).

DNSH Consideration: Ensure that reporting is accurate, transparent, and accessible to stakeholders.

6. Safety and Regulatory Compliance

6.1 Compliance with Food Safety and Quality Standards

Criteria: Post-harvest management must comply with national and international food safety standards to ensure the quality and safety of agricultural products.

Basic: Compliance with local food safety regulations and basic hygiene practices.

Intermediate: Implementation of food safety management systems (e.g., Hazard Analysis and Critical Control Points - HACCP) in storage and processing facilities.

Advanced: Use of advanced food safety technologies, such as blockchain for traceability, to ensure the highest standards of quality and safety across the supply chain.

DNSH Consideration: Ensure that food safety regulations do not create barriers to entry for small-scale farmers or limit access to technologies that improve post-harvest outcomes.

6.2 Compliance with Environmental Regulations

Criteria: Post-harvest technologies must comply with environmental regulations, including those related to waste management, energy use, and emissions.

Basic: Adherence to local environmental regulations in post-harvest operations.

Intermediate: Use of energy-efficient systems and waste management practices that comply with national standards.

Advanced: Full compliance with international environmental standards, including carbon neutrality in post-harvest operations.

DNSH Consideration: Ensure that regulatory compliance does not result in additional burdens for smallholder farmers or limit their access to beneficial post-harvest technologies.

» ISO Standards

1. Food Safety and Quality Standards

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Provides a framework for managing food safety throughout the supply chain, including post-harvest processes. It ensures that food is safe for consumption and that hazards are controlled at every stage of handling, storage, and transportation.

ISO 9001: Quality Management Systems – Requirements

Application: Establishes criteria for a quality management system, ensuring that post-harvest processes are optimized for efficiency, product quality, and customer satisfaction.

It helps organizations improve operations by continuously monitoring and improving their processes.

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Assists in setting up traceability systems for agricultural products, allowing producers to track and monitor their goods throughout the post-harvest process. This helps ensure transparency and improves the quality and safety of food products.

ISO 16577: Molecular Biomarker Analysis – Vocabulary for Molecular Biomarker Analytical Methods in Agriculture and Food Production

Application: Provides guidelines for the use of molecular biomarkers in monitoring the quality of agricultural products. This is particularly important for ensuring food safety and reducing losses during storage and transportation.

2. Environmental and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing environmental responsibilities during post-harvest operations. It ensures that processes such as storage, packaging, and transportation are sustainable, minimizing environmental impacts such as waste generation, energy use, and pollution.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Supports the management of water resources in post-harvest processes by assessing the water footprint of operations, including water use for cleaning, processing, and packaging. It helps minimize water consumption and improve sustainability.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Provides principles for assessing the environmental impact of post-harvest technologies throughout their life cycle, from material sourcing to waste management. It helps organizations adopt more sustainable practices in their operations.

3. Packaging and Transportation Standards

ISO 18601: Packaging and the Environment – General Requirements for the Use of ISO Standards in the Field of Packaging and the Environment

Application: Sets out general requirements for environmentally friendly packaging, ensuring that materials used in post-harvest processes are sustainable and recyclable. It also addresses the environmental impact of packaging materials used in transporting agricultural products.

ISO 14855: Determination of the Ultimate Aerobic Biodegradability of Plastic Materials Under Controlled Composting Conditions – Method by Analysis of Released Carbon Dioxide

Application: Provides guidelines for assessing the biodegradability of packaging materials used in post-harvest processes. It ensures that materials used are compostable and environmentally friendly, supporting circular economy principles.

ISO 6341: Water Quality – Determination of the Inhibition of the Mobility of Daphnia magna Straus (Cladocera, Crustacea) – Acute Toxicity Test

Application: Ensures that any post-harvest packaging or chemicals used in storage (such as fumigants or preservatives) are non-toxic to aquatic environments, thereby safeguarding ecosystems.

4. Energy Efficiency and Resource Management Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Establishes a framework for managing energy use in post-harvest operations, including cold storage, drying, and processing. It promotes energy efficiency and helps reduce the carbon footprint of post-harvest activities.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Provides guidelines for conducting energy audits in post-harvest facilities to identify opportunities for improving energy efficiency. This is essential for operations involving high-energy processes like cold storage or mechanical drying.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Focuses on quantifying and managing the carbon footprint of post-harvest processes. This standard helps organizations track emissions from energy use and transportation and implement measures to reduce their carbon footprint.

5. Agricultural and Food Security Standards

ISO 34101: Sustainable and Traceable Cocoa – Requirements for Sustainability Management Systems

Application: Provides a framework for managing the sustainability and traceability of agricultural products such as cocoa. It ensures that post-harvest practices promote sustainability, particularly in reducing waste, improving storage, and increasing the marketability of products.

ISO 22002-1: Prerequisite Programs on Food Safety – Part 1: Food Manufacturing

Application: Establishes the prerequisite programs for food safety in food manufacturing processes, including post-harvest handling and storage. This standard ensures that products are safely handled, processed, and stored to avoid contamination.

6. Waste Management and Circular Economy Standards

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combating Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Provides guidelines for managing agricultural waste in post-harvest processes, promoting sustainable practices like composting and recycling. This standard supports the reduction of waste and the use of agricultural by-products in a circular economy.

ISO 21930: Sustainability in Buildings and Civil Engineering Works – Core Rules for Environmental Product Declarations of Construction Products and Services

Application: Offers guidelines for assessing the sustainability of products used in post-harvest facilities, including packaging materials, storage infrastructure, and cooling systems. It promotes the use of eco-friendly products that reduce environmental impacts.

7. Risk Management and Safety Standards

ISO 31000: Risk Management – Guidelines

Application: Provides principles for managing risks in post-harvest processes, including operational, environmental, and safety risks. This standard ensures that risks are identified and mitigated in areas such as food safety, storage conditions, and energy use.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Focuses on managing the health and safety of workers involved in post-harvest processes. It helps organizations implement safety measures to protect workers in environments such as storage facilities, processing units, and transportation hubs.

8. Monitoring and Reporting Standards

ISO 22004: Food Safety Management Systems – Guidance on the Application of ISO 22000

Application: Offers guidance on applying ISO 22000, focusing on monitoring food safety during post-harvest handling and storage. It helps ensure that products meet safety standards and that any food safety risks are identified and managed.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Provides a framework for evaluating the environmental performance of post-harvest processes. It focuses on monitoring resource use, waste management, and energy efficiency to ensure that post-harvest activities are environmentally sustainable.

» ISICS Codes

1. Agriculture, Forestry, and Fishing

ISIC Code 0163: Post-Harvest Crop Activities

Application: Includes activities such as drying, cleaning, grading, and packing of crops to prepare them for storage and marketing after they have been harvested. This is directly related to the basic level of post-harvest management.

ISIC Code 0164: Seed Processing for Reproduction

Application: Involves the treatment and processing of seeds for reproduction, including cleaning, sorting, and packaging, ensuring they are preserved for future planting.

2. Manufacturing (Food and Beverages Processing)

ISIC Code 1030: Processing and Preserving of Fruit and Vegetables

Application: Covers the processing and preserving of fruits and vegetables through techniques such as drying, freezing, canning, and pickling. These activities are critical to intermediate and advanced levels of post-harvest management, where value addition extends shelf life.

ISIC Code 1040: Manufacture of Vegetable and Animal Oils and Fats

Application: Includes the extraction and refining of vegetable oils from seeds and fruits, which are often by-products of post-harvest crop processing.

ISIC Code 1050: Manufacture of Dairy Products

Application: Refers to the processing of milk and the production of dairy products such as butter, cheese, and yogurt, which require advanced post-harvest processing and preservation technologies.

ISIC Code 1061: Manufacture of Grain Mill Products

Application: Involves the milling and processing of grains such as wheat, rice, and maize, which are critical components of post-harvest management in grain storage and preservation.

ISIC Code 1072: Manufacture of Sugar

Application: Refers to the processing of sugarcane or sugar beets into sugar, which is a post-harvest processing activity that extends shelf life and adds value to the raw product.

ISIC Code 1079: Manufacture of Other Food Products n.e.c.

Application: Covers the processing of various other food products, including snacks, condiments, and processed meals, which often involve post-harvest value addition to agricultural products.

3. Warehousing and Storage

ISIC Code 5210: Warehousing and Storage

Application: Includes the operation of storage facilities for all kinds of goods, including agricultural products. This covers basic, intermediate, and advanced post-harvest storage technologies such as climate-controlled storage, silos, cold chains, and warehouses.

ISIC Code 5224: Cargo Handling

Application: Refers to the loading, unloading, and handling of goods, including agricultural products, during transportation. Efficient handling of crops and products after harvest ensures minimal losses during transport.

ISIC Code 5229: Other Transportation Support Activities

Application: Includes activities such as freight forwarding, transportation logistics, and other support services that ensure the safe and timely movement of agricultural goods from farm to market after harvest.

4. Transportation and Logistics

ISIC Code 4923: Freight Transport by Road

Application: Refers to the transportation of post-harvest goods by road, including perishable goods such as fruits, vegetables, and dairy products. Ensuring efficient and reliable transport systems is essential for maintaining product quality after harvest.

ISIC Code 4930: Transport via Pipeline

Application: Covers the transportation of liquid products, which could include oils, beverages, or other liquid agricultural products processed post-harvest.

ISIC Code 5012: Sea and Coastal Freight Water Transport

Application: Refers to the transportation of post-harvest goods by sea, which is particularly important for exporting large volumes of agricultural products to distant markets.

ISIC Code 5120: Freight Air Transport

Application: Includes the transportation of high-value, perishable goods by air, ensuring rapid delivery of products such as flowers, fruits, and fresh produce to distant markets.

5. Technical Testing and Analysis

ISIC Code 7120: Technical Testing and Analysis

Application: Involves the analysis of product quality, including testing for contaminants, grading, and ensuring that post-harvest handling and processing adhere to food safety standards. It is essential for ensuring quality control in advanced post-harvest systems.

6. Packaging and Material Handling

ISIC Code 8292: Packaging Activities

Application: Includes the packaging of products, which is a crucial aspect of post-harvest management. It covers both basic and advanced packaging techniques to preserve the quality and safety of agricultural products during storage and transport.

7. Wholesale and Retail Trade

ISIC Code 4620: Wholesale of Agricultural Raw Materials and Live Animals

Application: Covers the wholesale distribution of post-harvest agricultural products, ensuring that they reach markets efficiently. This activity is critical to the value chain of post-harvest management.

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Refers to the wholesale trade of processed agricultural goods, which are handled and distributed after post-harvest processing and value addition.

» Other international or adapted Certifications & Standards

Hazard Analysis and Critical Control Points (HACCP): Certification ensuring food safety through systematic preventive approaches.

» Specific Government Policy (National Standards or Certification)

National Food Safety Policy 2015

» Responsible Agencies/ Regulators

Food and Drugs Authority, Ghana Comodity ExchangeGhana Standard Authority, and Ministry of Food and Agriculture (MoFA)

Commercial Plantation Establishment

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Biodiversity Conservation

Criteria: Commercial plantation establishment must minimize impacts on biodiversity and ensure the conservation of local ecosystems.

Basic: Avoid establishing plantations in areas with high biodiversity value, such as primary forests or protected areas.

Intermediate: Implement buffer zones around sensitive ecosystems and maintain corridors for wildlife movement.

Advanced: Engage in active restoration of degraded land with native species alongside the plantation, promoting agroforestry models and mixed-use plantations.

DNSH Consideration: Ensure that plantation development does not lead to deforestation, habitat destruction, or the introduction of invasive species.

1.2 Water Management

Criteria: Water management practices must ensure that plantation establishment does not deplete local water resources or pollute water bodies.

Basic: Implement basic water conservation measures such as rainwater harvesting and efficient irrigation systems.

Intermediate: Use water-efficient irrigation technologies such as drip irrigation, and monitor water usage to avoid over-extraction.

Advanced: Employ precision agriculture technologies and integrated watershed management to optimize water use and improve water quality.

DNSH Consideration: Ensure that water management practices do not lead to water shortages for local communities or negatively impact aquatic ecosystems.

1.3 Soil Health and Erosion Control

Criteria: The establishment of commercial plantations must incorporate practices to maintain or improve soil health and prevent erosion.

Basic: Implement soil conservation practices such as contour planting and cover cropping to minimize erosion.

Intermediate: Use organic farming methods, including composting and mulching, to enhance soil fertility and reduce the need for synthetic fertilizers.

Advanced: Employ agroforestry or mixed-species plantations to improve soil organic matter and reduce soil erosion through permanent ground cover.

DNSH Consideration: Ensure that plantation practices do not lead to soil degradation, erosion, or loss of topsoil.

1.4 GHG Emissions Reduction

Criteria: Commercial plantations should contribute to reducing greenhouse gas (GHG) emissions through sustainable land-use practices.

Basic: Avoid land conversion of carbon-rich areas such as peatlands or forests.

Intermediate: Use low-emission land preparation techniques and ensure carbon sequestration through tree planting.

Advanced: Implement climate-smart agriculture practices and track carbon sequestration in biomass and soil, aiming for carbon-neutral or carbon-positive plantations.

DNSH Consideration: Ensure that plantation practices do not lead to the release of large amounts of GHGs, especially through deforestation or the burning of biomass.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources

Criteria: Plantations must be resource-efficient, minimizing the use of water, fertilizers, and other inputs.

Basic: Use basic resource efficiency techniques such as optimizing planting density to reduce the need for fertilizers and pesticides.

Intermediate: Introduce precision agriculture tools to optimize resource use, including sensors and data analytics for water and nutrient management.

Advanced: Implement circular economy principles by recycling organic waste from plantations (e.g., using crop residues for bioenergy or composting) and minimizing waste generation.

DNSH Consideration: Ensure that plantation practices do not overuse resources such as water and fertilizers, leading to negative environmental impacts such as water depletion or eutrophication.

2.2 Use of Renewable Energy

Criteria: The establishment and operation of plantations must incorporate renewable energy sources where possible.

Basic: Use manual labor and energy-efficient machinery for plantation establishment.

Intermediate: Incorporate solar-powered irrigation systems and energy-efficient processing machinery.

Advanced: Power plantation operations (e.g., processing, transportation) using renewable energy sources such as biomass, solar, or wind energy.

DNSH Consideration: Ensure that the energy use in plantation operations does not contribute significantly to GHG emissions.

3. Climate Resilience and Adaptation

3.1 Resilience to Climate Variability

Criteria: Commercial plantations must be resilient to climate variability and extremes, such as droughts, floods, and temperature fluctuations.

Basic: Select drought- and flood-resistant crop varieties to minimize losses during extreme weather events.

Intermediate: Implement climate-resilient infrastructure such as water storage systems and flood barriers.

Advanced: Use climate prediction tools to guide planting schedules and optimize irrigation, and implement diversified cropping systems that are more resilient to climate variability.

DNSH Consideration: Ensure that climate adaptation measures do not negatively impact local communities or ecosystems.

3.2 Sustainable Land-Use Planning

Criteria: Plantations must be part of broader sustainable land-use planning to ensure long-term viability and sustainability.

Basic: Conduct environmental impact assessments (EIAs) before establishing plantations.

Intermediate: Collaborate with local governments and communities to develop land-use plans that balance plantation development with ecosystem conservation and local needs.

Advanced: Use geographic information systems (GIS) and remote sensing to monitor land use and avoid land degradation and deforestation.

DNSH Consideration: Ensure that land-use planning does not lead to land conflicts or degradation of important natural resources.

4. Social and Economic Benefits

4.1 Job Creation and Inclusive Economic Growth

Criteria: Commercial plantations should contribute to job creation, improve livelihoods, and promote inclusive economic growth.

Basic: Create jobs through plantation establishment and maintenance, providing employment opportunities for local communities.

Intermediate: Implement fair labor practices and provide training for workers to increase their skills in sustainable agriculture and forestry management.

Advanced: Develop value-added processing facilities that create high-skill jobs and contribute to local economic growth, including opportunities for smallholders to participate in supply chains.

DNSH Consideration: Ensure that plantation operations do not contribute to unfair labor practices or exploitation of workers.

4.2 Social Inclusivity and Community Engagement

Criteria: Plantations must engage local communities and ensure that their development benefits all stakeholders, including vulnerable groups such as smallholder farmers and indigenous populations.

Basic: Engage communities in consultation processes before plantation establishment.

Intermediate: Provide technical support and training for smallholder farmers to integrate them into plantation supply chains.

Advanced: Develop partnerships with local communities to co-manage plantations and share benefits, ensuring that plantations contribute to community development and poverty reduction.

DNSH Consideration: Ensure that plantation development does not result in land dispossession, displacement, or exclusion of marginalized groups.

4.3 Food Security and Local Development

Criteria: Plantation establishment must not negatively impact food security or local development.

Basic: Avoid converting prime agricultural land into plantations for non-food crops.

Intermediate: Incorporate food-producing plants in agroforestry systems, balancing plantation establishment with food production for local communities.

Advanced: Use plantations as part of integrated land-use systems that support local food production, livelihoods, and ecosystem services.

DNSH Consideration: Ensure that plantation establishment does not reduce the availability of land for local food production, undermining food security.

5. Monitoring and Reporting

5.1 Monitoring of Environmental Impact

Criteria: Plantation operations must include mechanisms for monitoring their environmental impact, including water use, soil health, and biodiversity conservation.

Basic: Conduct regular monitoring of plantation operations to ensure compliance with environmental standards.

Intermediate: Use digital tools to monitor plantation impact on ecosystems, including water usage and biodiversity health.

Advanced: Employ remote sensing, drones, and satellite imagery to track plantation expansion and its environmental impact in real-time.

DNSH Consideration: Ensure that monitoring systems are accurate, transparent, and lead to actionable insights for improving sustainability.

5.2 Reporting on GHG Emissions and Carbon Sequestration

Criteria: Commercial plantations must report on their contributions to reducing or sequestering GHG emissions.

Basic: Estimate GHG emissions from land-use changes and plantation operations.

Intermediate: Implement carbon accounting systems to track carbon sequestration in plantation biomass and soil.

Advanced: Engage in third-party certification and verification of carbon credits generated by plantations, contributing to national or international carbon markets.

DNSH Consideration: Ensure that carbon sequestration reporting is transparent and aligns with international best practices.

6. Safety and Regulatory Compliance

6.1 Compliance with Environmental and Labor Regulations

Criteria: Plantations must comply with national and international environmental and labor regulations to ensure sustainability and fairness.

Basic: Adhere to national laws on environmental protection, including water usage, pesticide application, and labor rights.

Intermediate: Obtain certifications such as Forest Stewardship Council (FSC) or Rainforest Alliance to demonstrate compliance with sustainable practices.

Advanced: Ensure full alignment with international environmental treaties and sustainable certification schemes, including labor rights under International Labour Organization (ILO) conventions.

DNSH Consideration: Ensure that plantation operations do not violate environmental or labor laws, leading to penalties or reputational risks.

» ISO Standards

1. Environmental Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of plantation establishment and operations, ensuring that plantation activities are sustainable, minimize negative environmental impacts, and comply with environmental laws.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land-use practices, especially in regions prone to degradation and desertification. It helps in developing plantation projects that restore land productivity and improve resilience to climate change.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Assesses the water footprint of commercial plantations, guiding efficient water use in plantation operations to avoid over-extraction from local water resources and minimize the impact on surrounding ecosystems.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Supports the assessment of the environmental impacts of plantation establishment throughout its life cycle, from land clearing to plantation maintenance. It helps to evaluate the carbon footprint, resource use, and biodiversity impacts.

2. Social Responsibility and Inclusivity Standards

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into plantation management, ensuring that plantations respect human rights, promote fair labor practices, and contribute positively to the social and economic development of local communities.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures that plantation workers are provided with safe and healthy working conditions. It is particularly relevant for labor-intensive plantation activities, ensuring compliance with national and international safety standards.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements to prevent, detect, and address bribery, ensuring that commercial plantation operations are conducted ethically, without engaging in corrupt practices, especially when dealing with local communities and regulatory authorities.

3. Resource Efficiency and Circular Economy Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for optimizing energy use in plantation operations, including water pumping, processing, and transport. This standard helps plantations reduce their energy consumption and carbon footprint.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Offers guidelines for measuring and reporting the carbon footprint of plantation activities. This helps plantation managers to monitor and reduce emissions associated with land clearing, soil management, and the use of fertilizers and machinery.

ISO 18601: Packaging and the Environment – General Requirements for the Use of ISO Standards in the Field of Packaging and the Environment

Application: Provides guidance on sustainable packaging solutions for plantation products, ensuring that packaging materials are recyclable or biodegradable, minimizing environmental harm.

4. Climate Resilience and Adaptation Standards

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides a framework for plantations to assess climate risks and implement adaptation measures, ensuring that plantations are resilient to climate change impacts such as extreme weather, temperature changes, and altered precipitation patterns.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Focuses on assessing vulnerability and climate risks to plantation ecosystems and local communities, ensuring that plantation establishments account for these risks and build resilience through proper planning and management practices.

5. Biodiversity and Conservation Standards

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Guides the integration of plantation activities with community development, ensuring that plantations contribute to sustainable livelihoods, biodiversity conservation, and improved local environmental conditions.

ISO 20400: Sustainable Procurement – Guidance

Application: Encourages plantations to adopt sustainable procurement practices for seeds, fertilizers, and other materials, ensuring that the entire supply chain adheres to environmental and social responsibility principles.

ISO 14064-2: Greenhouse Gases – Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

Application: Assists plantations in implementing and monitoring projects that reduce GHG emissions, such as carbon sequestration in trees and soil. It supports certification for carbon credits and emissions reductions.

6. Sustainable Forest Management Standards

ISO 38200: Chain of Custody of Wood and Wood-Based Products

Application: Ensures that plantations involved in timber production maintain a chain of custody for wood products, ensuring traceability and compliance with sustainability criteria.

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Assists in conducting environmental assessments of plantation sites to ensure they are managed sustainably, without causing degradation or deforestation, and that they align with national and international environmental objectives.

» ISICS Codes

ISIC Codes for Commercial Plantation Establishment:

1. Agriculture, Forestry, and Logging

ISIC Code 0113: Growing of Vegetables and Melons, Roots and Tubers

Application: Covers the commercial growing of vegetables, melons, roots, and tubers, which could be part of diversified or agroforestry plantation systems.

ISIC Code 0116: Growing of Fibre Crops

Application: Refers to the cultivation of crops used for fiber production, such as cotton or jute, which are often grown on commercial plantations.

ISIC Code 0122: Growing of Perennial Crops

Application: Includes the growing of perennial crops such as coffee, tea, cocoa, rubber, and other plantation crops that are harvested over several years.

ISIC Code 0126: Growing of Oleaginous Fruits

Application: Involves the cultivation of oleaginous fruits such as oil palm and olives, which are often produced on large-scale commercial plantations.

ISIC Code 0129: Growing of Other Perennial Crops

Application: Refers to the cultivation of a variety of other perennial crops like bamboo, rattan, and other tree species often grown for commercial purposes.

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Covers the growing of trees for timber production and other forest-related activities, including afforestation and reforestation as part of commercial plantation establishment.

ISIC Code 0220: Logging

Application: Refers to the production of logs from commercial forestry plantations, including the harvesting of timber for construction, furniture, and other wood products.

ISIC Code 0230: Gathering of Non-Wood Forest Products

Application: Involves the collection of non-wood forest products such as rubber, latex, and plant-based resins, which are often produced in commercial plantations.

2. Manufacturing and Processing of Plantation Products

ISIC Code 1040: Manufacture of Vegetable and Animal Oils and Fats

Application: Includes the processing of oleaginous fruits (e.g., palm oil production), often associated with commercial plantations, particularly oil palm.

ISIC Code 1610: Sawmilling and Planing of Wood

Application: Refers to the processing of logs harvested from commercial timber plantations, turning them into sawn timber, planks, and other wood products.

ISIC Code 1621: Manufacture of Veneer Sheets and Wood-Based Panels

Application: Involves the production of veneer sheets, plywood, and other panel products made from timber grown on commercial plantations.

ISIC Code 1629: Manufacture of Other Products of Wood; Manufacture of Articles of Cork, Straw, and Plaiting Materials

Application: Covers the manufacturing of wood-based products such as bamboo, cork, and straw products, which are often grown on specialized commercial plantations.

3. Wholesale and Retail Trade of Plantation Products

ISIC Code 4620: Wholesale of Agricultural Raw Materials and Live Animals

Application: Refers to the wholesale trade of plantation products such as cocoa, coffee, rubber, and timber, which are grown in commercial plantations.

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Includes the wholesale trade of processed plantation products such as palm oil, tea, and cocoa.

4. Support Activities for Plantation Establishment

ISIC Code 0161: Support Activities for Crop Production

Application: Includes a wide range of support activities for plantation establishment, including land preparation, irrigation system setup, and pest management services.

ISIC Code 0162: Support Activities for Animal Production

Application: Refers to support services in agroforestry systems that integrate livestock with plantation management, ensuring sustainable land use and productivity.

ISIC Code 0240: Support Services to Forestry

Application: Covers forestry-related support services such as tree planting, reforestation, and sustainable forest management services that are critical for commercial timber plantations.

ISIC Code 3312: Repair of Machinery

Application: Involves the repair and maintenance of machinery used in plantation operations, such as tractors, harvesters, and processing equipment.

5. Transportation and Storage of Plantation Products

ISIC Code 5210: Warehousing and Storage

Application: Refers to the storage of plantation products such as timber, rubber, and palm oil before they are processed or distributed to markets.

ISIC Code 4923: Freight Transport by Road

Application: Includes the transportation of plantation products by road, particularly for bulk commodities like timber, rubber, and oil palm products.

ISIC Code 5012: Sea and Coastal Freight Water Transport

Application: Involves the transportation of plantation products by sea, which is critical for the export of large quantities of agricultural and timber products from plantations.

6. Land Use and Environmental Management

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes consultancy services for the planning and design of commercial plantations, including land-use planning, environmental impact assessments, and water management systems.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Covers activities such as environmental monitoring, biodiversity assessments, and carbon accounting services, which are essential for ensuring the sustainability of commercial plantations.

» Other international or adapted Certifications & Standards

Forest Stewardship Council (FSC) Certification: Ensures responsible management of forest resources.

Rainforest Alliance Certification: Focuses on sustainable agriculture and forestry practices that conserve biodiversity.

Architecture for REDD+ Transactions (ART)- The REDD+ Environmental Excelence Standards (TREES): standard for the quantification, monitoring, reporting and verification of Greenhouse Gas (GHG) emission reductions and removals from REDD+ activities at a jurisdictional and national scale

» Specific Government Policy (National Standards or Certification)

- Forest and Wildlife Policy (2012)
- Land Use and Spatial Planning Act 2016
- Trees and timber Act - 1974 (nrcd 273)
- Ghana Forest Plantation Strategy (2016-2040)

» Responsible Agencies/ Regulators

- Ministry of Lands and Natural Resources
- Forestry Commission
- Trees and timber Act - 1974 (nrcd 273)

Timber and Non-Timber Forest Products (NTFPs)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Sustainable Harvesting Practices for Timber and NTFPs

Criteria: Harvesting of timber and NTFPs must be conducted in a way that maintains forest health and biodiversity.

Basic: Implement selective logging and minimal-impact harvesting techniques to prevent deforestation and maintain forest cover.

Intermediate: Use forest certification systems such as the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC) to ensure sustainable forest management.

Advanced: Apply reduced-impact logging (RIL) techniques and ecosystem-based forest management to ensure regeneration and protect ecological integrity, including biodiversity conservation.

DNSH Consideration: Ensure that harvesting does not lead to deforestation, habitat destruction, or significant harm to local ecosystems.

1.2 Protection of Ecosystem Services

Criteria: The extraction of timber and NTFPs must ensure that essential ecosystem services such as water filtration, carbon sequestration, and soil conservation are preserved.

Basic: Maintain riparian buffers and avoid logging in ecologically sensitive areas such as wetlands or steep slopes.

Intermediate: Incorporate agroforestry and mixed-species planting to support soil health, water retention, and biodiversity.

Advanced: Implement landscape-scale management plans that integrate timber and NTFP extraction with the protection of ecosystem services, ensuring that forests continue to provide long-term ecological benefits.

DNSH Consideration: Ensure that ecosystem services are not degraded by over-harvesting or poor management practices.

1.3 Forest Regeneration and Reforestation

Criteria: Forest management must include strategies for regenerating harvested areas and reforesting degraded lands.

Basic: Plant native species in deforested areas and implement natural regeneration practices after timber extraction.

Intermediate: Introduce assisted regeneration techniques and ensure a balanced mix of native species to enhance biodiversity and forest resilience.

Advanced: Develop reforestation projects that align with carbon sequestration goals and biodiversity conservation, incorporating climate-resilient species and sustainable forestry techniques.

DNSH Consideration: Ensure that reforestation efforts do not lead to monoculture plantations or the use of non-native invasive species.

1.4 GHG Emissions Reduction

Criteria: Forest management should contribute to reducing greenhouse gas (GHG) emissions by maintaining forest carbon stocks and sequestering additional carbon through sustainable practices.

Basic: Avoid land-use changes that release significant carbon, such as converting forests to agriculture or plantations.

Intermediate: Use carbon accounting to measure and report carbon storage in forest ecosystems, contributing to national and international climate commitments.

Advanced: Engage in carbon offset programs, including REDD+ (Reducing Emissions from Deforestation and Forest Degradation), and apply sustainable forest management practices that prioritize carbon sequestration.

DNSH Consideration: Ensure that timber and NTFP extraction does not lead to increased GHG emissions due to deforestation or soil degradation.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Timber and NTFPs

Criteria: Timber and NTFPs must be processed and utilized efficiently to minimize waste and maximize resource use.

Basic: Implement basic waste reduction practices such as using sawdust and other by-products for bioenergy or composting.

Intermediate: Introduce efficient milling technologies that reduce waste during timber processing and ensure full utilization of all NTFPs harvested.

Advanced: Develop circular economy practices by repurposing timber and NTFP waste into value-added products, such as biomass for energy, wood pellets, and fiberboard production.

DNSH Consideration: Ensure that waste from timber and NTFP harvesting is properly managed and does not contribute to environmental pollution or resource depletion.

2.2 Sustainable Packaging and Transport

Criteria: Packaging and transport systems for timber and NTFPs must minimize environmental impacts, including energy use and carbon emissions.

Basic: Use biodegradable or recyclable packaging materials for NTFPs to reduce plastic waste.

Intermediate: Optimize transport logistics to reduce the carbon footprint of moving timber and NTFPs from forest to market, including using energy-efficient vehicles.

Advanced: Implement renewable energy-powered transportation (e.g., electric vehicles or biofuels) and develop low-carbon supply chains for timber and NTFPs.

DNSH Consideration: Ensure that transportation and packaging practices do not result in excessive carbon emissions or non-recyclable waste.

3. Climate Resilience and Adaptation

3.1 Resilience to Climate Change

Criteria: Timber and NTFP production must be resilient to climate variability and extremes such as droughts, floods, and temperature fluctuations.

Basic: Select tree species and NTFPs that are climate-resilient and capable of withstanding local climatic conditions.

Intermediate: Implement adaptive management practices, such as adjusting planting and harvesting schedules based on climate forecasts.

Advanced: Use climate modeling tools to anticipate future climate impacts and incorporate these projections into long-term forest management and planning.

DNSH Consideration: Ensure that climate adaptation measures do not negatively impact forest ecosystems or biodiversity.

3.2 Sustainable Water Management

Criteria: Water use in the management and processing of timber and NTFPs must be efficient and sustainable.

Basic: Minimize water use during timber processing and in the management of NTFPs, ensuring that local water resources are not over-extracted.

Intermediate: Use water-efficient technologies in processing facilities and implement water conservation practices in forest management.

Advanced: Incorporate integrated water management systems that protect watershed health and ensure long-term water availability for forest ecosystems and surrounding communities.

DNSH Consideration: Ensure that water extraction for timber and NTFP processing does not harm local water bodies or reduce water availability for ecosystems and communities.

4. Social and Economic Benefits

4.1 Livelihood Support and Economic Opportunities

Criteria: The extraction and management of timber and NTFPs must create sustainable livelihoods and economic opportunities for local communities.

Basic: Provide employment opportunities through harvesting and processing activities, ensuring fair wages and safe working conditions.

Intermediate: Promote local value addition through small-scale NTFP processing and marketing to enhance income for forest-dependent communities.

Advanced: Support the development of community-based forest enterprises that manage and sell NTFPs and timber sustainably, integrating them into global supply chains.

DNSH Consideration: Ensure that the extraction of timber and NTFPs does not lead to the exploitation of workers or the marginalization of vulnerable groups, such as indigenous people.

4.2 Social Inclusivity and Community Engagement

Criteria: Forest management activities must involve local communities and ensure equitable distribution of benefits.

Basic: Engage local communities in decision-making processes related to timber and NTFP extraction.

Intermediate: Provide training and capacity-building programs to local communities to enhance their ability to manage and market timber and NTFPs sustainably.

Advanced: Establish co-management agreements with indigenous and local communities that grant them rights to manage, harvest, and benefit from forest resources.

DNSH Consideration: Ensure that community engagement is meaningful and inclusive, and does not result in land grabbing or the exclusion of vulnerable groups.

4.3 Cultural Preservation and Traditional Knowledge

Criteria: Timber and NTFP management must respect and integrate traditional knowledge and cultural practices.

Basic: Recognize and protect the traditional uses of NTFPs by local and indigenous communities.

Intermediate: Incorporate traditional knowledge into forest management plans, ensuring that cultural practices are preserved.

Advanced: Develop community-based monitoring systems that integrate traditional ecological knowledge with modern forest management practices.

DNSH Consideration: Ensure that traditional knowledge is not exploited without proper consent or compensation.

5. Monitoring and Reporting

5.1 Monitoring of Forest Health and Regeneration

Criteria: Forest management systems must include mechanisms for monitoring forest health, including the impacts of timber and NTFP extraction.

Basic: Conduct periodic monitoring of forest cover and species diversity to ensure sustainable harvesting levels.

Intermediate: Use digital tools and remote sensing technologies to monitor forest health, deforestation rates, and biodiversity changes in real-time.

Advanced: Implement advanced forest monitoring systems that integrate satellite data, drones, and artificial intelligence to track the long-term impacts of timber and NTFP extraction on forest ecosystems.

DNSH Consideration: Ensure that monitoring data is used to adjust management practices and prevent over-harvesting or ecosystem degradation.

5.2 Reporting on Sustainability Indicators

Criteria: Forest management activities must report on key sustainability indicators, including carbon sequestration, biodiversity conservation, and social impact.

Basic: Provide annual reports on forest management practices, harvesting levels, and community benefits.

Intermediate: Use standardized frameworks for reporting sustainability metrics, such as GHG emissions reductions, water use, and biodiversity conservation efforts.

Advanced: Engage in third-party certification and verification of sustainability claims, ensuring transparency and accountability in forest management practices.

DNSH Consideration: Ensure that reporting is accurate, transparent, and accessible to stakeholders, including local communities and consumers.

6. Safety and Regulatory Compliance

6.1 Compliance with Environmental and Social Regulations

Criteria: Timber and NTFP management must comply with national and international environmental and social regulations.

Basic: Ensure compliance with national forestry laws and environmental protection regulations, including those related to protected areas and wildlife conservation.

Intermediate: Obtain sustainable forest management certifications such as FSC or PEFC, demonstrating compliance with global environmental and social standards.

Advanced: Align with international climate and biodiversity agreements, such as the Paris Agreement and the Convention on Biological Diversity (CBD), ensuring that timber and NTFP extraction supports global sustainability goals.

DNSH Consideration: Ensure that regulatory compliance does not result in land conflicts or environmental degradation.

» ISO Standards

1. Sustainability and Environmental Management

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing environmental responsibilities related to timber and NTFP extraction, ensuring that operations minimize their impact on the environment and promote sustainability.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidance on sustainable land management practices, particularly important for timber and NTFP extraction to prevent land degradation and maintain healthy ecosystems.

ISO 14064-2: Greenhouse Gases – Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of GHG Emission Reductions or Removal Enhancements

Application: Helps measure, report, and verify greenhouse gas (GHG) emissions reductions or carbon sequestration in forestry projects. This standard is relevant for timber and NTFP operations that aim to reduce their carbon footprint or engage in carbon offset projects like REDD+ (Reducing Emissions from Deforestation and Forest Degradation).

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Provides guidelines for quantifying the carbon footprint of products, including timber and NTFPs, ensuring that companies can accurately measure and reduce emissions associated with their operations.

2. Sustainable Forestry and Chain of Custody

ISO 38200: Chain of Custody of Wood and Wood-Based Products

Application: Ensures traceability of timber and wood-based products throughout the supply chain. This is essential for ensuring that timber is sourced sustainably and meets certification requirements like the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC).

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Assists in conducting environmental assessments of timber and NTFP extraction sites, ensuring that activities are sustainable and comply with environmental regulations. This standard supports decision-making regarding land use, site management, and environmental risk mitigation.

ISO 21930: Sustainability in Buildings and Civil Engineering Works – Core Rules for Environmental Product Declarations of Construction Products and Services

Application: Provides guidelines for assessing the environmental impact of construction materials, including timber products. This helps ensure that timber used in construction is sustainably sourced and has minimal environmental impact.

3. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance for integrating social responsibility into business practices, ensuring that timber and NTFP operations respect human rights, promote fair labor practices, and contribute to the socio-economic development of local communities.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements to prevent, detect, and address bribery in timber and NTFP operations, ensuring that business dealings are ethical, transparent, and compliant with legal and regulatory requirements.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in timber and NTFP harvesting and processing, helping companies establish safe working environments and comply with national and international safety standards.

4. Product Quality and Traceability

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Provides a framework for implementing traceability systems in NTFPs that are part of the food chain, ensuring transparency from harvest to final product, which is critical for products like medicinal plants, nuts, and fruits.

ISO 9001: Quality Management Systems – Requirements

Application: Ensures that timber and NTFP operations follow a structured approach to quality management, including consistent production processes and customer satisfaction. This standard helps maintain product quality across the supply chain.

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Relevant for NTFPs that are food products (e.g., nuts, fruits, edible resins). This standard ensures that products are safely handled, processed, and distributed in compliance with food safety regulations.

5. Biodiversity and Ecosystem Protection

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Supports the integration of sustainable development principles into forest management practices. It helps ensure that timber and NTFP operations contribute to community well-being and biodiversity conservation.

ISO 14055-2: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 2: Implementation and Monitoring

Application: Provides guidelines for implementing and monitoring land management practices that help maintain biodiversity, crucial for sustainable timber and NTFP operations in forests.

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Assists organizations in reporting on their environmental impact, including the biodiversity and ecosystem effects of their timber and NTFP operations, ensuring transparency and accountability.

6. Water and Resource Management

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Guides organizations in assessing and managing their water footprint, particularly important for timber processing and NTFP extraction in areas where water resources are critical for local ecosystems and communities.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use efficiently in timber and NTFP operations, reducing energy consumption and associated greenhouse gas emissions.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Ensures that companies conducting timber and NTFP processing facilities can carry out energy audits, identifying opportunities to improve energy efficiency and reduce environmental impacts.

» ISICS Codes

1. Forestry and Logging

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Covers the growing of trees for timber production, as well as forest management activities such as afforestation, reforestation, and sustainable forestry practices.

ISIC Code 0220: Logging

Application: Refers to the production of logs and timber through the harvesting of trees, either from natural forests or commercial plantations. It includes both sustainable logging and other logging operations for the production of construction materials, paper, and other wood products.

ISIC Code 0230: Gathering of Non-Wood Forest Products

Application: Involves the collection of non-timber forest products such as nuts, fruits, medicinal plants, resins, gums, bamboo, rattan, and other materials sourced from forests. It includes the sustainable harvesting of NTFPs that do not involve cutting down trees.

ISIC Code 0240: Support Services to Forestry

Application: Provides services that support forestry operations, such as forest management consultancy, planting services, pest control, and forest fire prevention. This code is relevant for companies that offer technical or logistical support for timber and NTFP operations.

2. Manufacturing and Processing of Timber and NTFPs

ISIC Code 1610: Sawmilling and Planing of Wood

Application: Refers to the sawing, planing, and shaping of logs into timber products, such as boards, planks, and beams. This is a key stage in the processing of harvested timber for construction and other uses.

ISIC Code 1621: Manufacture of Veneer Sheets and Wood-Based Panels

Application: Involves the production of veneer sheets, plywood, particle boards, and other wood-based panel products, often made from timber harvested in forests or plantations.

ISIC Code 1622: Manufacture of Builders' Carpentry and Joinery

Application: Covers the production of wooden products used in construction, such as doors, windows, and frameworks. These products are typically made from processed timber.

ISIC Code 1629: Manufacture of Other Products of Wood; Manufacture of Articles of Cork, Straw, and Plaiting Materials

Application: Refers to the production of wood-based products other than panels and timber for construction, such as furniture, bamboo products, or articles made from cork, straw, and other non-timber materials.

3. Wholesale and Retail Trade of Timber and NTFPs

ISIC Code 4620: Wholesale of Agricultural Raw Materials and Live Animals

Application: Includes the wholesale of raw timber and NTFPs such as logs, bamboo, and natural fibers. This category covers the bulk trading of unprocessed forest products.

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Relevant for NTFPs that are part of the food chain, such as nuts, fruits, and edible resins. This code covers the wholesale trade of edible forest products.

ISIC Code 4719: Other Retail Sale in Non-Specialized Stores

Application: Refers to the retail sale of a range of forest products, including timber for DIY and construction projects, as well as NTFPs like herbal medicines, nuts, and crafts made from forest materials.

ISIC Code 4789: Retail Sale via Stalls and Markets of Other Goods

Application: Covers the sale of NTFPs in local markets, including products such as medicinal plants, nuts, fruits, and handcrafted items made from forest materials.

4. Transportation and Storage of Timber and NTFPs

ISIC Code 5210: Warehousing and Storage

Application: Refers to the storage of timber and NTFPs before they are processed or distributed. It includes climate-controlled storage facilities for perishable NTFPs such as fruits or medicinal plants.

ISIC Code 4923: Freight Transport by Road

Application: Includes the transportation of timber and NTFPs by road, particularly for bulk products like logs or bamboo that need to be moved from forests to processing facilities or markets.

ISIC Code 5012: Sea and Coastal Freight Water Transport

Application: Refers to the transportation of large volumes of timber and NTFPs via sea freight, commonly used for the export of logs, processed timber, or high-value NTFPs to international markets.

5. Professional, Scientific, and Technical Activities

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Covers consultancy services related to sustainable forestry management, environmental impact assessments, and the design of sustainable forestry operations, particularly those focused on timber and NTFP production.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Refers to scientific and technical services such as biodiversity assessments, forest certification audits, carbon sequestration projects, and other environmental monitoring services critical for sustainable timber and NTFP operations.

6. Support Services for Timber and NTFPs

ISIC Code 0161: Support Activities for Crop Production

Application: Includes support services for managing plantations and forest crops, such as pest control, irrigation management, and other services that enhance the productivity and sustainability of forest resources.

ISIC Code 3312: Repair of Machinery

Application: Refers to the repair and maintenance of machinery used in timber harvesting, wood processing, and NTFP extraction, ensuring the efficiency and safety of equipment used in forestry operations.

» Other international or adapted Certifications & Standards

Rainforest Alliance Certification: Focuses on sustainable agriculture and forestry practices that conserve biodiversity.

Forest Stewardship Council (FSC) Certification: Ensures responsible management of forest resources.

» Specific Government Policy (National Standards or Certification)

- Ghana’s National REDD+ Strategy

- Forest and Wildlife Policy (2012)

- Land Use and Spatial Planning Act 2016

- Trees and timber Act - 1974 (nrcd 273)

» Responsible Agencies/ Regulators

- Ministry of Environment, Science, Technology and Innovation (MESTI)

- Ministry of Lands and Natural Commission

- Forestry Commission

Agroforestry

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Biodiversity Conservation

Criteria: Agroforestry systems must support biodiversity conservation by integrating a variety of tree species and agricultural crops.

Basic: Incorporate a minimum of two tree species per hectare in the agroforestry system to enhance biodiversity.

Intermediate: Use native and endemic tree species to promote local biodiversity and ensure that the agroforestry system supports local wildlife and ecosystems.

Advanced: Design the agroforestry system to create wildlife corridors and buffer zones around protected areas, enhancing connectivity between ecosystems.

DNSH Consideration: Ensure that agroforestry practices do not lead to the introduction of invasive species or harm local biodiversity.

1.2 Soil Health and Erosion Control

Criteria: Agroforestry systems must improve or maintain soil health and prevent erosion.

Basic: Implement basic soil conservation techniques such as contour planting, mulching, and the use of cover crops.

Intermediate: Use nitrogen-fixing tree species and deep-rooted plants to enhance soil fertility and structure, reducing the need for chemical fertilizers.

Advanced: Apply advanced soil management techniques such as agroecology and permaculture principles, including continuous ground cover, organic soil amendments, and integrated pest management.

DNSH Consideration: Ensure that soil management practices do not lead to soil degradation, erosion, or nutrient depletion.

1.3 Water Management

Criteria: Agroforestry systems must use water efficiently and protect local water resources.

Basic: Incorporate basic water conservation practices such as rainwater harvesting and optimizing irrigation methods (e.g., drip irrigation).

Intermediate: Use agroforestry systems to enhance water infiltration and reduce surface runoff, improving water retention in the soil.

Advanced: Implement integrated watershed management practices that combine agroforestry with reforestation and riparian buffer zones to protect water bodies and maintain hydrological cycles.

DNSH Consideration: Ensure that water use in agroforestry systems does not lead to water shortages or the depletion of local water resources.

1.4 GHG Emissions Reduction and Carbon Sequestration

Criteria: Agroforestry systems must contribute to reducing greenhouse gas (GHG) emissions by sequestering carbon and improving land-use efficiency.

Basic: Avoid practices that result in land-use changes releasing significant carbon (e.g., deforestation or clearing primary forests).

Intermediate: Incorporate tree species that sequester carbon efficiently, including a minimum number of trees per hectare to maximize carbon storage in biomass and soil.

Advanced: Design agroforestry systems as part of carbon offset projects, aligning with carbon sequestration goals (e.g., through afforestation, reforestation, or REDD+ projects) and implementing climate-smart agricultural practices.

DNSH Consideration: Ensure that agroforestry practices do not contribute to increased emissions through deforestation, unsustainable land use, or degradation of carbon-rich soils.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources

Criteria: Agroforestry systems must be resource-efficient, minimizing the use of water, energy, and inputs such as synthetic fertilizers and pesticides.

Basic: Implement basic resource efficiency techniques, including composting organic waste and using integrated pest management to reduce chemical inputs.

Intermediate: Use precision agriculture tools to optimize water and nutrient use, including soil moisture sensors and targeted fertilization.

Advanced: Develop closed-loop agroforestry systems that recycle organic waste into compost and biofertilizers, and minimize external inputs, promoting a circular economy approach.

DNSH Consideration: Ensure that resource use in agroforestry systems does not lead to resource depletion, pollution, or unsustainable agricultural practices.

2.2 Diversification of Production

Criteria: Agroforestry systems must provide multiple products and services to enhance resource efficiency and income diversification.

Basic: Grow a mix of timber and agricultural crops to diversify production and income streams.

Intermediate: Include non-timber forest products (NTFPs) such as fruits, nuts, resins, and medicinal plants in the agroforestry system to enhance diversification.

Advanced: Develop value-added agroforestry products and services (e.g., eco-tourism, carbon credits, agroforestry-based enterprises) to increase income streams and promote sustainable economic growth.

DNSH Consideration: Ensure that diversification strategies do not compromise environmental sustainability or lead to overexploitation of resources.

3. Climate Resilience and Adaptation

3.1 Resilience to Climate Variability

Criteria: Agroforestry systems must be resilient to climate variability and extremes such as droughts, floods, and temperature fluctuations.

Basic: Select drought- and flood-resistant tree species and crops that are well-adapted to local climatic conditions.

Intermediate: Use climate-smart agriculture techniques such as staggered planting and crop rotation to reduce vulnerability to climate shocks.

Advanced: Implement climate prediction tools and remote sensing technologies to monitor climate risks and optimize agroforestry management practices based on climate data.

DNSH Consideration: Ensure that climate adaptation strategies do not negatively impact local ecosystems or biodiversity.

3.2 Sustainable Land-Use Planning

Criteria: Agroforestry systems must be part of broader sustainable land-use planning to ensure long-term viability and ecosystem services.

Basic: Conduct environmental impact assessments (EIAs) before implementing agroforestry projects.

Intermediate: Collaborate with local communities and stakeholders to integrate agroforestry into regional land-use plans, balancing agricultural production with ecosystem conservation.

Advanced: Use geographic information systems (GIS) and remote sensing technologies to monitor land-use changes and ensure that agroforestry systems contribute to sustainable landscape management.

DNSH Consideration: Ensure that land-use planning does not lead to land conflicts or degradation of critical ecosystems.

4. Social and Economic Benefits

4.1 Livelihood Support and Economic Opportunities

Criteria: Agroforestry systems must create sustainable livelihoods and economic opportunities for local communities.

Basic: Provide employment and training opportunities for local farmers in agroforestry practices, ensuring fair wages and safe working conditions.

Intermediate: Establish small-scale agroforestry enterprises that promote value addition (e.g., processing of timber, fruits, or NTFPs) to increase local incomes.

Advanced: Support the development of community-based agroforestry cooperatives that enable smallholders to access markets, finance, and technical support for sustainable agroforestry systems.

DNSH Consideration: Ensure that agroforestry operations do not exploit workers or marginalize vulnerable groups, such as women or indigenous communities.

4.2 Social Inclusivity and Community Engagement

Criteria: Agroforestry systems must engage local communities and ensure equitable distribution of benefits.

Basic: Involve local communities in decision-making processes related to the planning and implementation of agroforestry systems.

Intermediate: Provide training and capacity-building programs to local farmers, focusing on agroforestry practices that enhance resilience and sustainability.

Advanced: Develop participatory agroforestry projects that co-manage land and resources with local communities, ensuring long-term ownership and benefits for marginalized groups.

DNSH Consideration: Ensure that community engagement is meaningful and inclusive, avoiding land dispossession or exclusion of vulnerable populations.

5. Monitoring and Reporting

5.1 Monitoring of Agroforestry System Performance

Criteria: Agroforestry systems must include mechanisms for monitoring performance, including environmental, social, and economic impacts.

Basic: Conduct regular monitoring of tree survival rates, crop yields, and soil health to ensure that agroforestry systems are sustainable.

Intermediate: Use digital tools such as remote sensing, mobile apps, and drones to track agroforestry performance in real-time, including carbon sequestration and water use efficiency.

Advanced: Implement advanced agroforestry monitoring systems that integrate satellite data, artificial intelligence (AI), and blockchain technology to ensure transparency and traceability in agroforestry practices.

DNSH Consideration: Ensure that monitoring data is used to inform adaptive management practices, preventing over-harvesting or land degradation.

5.2 Reporting on Sustainability Indicators

Criteria: Agroforestry systems must report on key sustainability indicators such as carbon sequestration, biodiversity conservation, and social impact.

Basic: Provide annual reports on agroforestry operations, including data on tree planting, carbon storage, and community benefits.

Intermediate: Use standardized frameworks for reporting on sustainability metrics, such as GHG emissions reductions, water use efficiency, and biodiversity conservation.

Advanced: Engage in third-party certification and verification of sustainability claims, ensuring transparency and accountability in agroforestry systems.

DNSH Consideration: Ensure that reporting is accurate, transparent, and accessible to stakeholders, including local communities and consumers.

6. Safety and Regulatory Compliance

6.1 Compliance with Environmental and Social Regulations

Criteria: Agroforestry systems must comply with national and international environmental and social regulations to ensure sustainability and fairness.

Basic: Ensure compliance with national forestry and agriculture laws, including those related to environmental protection and land use.

Intermediate: Obtain certifications such as Forest Stewardship Council (FSC) or Organic Certification to demonstrate compliance with sustainable practices.

Advanced: Align agroforestry systems with international agreements such as the Paris Agreement, Convention on Biological Diversity (CBD), and Sustainable Development Goals (SDGs) to promote global sustainability.

DNSH Consideration: Ensure that agroforestry operations do not violate environmental or labor laws, leading to penalties or reputational risks.

» ISO Standards

1. Environmental Sustainability and Management

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of agroforestry systems, ensuring that practices minimize harm to the environment and promote sustainability.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land management, focusing on preventing land degradation and maintaining healthy ecosystems, which is critical in agroforestry systems.

ISO 14064-2: Greenhouse Gases – Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of GHG Emission Reductions or Removal Enhancements

Application: Helps in quantifying, monitoring, and reporting GHG emission reductions or carbon sequestration from agroforestry projects. This is important for carbon offset programs or REDD+ (Reducing Emissions from Deforestation and Forest Degradation).

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Provides guidelines for quantifying the carbon footprint of agroforestry products, helping agroforestry operations measure and reduce their carbon emissions.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Offers a framework for assessing the water footprint of agroforestry practices, ensuring that water use is sustainable and minimizes the impact on local water resources.

2. Sustainable Agriculture and Forest Management

ISO 38200: Chain of Custody of Wood and Wood-Based Products

Application: Ensures traceability of wood and wood-based products from agroforestry systems, helping agroforestry practitioners prove the sustainable origin of timber and non-timber forest products.

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Assists in conducting environmental assessments of agroforestry sites to ensure that activities are aligned with sustainable practices and comply with environmental regulations.

3. Resource Efficiency and Circular Economy

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use in agroforestry operations, ensuring that energy consumption is efficient and sustainable.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Supports agroforestry systems in conducting energy audits, identifying opportunities for improving energy efficiency, and reducing emissions related to energy use.

ISO 18601: Packaging and the Environment – General Requirements for the Use of ISO Standards in the Field of Packaging and the Environment

Application: Provides guidelines for ensuring that packaging materials used in agroforestry operations are sustainable, recyclable, or biodegradable, promoting a circular economy approach.

4. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into agroforestry operations, ensuring that practices respect human rights, promote fair labor, and contribute to community well-being.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in agroforestry, helping organizations establish safe working environments and comply with safety standards.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements to prevent, detect, and address bribery in agroforestry operations, ensuring that all business dealings are ethical and compliant with legal requirements.

5. Product Quality and Traceability

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Provides a framework for ensuring the traceability of agroforestry products, especially those that enter the food chain (e.g., fruits, nuts, medicinal plants), ensuring transparency from farm to market.

ISO 9001: Quality Management Systems – Requirements

Application: Ensures that agroforestry operations follow a structured approach to quality management, ensuring consistency in production processes and product quality.

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Relevant for agroforestry products that are part of the food chain, such as nuts, fruits, and edible products. This standard ensures that food safety is managed throughout the production and processing stages.

6. Climate Resilience and Adaptation

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides a framework for assessing and implementing climate change adaptation measures in agroforestry systems, ensuring that they are resilient to climate variability and extremes.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Focuses on assessing vulnerability and risks due to climate change impacts, ensuring that agroforestry systems are designed to be resilient and adaptable to changing climatic conditions.

7. Biodiversity and Ecosystem Services

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Supports agroforestry systems in aligning with sustainable development goals, promoting ecosystem services, biodiversity conservation, and community well-being.

ISO 14055-2: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 2: Implementation and Monitoring

Application: Offers guidelines for the implementation and monitoring of agroforestry practices to prevent land degradation and desertification, ensuring that agroforestry systems are sustainable and contribute to land restoration.

» ISICS Codes

1. Agriculture and Forestry Activities

ISIC Code 0110: Growing of Non-Perennial Crops

Application: Refers to the cultivation of crops that are not permanent and are harvested within a short cycle. Agroforestry systems often combine non-perennial crops (e.g., cereals, vegetables) with trees.

ISIC Code 0120: Growing of Perennial Crops

Application: Includes the cultivation of long-lasting crops such as fruit trees, coffee, tea, and rubber. This is a core activity in agroforestry, where perennial trees are combined with other crops to improve sustainability.

ISIC Code 0126: Growing of Oleaginous Fruits

Application: Refers to the cultivation of oil-producing fruits such as palm, olives, and other oilseeds, which are often part of agroforestry systems for producing diverse outputs.

ISIC Code 0129: Growing of Other Perennial Crops

Application: Includes the cultivation of various other perennial crops like bamboo, rattan, and tree species used in agroforestry systems.

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Involves the cultivation, management, and harvesting of trees for timber, which is a key component of agroforestry systems where tree species are integrated with crops.

ISIC Code 0220: Logging

Application: Refers to the cutting and harvesting of timber, which is part of some agroforestry systems. This code is relevant for agroforestry setups that include timber production.

ISIC Code 0230: Gathering of Non-Wood Forest Products

Application: Covers the collection of non-timber forest products (NTFPs) such as fruits, nuts, resins, and medicinal plants, which are an important output of agroforestry systems.

2. Livestock Farming in Agroforestry Systems

ISIC Code 0141: Raising of Cattle and Buffaloes

Application: In agroforestry systems, livestock is often integrated with trees and crops to optimize land use. This code covers the raising of cattle and buffaloes as part of agroforestry.

ISIC Code 0149: Raising of Other Animals

Application: Includes the raising of other livestock, such as goats, sheep, and poultry, which are sometimes part of agroforestry systems for providing diversified income streams and improving soil fertility through manure.

3. Processing and Manufacturing of Agroforestry Products

ISIC Code 1610: Sawmilling and Planing of Wood

Application: Refers to the processing of timber harvested from agroforestry systems, including activities such as sawing, planing, and shaping of logs for use in construction, furniture, and other wood products.

ISIC Code 1629: Manufacture of Other Products of Wood; Manufacture of Articles of Cork, Straw, and Plaiting Materials

Application: Includes the manufacturing of various wood products, bamboo, and rattan articles, which are common non-timber forest products from agroforestry systems.

ISIC Code 1030: Processing and Preserving of Fruit and Vegetables

Application: Covers the processing and preservation of fruits and vegetables, which are typically harvested from agroforestry systems. This includes drying, canning, and producing value-added products like jams or juices.

4. Wholesale and Retail Trade of Agroforestry Products

ISIC Code 4620: Wholesale of Agricultural Raw Materials and Live Animals

Application: Involves the wholesale trade of raw agricultural materials such as fruits, vegetables, and livestock produced in agroforestry systems, including both timber and non-timber products.

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Refers to the wholesale distribution of processed agroforestry products such as fruits, oils, and beverages derived from perennial crops.

ISIC Code 4719: Other Retail Sale in Non-Specialized Stores

Application: Covers retail sales of agroforestry products in non-specialized stores, including the sale of processed fruits, vegetables, and small timber products.

5. Support Services for Agroforestry

ISIC Code 0161: Support Activities for Crop Production

Application: Includes support services for managing agroforestry crops, such as soil preparation, pest control, and irrigation services, which are essential for maintaining agroforestry systems.

ISIC Code 0162: Support Activities for Animal Production

Application: Involves providing support services related to livestock in agroforestry systems, such as veterinary services, breeding, and animal husbandry techniques.

ISIC Code 0240: Support Services to Forestry

Application: Covers technical and management services to support forestry operations in agroforestry systems, including tree planting, forest management consulting, and sustainable forestry certifications.

6. Transportation and Storage of Agroforestry Products

ISIC Code 5210: Warehousing and Storage

Application: Refers to the storage of agroforestry products such as timber, fruits, and processed agricultural goods before they are transported to markets.

ISIC Code 4923: Freight Transport by Road

Application: Includes the transportation of agroforestry products such as timber, fruits, and livestock from farms to processing facilities or markets.

ISIC Code 5012: Sea and Coastal Freight Water Transport

Application: Refers to the transportation of large quantities of agroforestry products, including timber and processed agricultural goods, via sea for international trade.

7. Professional, Scientific, and Technical Services for Agroforestry

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Covers consulting services related to sustainable land-use planning, environmental impact assessments, and the design of agroforestry systems.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Refers to scientific and technical support services such as agroforestry system design, soil fertility assessments, climate risk monitoring, and biodiversity assessments.

» Specific Government Policy (National Standards or Certification)

- National Climate Change Policy (NCCP)

- Forest and Wildlife Policy (2012)

- Land Use and Spatial Planning Act 2016

- Trees and timber Act - 1974 (nrcd 273)

» Responsible Agencies/ Regulators

- Ministry of Food and Agriculture (MoFA)

- Ministry of Lands and Natural Resources

Forestry Commission

Carbon Credits and Trading.

Carbon credits and trading mechanisms are essential tools for mitigating climate change by allowing the reduction, sequestration, or avoidance of greenhouse gas (GHG) emissions to be monetized and traded. Projects generating carbon credits must meet stringent sustainability criteria to ensure they contribute to environmental goals, benefit local communities, and adhere to international standards.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 GHG Emissions Reduction or Avoidance

Criteria: Carbon credit projects must directly result in a quantifiable reduction or avoidance of GHG emissions.

Basic: Demonstrate that the project leads to the reduction of GHG emissions through verifiable actions such as renewable energy adoption, energy efficiency improvements, or reforestation.

Intermediate: Use internationally recognized methodologies (e.g., Clean Development Mechanism (CDM) or Verified Carbon Standard (VCS)) to quantify the emission reductions.

Advanced: Implement high-impact carbon offset projects with clear co-benefits such as biodiversity conservation, water resource protection, or soil health improvement, and use advanced monitoring and verification technologies such as satellite imaging or blockchain for tracking.

DNSH Consideration: Ensure that projects do not result in the unintended release of GHGs or undermine the environmental integrity of the area.

1.2 Carbon Sequestration and Storage

Criteria: Carbon credit projects must sequester carbon through afforestation, reforestation, agroforestry, or soil carbon projects.

Basic: Implement afforestation and reforestation projects using indigenous or non-invasive tree species that are adapted to the local environment.

Intermediate: Use agroforestry or soil carbon enhancement practices to sequester carbon in both biomass and soils while promoting sustainable land management.

Advanced: Integrate carbon sequestration projects into landscape-scale initiatives that include biodiversity conservation, water management, and community involvement.

DNSH Consideration: Ensure that sequestration projects do not lead to monocultures, loss of biodiversity, or negative impacts on local water cycles.

1.3 Permanence of Carbon Credits

Criteria: Carbon credits must represent long-term and permanent reductions or sequestration of GHG emissions.

Basic: Ensure that credits represent permanent emission reductions or sequestration for at least 100 years, using recognized methodologies for permanence.

Intermediate: Implement buffer zones or insurance mechanisms to safeguard against reversals due to natural disasters (e.g., fires, pests, or droughts) or land-use changes.

Advanced: Utilize monitoring systems such as remote sensing, satellite data, and continuous verification to ensure the permanence of carbon sequestration over the long term.

DNSH Consideration: Ensure that the risk of carbon release (e.g., through deforestation or land degradation) is minimized and that mitigation measures are in place.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources

Criteria: Carbon credit projects must efficiently use natural resources such as water, land, and energy.

Basic: Implement water-efficient practices in carbon credit projects, particularly in forestry and agriculture-based sequestration projects.

Intermediate: Use renewable energy sources for project operations, minimizing the carbon footprint of the carbon credit projects themselves.

Advanced: Develop closed-loop systems that recycle project by-products, such as using forestry waste for bioenergy or composting to enhance soil carbon storage.

DNSH Consideration: Ensure that carbon credit projects do not lead to over-exploitation of natural resources or conflict with local resource needs.

2.2 Diversification of Carbon Credit Projects

Criteria: Carbon credit projects must contribute to diversified economic activities and resource use, ensuring long-term sustainability.

Basic: Incorporate multiple carbon sequestration and reduction strategies (e.g., energy efficiency, reforestation, and methane capture) to diversify project impacts.

Intermediate: Include multiple carbon credit generation activities that enhance community resilience, such as agroforestry, renewable energy projects, or waste-to-energy initiatives.

Advanced: Support projects that generate carbon credits across sectors, including agriculture, industry, and energy, while integrating sustainable supply chains and circular economy principles.

DNSH Consideration: Ensure that project diversification does not lead to conflicting land use or resource depletion.

3. Climate Resilience and Adaptation

3.1 Climate Resilience of Carbon Credit Projects

Criteria: Carbon credit projects must be designed to withstand climate variability and extremes such as droughts, floods, and temperature changes.

Basic: Choose climate-resilient tree species and agricultural practices for carbon sequestration projects that are well-suited to local climatic conditions.

Intermediate: Implement climate-resilient infrastructure (e.g., water storage systems, flood barriers) in carbon credit projects to reduce the risk of project failure due to climate extremes.

Advanced: Use climate modeling and prediction tools to assess and manage climate risks in carbon credit projects, ensuring long-term project viability.

DNSH Consideration: Ensure that adaptation measures do not negatively impact local ecosystems or reduce resilience to other environmental pressures.

3.2 Sustainable Land-Use Planning

Criteria: Carbon credit projects must be part of a broader sustainable land-use plan that considers long-term viability and ecosystem services.

Basic: Conduct environmental impact assessments (EIAs) before implementing carbon credit projects, particularly for large-scale reforestation and land-use change projects.

Intermediate: Collaborate with local governments, communities, and stakeholders to integrate carbon credit projects into regional land-use plans that prioritize biodiversity conservation and sustainable land management.

Advanced: Use geographic information systems (GIS) and remote sensing technologies to monitor land-use changes and ensure that carbon credit projects support landscape-scale sustainability initiatives.

DNSH Consideration: Ensure that land-use planning does not result in land conflicts or degradation of critical ecosystems.

4. Social and Economic Benefits

4.1 Livelihood Support and Economic Opportunities

Criteria: Carbon credit projects must create sustainable livelihoods and economic opportunities for local communities.

Basic: Provide employment opportunities through the implementation of carbon credit projects, ensuring fair wages and safe working conditions.

Intermediate: Establish small-scale carbon credit enterprises that generate income for local farmers and communities through carbon sequestration or renewable energy projects.

Advanced: Support community-based carbon credit cooperatives, enabling smallholders and indigenous communities to participate in carbon markets and benefit from carbon credits generated on their land.

DNSH Consideration: Ensure that carbon credit projects do not exploit local communities or undermine their access to natural resources.

4.2 Social Inclusivity and Community Engagement

Criteria: Carbon credit projects must engage local communities and ensure equitable distribution of benefits.

Basic: Involve local communities in decision-making processes related to carbon credit projects, ensuring their participation in project design and implementation.

Intermediate: Provide training and capacity-building programs to local farmers and communities on carbon sequestration techniques and carbon market participation.

Advanced: Develop participatory carbon credit projects that co-manage land and resources with local communities, ensuring long-term ownership and benefits for marginalized groups.

DNSH Consideration: Ensure that community engagement is meaningful and inclusive, avoiding land dispossession or marginalization of vulnerable populations.

5. Monitoring and Reporting

5.1 Monitoring of GHG Emissions Reductions

Criteria: Carbon credit projects must include mechanisms for monitoring GHG emissions reductions and sequestration.

Basic: Conduct regular monitoring of carbon sequestration rates and GHG reductions using standardized methods, such as field surveys or remote sensing.

Intermediate: Use digital tools such as remote sensing, mobile apps, and drones to track GHG reductions in real-time, including carbon sequestration and methane capture.

Advanced: Implement advanced monitoring systems that integrate satellite data, artificial intelligence (AI), and blockchain technology to ensure transparency and traceability in carbon credit generation.

DNSH Consideration: Ensure that monitoring data is used to adjust project practices, preventing reversals of carbon sequestration or under-performance in emission reductions.

5.2 Reporting on Sustainability Indicators

Criteria: Carbon credit projects must report on key sustainability indicators such as GHG reductions, biodiversity conservation, and social impact.

Basic: Provide annual reports on carbon credit project activities, including data on carbon sequestration, GHG reductions, and community benefits.

Intermediate: Use standardized frameworks for reporting on sustainability metrics, such as GHG emissions reductions, water use efficiency, and biodiversity conservation.

Advanced: Engage in third-party certification and verification of sustainability claims, ensuring transparency and accountability in carbon credit projects.

DNSH Consideration: Ensure that reporting is accurate, transparent, and accessible to stakeholders, including local communities and consumers.

6. Regulatory Compliance and Certification

6.1 Compliance with Environmental and Social Regulations

Criteria: Carbon credit projects must comply with national and international environmental and social regulations.

Basic: Ensure compliance with national laws related to environmental protection, land use, and labor rights in carbon credit projects.

Intermediate: Obtain certifications such as Verified Carbon Standard (VCS), Clean Development Mechanism (CDM), or Gold Standard to demonstrate compliance with international carbon market standards.

Advanced: Align carbon credit projects with international climate agreements such as the Paris Agreement and Sustainable Development Goals (SDGs), ensuring that projects contribute to global sustainability objectives.

DNSH Consideration: Ensure that regulatory compliance does not result in land conflicts, environmental degradation, or social harm.

» ISO Standards

1. Greenhouse Gas Accounting and Carbon Credit Verification

ISO 14064-1: Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

Application: Provides a framework for organizations to quantify and report their greenhouse gas (GHG) emissions and removals. This standard ensures that carbon credits are based on accurate and verified GHG reductions or removals.

ISO 14064-2: Greenhouse Gases – Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of GHG Emission Reductions or Removal Enhancements

Application: Offers guidelines for carbon credit projects to quantify, monitor, and report GHG emission reductions or carbon sequestration at the project level. It is used for validating and verifying carbon credits generated by projects such as reforestation, renewable energy, or energy efficiency initiatives.

ISO 14064-3: Greenhouse Gases – Part 3: Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions

Application: Provides guidance for the validation and verification of GHG reduction claims and carbon credits. It ensures that carbon credits are validated by third-party auditors in line with internationally recognized standards.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Specifies requirements for calculating and reporting the carbon footprint of products, helping to ensure that the carbon credits generated from product-related projects are accurately quantified.

2. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of carbon credit projects, ensuring that they minimize harm to the environment and comply with regulatory requirements.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Provides principles for assessing the environmental impacts of carbon credit projects throughout their life cycle, helping organizations ensure that carbon offset projects are sustainable and environmentally sound.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land management, particularly for reforestation, afforestation, and soil carbon sequestration projects that generate carbon credits, ensuring these projects contribute to land restoration and combat desertification.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Assists carbon credit projects in assessing their water footprint, ensuring that projects like reforestation or bioenergy do not negatively impact local water resources.

3. Climate Resilience and Adaptation

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides a framework for assessing and implementing climate change adaptation measures in carbon credit projects, ensuring that projects are resilient to climate variability and extremes such as droughts, floods, and temperature changes.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Focuses on assessing vulnerability and climate risks in carbon credit projects, particularly in forestry or agriculture-based projects, ensuring that they are designed to be resilient and adaptive to climate change.

4. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into carbon credit projects, ensuring that these projects respect human rights, promote fair labor practices, and contribute to community well-being, particularly in projects involving indigenous lands or local communities.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements to prevent, detect, and address bribery in carbon credit projects and trading activities, ensuring that all business dealings are ethical, transparent, and compliant with legal and regulatory requirements.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in carbon credit projects, helping organizations establish safe working environments and comply with safety standards in forestry, energy, or other carbon credit-related activities.

5. Product Traceability and Certification

ISO 38200: Chain of Custody of Wood and Wood-Based Products

Application: Ensures the traceability of timber and wood products derived from carbon credit projects (e.g., reforestation or sustainable forest management projects). This standard helps verify that timber products linked to carbon credits are sustainably sourced.

ISO 9001: Quality Management Systems – Requirements

Application: Ensures that carbon credit projects and trading systems follow a structured approach to quality management, ensuring consistency in project design, monitoring, and reporting processes.

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Relevant for carbon credits generated through agricultural or forestry projects that are integrated into food or feed chains, ensuring traceability and transparency from project implementation to marketable carbon credits.

6. Energy Management and Efficiency

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use in carbon credit projects, particularly those focused on renewable energy, energy efficiency, or waste-to-energy initiatives, ensuring that energy use is minimized and sustainable.

ISO 50002: Energy Audits – Requirements with Guidance for Use

Application: Supports carbon credit projects in conducting energy audits, identifying opportunities for improving energy efficiency and reducing emissions, particularly in industrial or energy sector projects.

7. Certification of Carbon Credits and Trading Systems

ISO 17029: Conformity Assessment – General Principles and Requirements for Validation and Verification Bodies

Application: Specifies requirements for organizations providing validation and verification services for carbon credits, ensuring that carbon credits traded on the market are verified by credible third parties in line with international standards.

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Provides guidelines for certification bodies that assess and certify carbon credits, ensuring that the certification process for carbon credits and the trading platforms are credible, transparent, and consistent with international best practices.

» ISICS Codes

1. Agriculture, Forestry, and Land Use

ISIC Code 0110: Growing of Non-Perennial Crops

Application: Relevant for carbon credits generated through projects that enhance agricultural productivity while reducing GHG emissions or sequestering carbon, such as sustainable crop management or soil carbon sequestration projects.

ISIC Code 0120: Growing of Perennial Crops

Application: Involves carbon credit projects focused on perennial crops like coffee, cocoa, or tea, where agroforestry systems help sequester carbon and reduce emissions.

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: This code is relevant for forestry-based carbon credit projects, including afforestation, reforestation, and sustainable forest management that contribute to carbon sequestration.

ISIC Code 0220: Logging

Application: Logging activities under sustainable forest management practices can be part of carbon credit projects, particularly those aimed at reducing emissions through improved forestry practices.

ISIC Code 0230: Gathering of Non-Wood Forest Products

Application: Applies to carbon credit projects based on sustainable management and conservation of forests, where non-timber forest products are gathered in ways that avoid deforestation and enhance carbon storage.

ISIC Code 0240: Support Services to Forestry

Application: Involves services supporting carbon sequestration projects, such as forest management, reforestation planning, and carbon monitoring services.

2. Energy and Waste Management

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Relevant for carbon credits generated through renewable energy projects such as wind, solar, or hydroelectric power that replace fossil fuel-based electricity generation, reducing GHG emissions.

ISIC Code 3520: Manufacture of Gas; Distribution of Gaseous Fuels through Mains

Application: Refers to carbon credits from projects focused on biogas production, where methane is captured and used as an energy source, reducing emissions from traditional gas use.

ISIC Code 3700: Sewerage

Application: Involves carbon credits generated from methane capture and wastewater treatment processes that reduce GHG emissions by preventing methane release.

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Relevant for carbon credits generated from waste management projects, such as landfill gas capture or waste-to-energy initiatives, which reduce emissions by capturing methane or converting waste into usable energy.

ISIC Code 3821: Treatment and Disposal of Non-Hazardous Waste

Application: Carbon credits can be generated through waste treatment projects that capture GHGs or reduce emissions from waste disposal practices, including composting and recycling programs.

ISIC Code 3830: Materials Recovery

Application: Carbon credit projects related to recycling and materials recovery, reducing the demand for virgin materials and lowering associated emissions from production and disposal.

3. Manufacturing and Industrial Activities

ISIC Code 2410: Manufacture of Basic Iron and Steel

Application: Carbon credits can be generated from industrial projects that focus on energy efficiency, waste heat recovery, or alternative processes that reduce emissions in steel manufacturing.

ISIC Code 2520: Manufacture of Tanks, Reservoirs, and Containers of Metal

Application: Carbon credits may be generated from projects that enhance energy efficiency in the production process or use recycled materials, reducing overall emissions from manufacturing.

ISIC Code 2811: Manufacture of Engines and Turbines, Except Aircraft, Vehicle, and Cycle Engines

Application: Relevant for carbon credit projects that promote energy-efficient manufacturing of industrial machinery, reducing the carbon footprint of production activities.

4. Transportation and Mobility

ISIC Code 4911: Passenger Rail Transport, Interurban

Application: Carbon credits can be generated from projects that replace high-emission transport systems with low-carbon alternatives like electric rail, helping reduce emissions from transportation.

ISIC Code 4923: Freight Transport by Road

Application: Includes carbon credit projects focused on reducing emissions in freight transport, such as the use of electric vehicles or alternative fuels to lower GHG emissions from road transport.

ISIC Code 5012: Sea and Coastal Freight Water Transport

Application: Refers to carbon credits generated through projects that reduce emissions from maritime transport, such as fuel efficiency improvements or transitioning to low-emission fuels in shipping.

5. Professional, Scientific, and Technical Services

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Provides consulting and design services for carbon credit projects, including project planning, carbon accounting, GHG reduction strategies, and climate risk assessments.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Covers technical services related to carbon credit verification, certification, and monitoring, including environmental impact assessments and carbon offset validation.

6. Environmental and Carbon Market Services

ISIC Code 7020: Management Consultancy Activities

Application: Relevant for firms providing consulting services related to carbon credit trading, market access, project development, and the strategic management of carbon portfolios.

ISIC Code 7120: Technical Testing and Analysis

Application: Provides services for monitoring and verifying carbon credit projects, including testing emissions reductions, ensuring compliance with carbon standards, and validating project performance.

ISIC Code 8292: Packaging Activities

Application: Covers services related to the packaging and trading of carbon credits, including certification and marketing for carbon offset projects in various sectors.

» Responsible Agencies/ Regulators

Ministry of Lands and Natuarl Resources Forestory Commission

Ministry of Science, Technology and Innovation

Wildlife Conservation and Habitat Restoration

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Biodiversity Conservation

Criteria: Projects must promote the conservation of biodiversity, including endangered species and critical habitats.

Basic: Ensure that projects focus on conserving native species and protecting or enhancing critical ecosystems such as wetlands, forests, or savannas.

Intermediate: Incorporate ecosystem-based approaches that prioritize species richness and functional diversity, including the protection of keystone species.

Advanced: Implement habitat restoration and wildlife corridors to increase ecosystem connectivity and facilitate species migration, breeding, and genetic diversity.

DNSH Consideration: Ensure that conservation practices do not introduce invasive species or disrupt local ecosystems.

1.2 Ecosystem Restoration

Criteria: Habitat restoration projects must aim to restore ecosystems to their natural or improved conditions, supporting ecological integrity.

Basic: Implement afforestation, reforestation, or revegetation efforts using native or climate-resilient species to restore degraded landscapes.

Intermediate: Restore hydrological functions in wetlands and riparian areas to improve water flow, quality, and habitat availability for wildlife.

Advanced: Use a holistic landscape restoration approach, integrating agroforestry, reforestation, and sustainable land management practices to support long-term ecosystem stability.

DNSH Consideration: Ensure that restoration projects do not lead to monoculture plantations, soil degradation, or water shortages.

1.3 GHG Emissions Reduction and Carbon Sequestration

Criteria: Projects must contribute to GHG emissions reduction through enhanced carbon sequestration in restored habitats.

Basic: Focus on reforestation and wetland restoration efforts that sequester carbon in biomass and soils.

Intermediate: Use agroforestry and sustainable land-use systems to increase carbon storage while promoting biodiversity.

Advanced: Implement large-scale ecosystem restoration projects, including peatland and forest restoration, which maximize carbon sequestration and biodiversity co-benefits.

DNSH Consideration: Ensure that restoration projects do not cause unintended emissions, such as from soil disturbance or deforestation.

1.4 Water Management and Soil Health

Criteria: Projects must improve water management and soil health through sustainable practices that enhance ecosystem function.

Basic: Implement erosion control measures such as contour planting, riparian buffers, and ground cover crops to protect soil health.

Intermediate: Integrate water retention systems, such as constructed wetlands and swales, to improve water infiltration and storage in restored habitats.

Advanced: Use nature-based solutions, such as wetland restoration and watershed management, to enhance water quality and availability for both wildlife and human communities.

DNSH Consideration: Ensure that water management activities do not lead to excessive water extraction or negatively impact local water resources.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Resources

Criteria: Wildlife conservation and habitat restoration projects must efficiently use natural resources, including water, land, and energy.

Basic: Use water-efficient irrigation systems, such as drip irrigation, for reforestation and habitat restoration projects to minimize water use.

Intermediate: Incorporate resource-efficient technologies, such as solar-powered water pumps, in conservation projects to reduce energy consumption.

Advanced: Develop closed-loop systems where waste materials from restoration efforts (e.g., plant residues) are composted and used to enhance soil fertility in other parts of the project.

DNSH Consideration: Ensure that resource use does not lead to the depletion of local resources or conflict with community needs.

2.2 Sustainable Land Use and Agroecological Approaches

Criteria: Projects must promote sustainable land-use practices that enhance both biodiversity and local livelihoods.

Basic: Encourage agroforestry and intercropping practices that integrate trees, crops, and livestock to create multifunctional landscapes.

Intermediate: Support agroecological farming systems that use organic methods, crop diversification, and reduced chemical inputs, enhancing habitat quality while providing economic benefits.

Advanced: Implement landscape-scale conservation efforts that integrate sustainable agriculture, forestry, and wildlife conservation to create resilient ecosystems and economies.

DNSH Consideration: Ensure that land-use practices do not result in over-extraction of resources, habitat fragmentation, or ecosystem degradation.

3. Climate Resilience and Adaptation

3.1 Resilience to Climate Variability

Criteria: Wildlife conservation and habitat restoration projects must be designed to withstand climate variability and extremes, such as droughts, floods, and temperature changes.

Basic: Select climate-resilient native species for reforestation and habitat restoration projects to enhance ecosystem stability in the face of climate change.

Intermediate: Implement adaptive management practices such as rotational grazing or flexible water management in wetland restoration projects to respond to changing climate conditions.

Advanced: Use climate forecasting tools to guide habitat restoration and conservation efforts, ensuring that project design accounts for projected climate impacts.

DNSH Consideration: Ensure that restoration projects do not exacerbate climate vulnerability by introducing species or management practices that are not suited to future climatic conditions.

3.2 Sustainable Land-Use Planning

Criteria: Projects must be integrated into broader land-use planning strategies that promote long-term sustainability and ecosystem resilience.

Basic: Conduct environmental impact assessments (EIAs) to ensure that wildlife conservation projects align with regional and national biodiversity and climate goals.

Intermediate: Collaborate with local governments and communities to integrate conservation and restoration projects into land-use plans, ensuring that they contribute to biodiversity conservation and sustainable development.

Advanced: Use geographic information systems (GIS) and remote sensing technologies to monitor land-use changes, habitat quality, and wildlife movement, ensuring long-term viability.

DNSH Consideration: Ensure that land-use planning does not conflict with local community rights or lead to unintended environmental impacts.

4. Social and Economic Benefits

4.1 Livelihood Support and Economic Opportunities

Criteria: Wildlife conservation and habitat restoration projects must create sustainable livelihoods and provide economic opportunities for local communities.

Basic: Provide employment through restoration projects, ensuring fair wages and safe working conditions for local workers.

Intermediate: Support eco-tourism, sustainable harvesting of non-timber forest products (NTFPs), and agroforestry-based enterprises that create diversified income streams for communities.

Advanced: Develop community-based conservation programs that integrate wildlife management, habitat restoration, and sustainable livelihoods, ensuring that local communities share in the benefits of conservation efforts.

DNSH Consideration: Ensure that projects do not displace local communities or reduce their access to critical natural resources.

4.2 Social Inclusivity and Community Engagement

Criteria: Projects must engage local communities and ensure equitable distribution of benefits, including indigenous peoples and marginalized groups.

Basic: Involve local communities in the design and implementation of restoration and conservation projects, ensuring their participation in decision-making processes.

Intermediate: Provide training and capacity-building programs to local communities, focusing on sustainable land management, biodiversity conservation, and eco-friendly livelihood opportunities.

Advanced: Develop participatory governance models that allow communities to co-manage wildlife conservation areas and restored habitats, ensuring that their rights and knowledge are respected and integrated into conservation strategies.

DNSH Consideration: Ensure that community engagement is meaningful and inclusive, avoiding land dispossession or marginalization of vulnerable groups.

5. Monitoring and Reporting

5.1 Monitoring of Habitat Quality and Wildlife Populations

Criteria: Projects must include mechanisms for monitoring habitat quality and wildlife populations to ensure the success of conservation and restoration efforts.

Basic: Conduct regular field surveys to monitor changes in vegetation cover, species diversity, and habitat conditions.

Intermediate: Use remote sensing technologies such as drones or satellite imagery to track habitat restoration progress and wildlife movements.

Advanced: Implement advanced monitoring systems that use artificial intelligence (AI) and data analytics to predict changes in habitat quality, species populations, and ecosystem services, allowing for adaptive management.

DNSH Consideration: Ensure that monitoring systems are robust and transparent, providing accurate data to guide conservation decisions.

5.2 Reporting on Sustainability and Social Impact

Criteria: Projects must report on key sustainability indicators, including biodiversity conservation, carbon sequestration, and social benefits.

Basic: Provide annual reports on habitat restoration progress, wildlife population changes, and community benefits.

Intermediate: Use standardized frameworks for reporting on biodiversity and ecosystem services, such as IUCN Red List assessments or Ecosystem-based Adaptation (EbA) metrics.

Advanced: Engage third-party certification and verification of project outcomes, ensuring transparency and accountability in the conservation and restoration process.

DNSH Consideration: Ensure that reporting is accessible to stakeholders, including local communities, and that it informs ongoing project improvements.

6. Regulatory Compliance and Certification

6.1 Compliance with Environmental and Social Regulations

Criteria: Wildlife conservation and habitat restoration projects must comply with national and international environmental and social regulations.

Basic: Ensure that projects comply with local and national environmental laws, including those related to protected areas, endangered species, and water use.

Intermediate: Obtain certification from recognized bodies such as the Forest Stewardship Council (FSC) or the Global Conservation Standard, demonstrating compliance with sustainable conservation practices.

Advanced: Align projects with international conventions and agreements such as the Convention on Biological Diversity (CBD), the Paris Agreement, and the UN Sustainable Development Goals (SDGs), ensuring that projects contribute to global biodiversity and climate goals.

DNSH Consideration: Ensure that regulatory compliance does not result in conflicts over land rights, resource access, or community well-being.

» ISO Standards

1. Environmental Management and Biodiversity Conservation

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing environmental impacts related to wildlife conservation and habitat restoration projects, ensuring that operations minimize harm to the environment and promote sustainability.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land management to prevent and combat land degradation, which is critical for habitat restoration and conservation projects.

ISO 14064-2: Greenhouse Gases – Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring, and Reporting of GHG Emission Reductions or Removal Enhancements

Application: Provides guidelines for quantifying and reporting carbon sequestration from habitat restoration projects, ensuring that these projects contribute to GHG emission reductions.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in calculating the carbon footprint of projects related to wildlife conservation and habitat restoration, helping quantify the impact of restoration efforts on carbon sequestration.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides a framework for assessing the water footprint of wildlife conservation and habitat restoration projects, ensuring that they promote sustainable water management.

2. Climate Resilience and Adaptation

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides a framework for integrating climate change adaptation into wildlife conservation and habitat restoration projects, ensuring that they are resilient to climate variability and extreme weather events.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Focuses on assessing the vulnerability of ecosystems and species to climate change impacts, helping wildlife conservation and habitat restoration projects identify and manage risks.

3. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into wildlife conservation and habitat restoration projects, ensuring that these projects respect human rights, support local communities, and promote fair labor practices.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements for preventing, detecting, and addressing bribery in wildlife conservation and restoration projects, ensuring ethical and transparent business practices.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in conservation and restoration activities, helping organizations establish safe working environments and comply with safety standards.

4. Sustainable Land Use and Resource Efficiency

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing energy use in wildlife conservation and habitat restoration projects, particularly for managing energy-efficient operations in conservation sites.

ISO 14055-2: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 2: Implementation and Monitoring

Application: Offers guidelines for implementing and monitoring sustainable land management practices in wildlife conservation projects, ensuring that projects support ecosystem restoration and land reclamation.

5. Biodiversity and Ecosystem Protection

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Supports wildlife conservation and habitat restoration projects by promoting ecosystem services, biodiversity conservation, and community well-being in line with sustainable development principles.

ISO 14015: Environmental Management – Environmental Assessment of Sites and Organizations (EASO)

Application: Assists in conducting environmental assessments of wildlife conservation and restoration sites, ensuring that activities are sustainable and in compliance with environmental regulations.

6. Monitoring, Reporting, and Certification

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Provides guidelines for reporting on the environmental performance of wildlife conservation and habitat restoration projects, ensuring transparency and accountability.

ISO 17029: Conformity Assessment – General Principles and Requirements for Validation and Verification Bodies

Application: Specifies requirements for validation and verification bodies that assess the environmental performance of wildlife conservation and habitat restoration projects, ensuring that claims related to sustainability are accurate and reliable.

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Provides requirements for certification bodies involved in certifying wildlife conservation and restoration projects, ensuring that these projects meet international standards for sustainability and environmental management.

» ISICS Codes

ISIC Codes for Wildlife Conservation and Habitat Restoration:

1. Forestry and Land Management

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Refers to activities related to the cultivation, management, and conservation of forests, including reforestation and afforestation projects, which are essential components of habitat restoration.

ISIC Code 0220: Logging

Application: Includes sustainable logging activities that contribute to habitat restoration by ensuring that logging practices do not harm the ecosystem or biodiversity. It is relevant for projects focused on sustainable forest management.

ISIC Code 0230: Gathering of Non-Wood Forest Products

Application: Refers to the sustainable collection of non-timber forest products (NTFPs) such as fruits, seeds, resins, and medicinal plants, which can be a part of habitat conservation and restoration efforts in forest ecosystems.

ISIC Code 0240: Support Services to Forestry

Application: Covers technical and support services for forestry, such as forest management, fire prevention, and reforestation planning, all of which are crucial to habitat restoration projects.

2. Environmental and Conservation Services

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Includes scientific and technical consulting services related to wildlife conservation, biodiversity assessments, environmental impact studies, and habitat restoration planning.

ISIC Code 7120: Technical Testing and Analysis

Application: Involves environmental testing and analysis, such as water quality testing, soil analysis, and biodiversity monitoring, which are critical for managing and assessing wildlife conservation and habitat restoration projects.

ISIC Code 8292: Packaging Activities

Application: Covers activities related to packaging and handling of environmental data, reports, and assessments used for wildlife conservation and habitat restoration.

3. Agriculture and Land Use

ISIC Code 0110: Growing of Non-Perennial Crops

Application: Refers to agricultural activities that involve the growing of crops that do not last more than one growing season. Agroforestry systems can combine crop production with habitat conservation, supporting biodiversity.

ISIC Code 0120: Growing of Perennial Crops

Application: Involves the cultivation of long-lasting crops like coffee, cocoa, or rubber, where agroforestry practices are used to restore habitats and promote biodiversity while providing economic benefits to local communities.

ISIC Code 0141: Raising of Cattle and Buffaloes

Application: This code applies to livestock management practices that are integrated into habitat restoration projects, such as rotational grazing systems that support ecosystem regeneration.

ISIC Code 0161: Support Activities for Crop Production

Application: Includes land preparation, irrigation, pest control, and other activities that support crop production. Sustainable agriculture and agroecology practices that promote biodiversity conservation can fall under this code.

4. Water and Ecosystem Management

ISIC Code 3700: Sewerage

Application: Covers activities related to the management of water resources, including the treatment and disposal of wastewater. This code is relevant for wetland restoration and water ecosystem rehabilitation projects.

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Includes the management of water systems and wetlands, which are often targeted in habitat restoration projects aimed at improving water quality and re-establishing ecosystems.

5. Professional and Technical Services

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Refers to professional services related to land use planning, ecosystem restoration, and the design of conservation areas, ensuring that habitat restoration projects are sustainable and well-planned.

ISIC Code 7020: Management Consultancy Activities

Application: Relevant for firms that provide consulting services on wildlife conservation strategies, habitat restoration, project development, and managing conservation initiatives in line with regulatory standards.

6. Wholesale and Trade of Natural Products

ISIC Code 4620: Wholesale of Agricultural Raw Materials and Live Animals

Application: Refers to the trade of natural products, such as NTFPs, seeds, and live animals, which can support sustainable livelihoods in habitat restoration projects, such as eco-tourism and sustainable harvesting practices.

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Includes the wholesale trade of food products derived from agroforestry or sustainable land-use systems integrated into wildlife conservation and habitat restoration efforts.

» Specific Government Policy (National Standards or Certification)

Ghana Wildlife Society

Soil Nutrient Management (Basic, Intermediate, Advanced)

» Technical Screening Criteria

Soil Health and Fertility

1.1 Organic Matter Management

Basic:

Apply organic materials such as compost, manure, or crop residues to enhance soil organic matter and improve soil structure.

Incorporate crop rotations with leguminous crops to naturally increase soil nitrogen levels and enhance soil fertility.

Avoid over-reliance on synthetic fertilizers to maintain soil nutrient balance.

Intermediate:

Implement cover cropping and green manuring practices to improve soil organic content, increase nitrogen fixation, and reduce the need for synthetic fertilizers.

Use soil amendments such as biochar or humic substances to improve soil nutrient retention, reduce leaching, and enhance microbial activity.

Promote integrated crop-livestock systems that recycle organic nutrients within the farm ecosystem.

Advanced:

Employ regenerative agricultural practices that prioritize long-term soil health, such as agroforestry, permaculture, and no-till farming, to improve soil organic matter and nutrient cycling.

Use precision agriculture techniques to monitor soil organic content and apply organic amendments as needed based on soil tests and crop requirements.

Promote closed-loop farming systems where all organic waste is recycled into the soil, minimizing nutrient loss and ensuring a continuous flow of nutrients.

DNSH Consideration: Ensure that organic matter application does not result in nutrient overload, leaching, or environmental contamination, and avoid using untreated or contaminated organic waste.

1.2 Balanced Nutrient Inputs

Basic:

Use soil testing to identify nutrient deficiencies and apply appropriate quantities of fertilizers to correct imbalances, avoiding over-application.

Follow recommended fertilizer application rates to prevent soil nutrient depletion or excessive nutrient buildup.

Promote the use of organic fertilizers alongside chemical fertilizers to create a balanced nutrient input system.

Intermediate:

Develop nutrient management plans based on site-specific soil testing, crop needs, and environmental conditions to optimize nutrient use efficiency.

Use slow-release or stabilized fertilizers that reduce nitrogen and phosphorus losses through leaching and volatilization.

Rotate crops to optimize nutrient cycling and reduce dependency on external inputs.

Advanced:

Use precision nutrient management technologies, such as soil sensors, satellite imagery, or drones, to apply fertilizers at variable rates based on real-time crop nutrient requirements.

Implement nutrient budgeting and nutrient recovery strategies to reduce nutrient waste and increase soil nutrient use efficiency.

Promote the use of biofertilizers, mycorrhizal fungi, and microbial inoculants to enhance nutrient uptake and improve soil fertility over the long term.

DNSH Consideration: Ensure that nutrient applications do not contribute to soil degradation, eutrophication of water bodies, or loss of soil biodiversity through excessive chemical use.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Water and Nutrients

Basic:

Apply fertilizers during periods of optimal plant growth to maximize nutrient uptake and minimize nutrient loss through runoff or leaching.

Use basic water management practices such as mulching and drip irrigation to maintain soil moisture levels and enhance nutrient absorption.

Intermediate:

Integrate soil moisture monitoring systems to adjust irrigation and nutrient application according to soil moisture availability, ensuring that nutrients are not lost through runoff or leaching.

Use fertigation systems that combine irrigation and fertilization, optimizing nutrient application based on water availability and plant demand.

Advanced:

Implement precision irrigation systems that deliver water and nutrients at the exact time and location needed by crops, ensuring that nutrients are used efficiently without being lost to the environment.

Use climate-smart irrigation systems that adjust water and nutrient delivery based on real-time weather conditions, soil moisture data, and crop growth stages.

DNSH Consideration: Ensure that irrigation practices do not lead to overuse of water resources, soil salinization, or nutrient leaching into surrounding water bodies.

2.2 Waste Minimization and Nutrient Recycling

Basic:

Minimize nutrient waste by composting crop residues and using them to replenish soil nutrients.

Reduce food waste and return unused organic matter back to the soil through composting or mulching.

Intermediate:

Promote on-farm recycling of nutrients by using crop residues, animal manure, and other organic waste as nutrient inputs, reducing the need for external fertilizer sources.

Use biochar or other soil amendments to enhance nutrient retention in the soil and reduce nutrient loss through leaching.

Advanced:

Implement closed-loop nutrient management systems that capture and recycle nutrients from various sources, including wastewater and organic waste streams, ensuring that no nutrients are lost from the system.

Promote circular agriculture models that integrate nutrient recycling, composting, and regenerative practices to create a self-sustaining nutrient cycle on the farm.

DNSH Consideration: Ensure that nutrient recycling practices do not result in nutrient overload, contamination, or unintended environmental impacts, such as water pollution or soil toxicity.

3. Climate Resilience and Adaptation

3.1 Soil Conservation and Erosion Control

Basic:

Implement basic soil conservation practices, such as contour farming and mulching, to reduce soil erosion and prevent nutrient loss.

Use windbreaks or cover crops to protect the soil from wind and water erosion, maintaining soil structure and fertility.

Intermediate:

Adopt conservation tillage or no-till farming to minimize soil disturbance, enhance soil structure, and reduce the loss of nutrients through erosion.

Implement terracing, agroforestry, or buffer strips to control water runoff and prevent nutrient loss in sloped or degraded areas.

Advanced:

Use landscape-level soil management techniques that promote ecosystem resilience, such as watershed management, integrated water management, and large-scale agroforestry systems.

Employ cutting-edge soil erosion monitoring tools, such as drones or satellite imagery, to identify vulnerable areas and implement targeted soil conservation measures.

DNSH Consideration: Ensure that soil conservation practices do not lead to unintended consequences, such as loss of biodiversity, increased pest pressure, or reduced soil productivity.

3.2 Enhancing Soil Carbon Sequestration

Basic:

Use practices such as cover cropping, crop rotation, and reduced tillage to increase soil organic matter and promote soil carbon sequestration.

Avoid practices that degrade soil carbon stocks, such as excessive tillage, overgrazing, or monocropping.

Intermediate:

Implement agroecological practices that enhance soil organic carbon, such as agroforestry, silvopasture, or the use of perennial crops that increase soil carbon storage over time.

Monitor soil organic carbon levels regularly to track improvements in carbon sequestration and adjust management practices as needed.

Advanced:

Use advanced soil carbon management techniques, such as biochar application, regenerative grazing, or carbon farming, to maximize soil carbon sequestration and enhance long-term soil health.

Integrate carbon farming into climate finance mechanisms, such as carbon credit schemes, to incentivize farmers to adopt soil carbon sequestration practices.

DNSH Consideration: Ensure that carbon sequestration practices do not negatively impact other ecosystem services, such as water retention, biodiversity, or nutrient cycling.

4. Social and Economic Impact

4.1 Access to Soil Management Resources

Basic:

Provide farmers with access to basic soil testing services and information on soil nutrient management practices through extension services or community-based organizations.

Encourage the use of affordable, locally sourced organic fertilizers to improve soil fertility and reduce reliance on imported chemical fertilizers.

Intermediate:

Develop public-private partnerships to provide smallholder farmers with access to soil nutrient management technologies, such as soil sensors, precision agriculture tools, and nutrient monitoring systems.

Offer training and capacity-building programs on sustainable soil management practices, targeting women, youth, and marginalized groups.

Advanced:

Promote the establishment of soil health cooperatives or community-supported agriculture (CSA) programs that provide farmers with access to shared soil management resources, such as testing labs, composting facilities, and regenerative farming tools.

Support the development of policy frameworks that incentivize sustainable soil nutrient management and reward farmers for improving soil health and reducing nutrient losses.

DNSH Consideration: Ensure that soil management programs do not exclude vulnerable communities or exacerbate inequalities in access to agricultural inputs and knowledge.

4.2 Economic Viability of Sustainable Soil Management

Basic:

Encourage cost-effective soil nutrient management practices, such as using organic fertilizers and compost, that provide economic benefits to smallholder farmers without significant financial investment.

Promote local markets for organic fertilizers and soil amendments to reduce the cost of inputs for farmers.

Intermediate:

Develop financial mechanisms, such as micro-loans or subsidies, to help farmers invest in advanced soil nutrient management technologies, such as precision agriculture systems or climate-smart fertilizers.

Create value chains for sustainably managed soils, allowing farmers to access premium markets for crops produced with sustainable soil management practices.

Advanced:

Promote climate finance mechanisms, such as carbon credits or ecosystem service payments, to reward farmers for implementing soil nutrient management practices that enhance carbon sequestration, reduce emissions, and improve ecosystem resilience.

Support research and innovation in soil nutrient management technologies that reduce input costs and increase farm profitability.

DNSH Consideration: Ensure that economic incentives for soil management do not lead to unintended environmental or social consequences, such as land degradation, displacement of smallholder farmers, or overuse of fertilizers.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impact of soil nutrient management activities, ensuring sustainable practices are followed in fertilization, soil amendments, and water conservation.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable soil management, focusing on practices that improve soil fertility while preventing degradation and promoting long-term soil health.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Provides a framework for assessing the environmental impacts of fertilizers, soil amendments, and nutrient management practices across their life cycle, helping identify opportunities to reduce negative impacts on the environment.

ISO 14064-1: Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

Application: Relevant for assessing the greenhouse gas emissions from nutrient management practices, particularly for nitrogen-based fertilizers, and reporting emissions reductions through sustainable practices.

2. Sustainable Agricultural Practices

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing and managing the water footprint of soil nutrient management practices, ensuring that water use in irrigation and fertilizer application is sustainable and does not negatively impact water resources.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Offers a method for quantifying the carbon footprint of fertilizer production and use in soil nutrient management, helping optimize fertilizer applications and reduce emissions from agricultural inputs.

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Ensures that soil nutrient management practices, including the application of organic and synthetic fertilizers, follow food safety guidelines to prevent contamination of food crops and ensure safe agricultural production.

3. Soil Health and Nutrient Management

ISO 18400-104: Soil Quality – Sampling – Part 104: Strategies

Application: Provides guidelines on soil sampling strategies for nutrient analysis, ensuring accurate and representative sampling of soil for testing fertility, pH, and organic matter content to inform nutrient management decisions.

ISO 10381-6: Soil Quality – Sampling – Guidance on the Collection, Handling, and Storage of Soil Under Aerobic Conditions for the Assessment of Microbiological Processes, Biomass, and Diversity in the Laboratory

Application: Ensures that soil samples are collected and handled properly for microbiological analysis, which is critical for understanding the role of soil microorganisms in nutrient cycling and soil fertility.

ISO 11074: Soil Quality – Vocabulary

Application: Provides definitions for terms related to soil quality, ensuring consistency in language when discussing soil nutrient management and related practices in reports and guidelines.

4. Fertilizer and Soil Amendment Quality

ISO 8157: Fertilizers and Soil Conditioners – Vocabulary

Application: Defines key terms related to fertilizers and soil conditioners, helping ensure that terminology used in soil nutrient management is clear and standardized across the industry.

ISO 17318: Fertilizers and Soil Conditioners – Determination of Arsenic, Cadmium, Lead, and Mercury Contents

Application: Provides methods for testing fertilizers and soil amendments for toxic heavy metals, ensuring that inputs used in soil nutrient management are safe for the environment and human health.

ISO 17075: Fertilizers – Determination of Moisture Content

Application: Specifies methods for determining the moisture content of fertilizers, ensuring product quality and effectiveness in soil nutrient management.

ISO 15923-1: Water Quality – Determination of Selected Parameters by Discrete Analysis Systems – Part 1: Ammonium, Chloride, Nitrate, Nitrite, Phosphate, and Sulphate

Application: Relevant for monitoring nutrient levels in soil and water, particularly nitrogen and phosphorus, which are critical nutrients in soil management. Helps assess the risk of nutrient leaching into water bodies.

5. Health, Safety, and Risk Management

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers handling fertilizers, soil amendments, and soil management machinery by providing a framework for identifying and mitigating workplace hazards in soil nutrient management activities.

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for managing risks associated with soil nutrient management, such as fertilizer over-application, nutrient runoff, or contamination from soil amendments.

» ISICS Codes

ISIC Codes for Soil Nutrient Management:

1. Crop Production and Soil Management

ISIC Code 0111: Growing of Cereals (Except Rice), Leguminous Crops, and Oil Seeds

Application: Involves nutrient management practices for cereal crops, legumes, and oilseeds, including the application of fertilizers and soil amendments to maintain soil fertility and productivity.

ISIC Code 0112: Growing of Rice

Application: Refers to nutrient management practices in rice cultivation, which includes proper fertilizer application, water management, and soil health monitoring.

ISIC Code 0113: Growing of Vegetables and Melons, Roots and Tubers

Application: Involves soil nutrient management for vegetables, root crops, and tubers, ensuring appropriate nutrient balance for healthy plant growth and sustainable soil fertility.

ISIC Code 0119: Growing of Other Non-Perennial Crops

Application: Covers the nutrient management of other non-perennial crops, such as herbs, spices, and non-perennial medicinal plants, which require efficient soil nutrient practices to maintain productivity.

ISIC Code 0121: Growing of Grapes

Application: Includes soil nutrient management for grape cultivation, focusing on soil amendment practices and the use of organic and chemical fertilizers to ensure balanced nutrients for optimal growth.

ISIC Code 0123: Growing of Citrus Fruits

Application: Covers the nutrient management of citrus fruits, with a focus on soil health monitoring, fertilizer application, and organic amendments to improve soil fertility.

ISIC Code 0128: Growing of Spices, Aromatic, Drug, and Pharmaceutical Crops

Application: Refers to nutrient management for the cultivation of spices, medicinal plants, and aromatic crops, ensuring proper soil nutrient levels and organic matter management.

ISIC Code 0130: Plant Propagation

Application: Includes nutrient management for nurseries and propagation activities where seedlings are grown and soil health is maintained through proper nutrient application.

2. Fertilizer and Soil Amendment Manufacturing

ISIC Code 2012: Manufacture of Fertilizers and Nitrogen Compounds

Application: Refers to the production of organic and inorganic fertilizers, as well as nitrogen-based compounds, which are crucial inputs in soil nutrient management.

ISIC Code 1080: Manufacture of Prepared Animal Feeds

Application: While primarily focused on animal feed, this code includes the production of organic waste by-products that can be used as organic fertilizers or soil amendments in nutrient management practices.

3. Support Services for Soil Nutrient Management

ISIC Code 0161: Support Activities for Crop Production

Application: Includes soil nutrient management activities such as soil testing, fertilizer application, and the provision of agronomic advice to farmers on how to manage soil nutrients effectively.

ISIC Code 0164: Seed Processing for Propagation

Application: Covers activities related to seed processing, which includes the application of nutrient treatments to seeds to enhance germination and early plant growth.

4. Testing, Research, and Consultancy Services

ISIC Code 7120: Technical Testing and Analysis

Application: Includes soil testing and analysis services that determine nutrient content, pH levels, and other soil characteristics to guide soil nutrient management decisions.

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves R&D activities focused on improving soil nutrient management, such as developing sustainable fertilizer solutions, innovative soil testing methods, and nutrient-efficient crop varieties.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Refers to consulting services related to soil management, including advice on nutrient management plans, fertilizer application strategies, and improving soil health through sustainable practices.

» Specific Government Policy (National Standards or Certification)

National Nutrition Policy (NNP)

» Responsible Agencies/ Regulators

Ministry of Environment, Science, Technology and Innovation (MESTI)

Fisheries and Acquaculture Management (Basic, Intermediate, Advanced)

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Sustainable Fisheries Management

Basic:

Implement minimum catch limits to prevent overfishing and maintain fish populations.

Use selective fishing gear to reduce bycatch (unintended catch of non-target species) and avoid catching juvenile fish.

Prohibit destructive fishing practices, such as dynamite or cyanide fishing, and ensure compliance with local fishing regulations.

Intermediate:

Adopt ecosystem-based fisheries management practices that maintain ecological balance and protect critical habitats (e.g., coral reefs, mangroves, and seagrass beds).

Enforce seasonal fishing bans and marine protected areas (MPAs) to allow fish populations to recover during breeding seasons.

Use community-based monitoring systems to track fish stocks and ensure that fishing activities do not exceed sustainable levels.

Advanced:

Implement adaptive management strategies that account for the impacts of climate change on fish stocks, including ocean warming and acidification.

Develop and apply data-driven fisheries management models using advanced monitoring technologies (e.g., satellite tracking, electronic catch documentation) to monitor fish populations and fishing activity in real-time.

Establish traceability systems for fisheries products to ensure that they are sustainably sourced and compliant with international standards (e.g., Marine Stewardship Council (MSC) certification).

DNSH Consideration: Ensure that fisheries management practices do not harm marine ecosystems, cause habitat destruction, or contribute to the loss of biodiversity.

1.2 Sustainable Aquaculture Practices

Basic:

Ensure aquaculture facilities are located away from sensitive ecosystems (e.g., wetlands, coral reefs) to prevent habitat destruction.

Use sustainable feed inputs, minimizing the reliance on wild-caught fish for feed.

Implement basic water quality management practices to prevent pollution from aquaculture facilities, such as regular monitoring of nutrient levels and waste discharge.

Intermediate:

Adopt integrated multi-trophic aquaculture (IMTA) systems, which combine different species (e.g., fish, shellfish, and seaweed) to mimic natural ecosystems and reduce environmental impacts.

Implement best practices for disease management, such as vaccination and improved biosecurity, to reduce the use of antibiotics and chemicals in aquaculture.

Use recirculating aquaculture systems (RAS) that minimize water use and improve waste management.

Advanced:

Develop closed-loop aquaculture systems that use renewable energy sources, recycle waste products, and produce zero effluent, contributing to a circular economy approach.

Apply ecosystem-based approaches to aquaculture, integrating habitat restoration (e.g., mangrove replanting) and biodiversity conservation into aquaculture production systems.

Achieve third-party sustainability certifications for aquaculture products (e.g., Aquaculture Stewardship Council (ASC) certification) to demonstrate adherence to high environmental standards.

DNSH Consideration: Ensure that aquaculture activities do not contribute to water pollution, habitat destruction, or excessive use of antibiotics and chemicals.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Inputs

Basic:

Use feed with a low fish-in, fish-out ratio (FI) to reduce the dependence on wild fish for aquaculture feed.

Minimize water use in aquaculture systems by using water-saving technologies, such as efficient irrigation for pond aquaculture.

Intermediate:

Implement circular economy practices by recycling fish waste into fertilizers or bioenergy.

Improve feed efficiency by using plant-based feeds, reducing reliance on fishmeal, and incorporating locally sourced feed ingredients.

Advanced:

Develop zero-waste aquaculture systems where all outputs (e.g., water, waste, and by-products) are reused or repurposed within the system, reducing environmental impact.

Use renewable energy sources (e.g., solar, wind, or hydropower) to power aquaculture operations, reducing the carbon footprint of production.

DNSH Consideration: Ensure that resource use does not lead to over-extraction of natural resources or contribute to environmental degradation.

3. Climate Resilience and Adaptation

3.1 Resilience to Climate Change

Basic:

Use climate-resilient fish species in aquaculture that can tolerate changes in water temperature and salinity.

Implement basic disaster risk reduction measures, such as raising fishpond levees to prevent flooding.

Intermediate:

Design aquaculture facilities to withstand extreme weather events, such as storms, floods, and sea-level rise, by incorporating climate-resilient infrastructure.

Implement early warning systems and disaster preparedness plans to protect fisheries and aquaculture operations from the impacts of climate change.

Advanced:

Use climate modeling tools to anticipate changes in fish stocks and water conditions, allowing for adaptive management of fisheries and aquaculture systems.

Develop innovative aquaculture systems (e.g., offshore aquaculture) that are less vulnerable to the impacts of climate change and reduce pressure on coastal ecosystems.

DNSH Consideration: Ensure that climate adaptation strategies do not negatively impact local ecosystems or exacerbate climate vulnerability in surrounding communities.

» 4. Social and Economic Benefits

4.1 Livelihood Support and Economic Opportunities

Basic:

Provide fair wages and safe working conditions for workers involved in fisheries and aquaculture operations.

Support small-scale fishers and aquaculture farmers by providing access to finance, equipment, and technical training.

Intermediate:

Develop community-based fisheries and aquaculture enterprises that promote local ownership and control of resources, enhancing food security and economic resilience.

Encourage the development of value-added products (e.g., fish processing and packaging) to increase income for fishers and aquaculture producers.

Advanced:

Integrate fisheries and aquaculture into broader sustainable development strategies, promoting eco-tourism, fish-based agroforestry, and ecosystem restoration initiatives that create diversified income streams for local communities.

Support the development of certification schemes (e.g., Fair Trade for fisheries) that ensure ethical labor practices and equitable benefit-sharing in the fisheries and aquaculture value chain.

DNSH Consideration: Ensure that fisheries and aquaculture projects do not displace local communities or reduce access to vital marine and freshwater resources.

5. Monitoring and Reporting

5.1 Monitoring of Fish Stocks and Aquaculture Performance

Basic:

Conduct regular stock assessments to monitor the health of fish populations and the sustainability of catch levels.

Track water quality parameters in aquaculture systems to ensure that water conditions remain suitable for fish production.

Intermediate:

Use electronic monitoring systems (e.g., GPS tracking, catch documentation) to improve transparency and accountability in fisheries management.

Implement digital tools for monitoring the performance of aquaculture systems, including feed conversion ratios and growth rates.

Advanced:

Utilize satellite and remote sensing technologies to monitor fish stocks and marine ecosystems in real-time, ensuring that fisheries and aquaculture practices are sustainable and adaptive to environmental changes.

Engage in third-party auditing and certification of fisheries and aquaculture operations, providing transparency and accountability in sustainability claims.

DNSH Consideration: Ensure that monitoring systems are transparent, reliable, and accessible to all stakeholders, including local communities and regulatory agencies.

6. Regulatory Compliance and Certification

6.1 Compliance with Environmental and Social Regulations

Basic:

Ensure that fisheries and aquaculture operations comply with local and national regulations, including fishing quotas, environmental protection laws, and labor standards.

Implement basic environmental impact assessments (EIAs) for aquaculture operations to assess potential impacts on ecosystems.

Intermediate:

Obtain national or regional certification for fisheries and aquaculture products that meet sustainability standards.

Implement sustainable fishing or aquaculture management plans that align with international standards such as the FAO Code of Conduct for Responsible Fisheries.

Advanced:

Achieve third-party certification (e.g., Marine Stewardship Council (MSC) for fisheries or Aquaculture Stewardship Council (ASC) for aquaculture) to demonstrate that fisheries and aquaculture practices meet rigorous environmental, social, and governance (ESG) standards.

Align fisheries and aquaculture operations with global sustainability frameworks, such as the UN Sustainable Development Goals (SDGs) and the Paris Agreement on climate change.

DNSH Consideration: Ensure that regulatory compliance does not lead to exclusion of small-scale fishers or aquaculture farmers from markets or access to resources.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of fisheries and aquaculture operations, ensuring that practices minimize harm to ecosystems and promote sustainability.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land management practices, which can be applied to aquaculture projects in coastal and inland areas to prevent degradation of habitats and ecosystems.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in calculating and reducing the carbon footprint of fisheries and aquaculture products, ensuring that production processes are aligned with efforts to mitigate climate change.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing the water footprint of fisheries and aquaculture operations, helping ensure that water resources are managed sustainably and without pollution.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Offers a framework for managing energy use in fisheries and aquaculture operations, promoting energy efficiency and the use of renewable energy sources to reduce environmental impacts.

2. Sustainable Fisheries and Aquaculture Management

ISO 12875: Traceability of Finfish Products – Specification on the Information to be Recorded in Captured Finfish Distribution Chains

Application: Ensures traceability of fish products through the entire supply chain, from capture to consumer. This standard helps verify the sustainability of fisheries and supports responsible sourcing.

ISO 12878: Remote Monitoring of Aquaculture – Requirements for the Design, Construction, and Equipment of Installations for Remote Monitoring

Application: Provides guidelines for the remote monitoring of aquaculture systems, helping operators track water quality, fish health, and other key metrics to ensure sustainability and efficient management of resources.

ISO 18593: Microbiology of the Food Chain – Horizontal Methods for Sampling Techniques from Surfaces Using Contact Plates and Swabs

Application: Relevant for ensuring that aquaculture facilities meet hygiene and food safety standards, particularly in the handling and processing of fish and seafood products.

ISO 17088: Specifications for Compostable Plastics

Application: Supports the use of sustainable materials in fisheries and aquaculture, including compostable plastics for packaging and equipment, to reduce the environmental impact of plastic waste in aquatic environments.

3. Water Quality and Resource Management

ISO 5667-3: Water Quality – Sampling – Part 3: Preservation and Handling of Water Samples

Application: Provides guidelines for the sampling and handling of water in fisheries and aquaculture systems to monitor water quality and ensure that it meets environmental standards.

ISO 5667-6: Water Quality – Sampling – Part 6: Guidance on Sampling of Rivers and Streams

Application: Supports the monitoring of water quality in rivers and streams, which is critical for assessing the environmental impact of inland aquaculture and fisheries on freshwater ecosystems.

ISO 5667-19: Water Quality – Sampling – Part 19: Guidance on Sampling of Marine Sediments

Application: Offers guidelines for sampling marine sediments in aquaculture areas, ensuring that sediment quality is maintained and that aquaculture practices do not lead to pollution or habitat degradation.

4. Social Responsibility and Labor Standards

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into fisheries and aquaculture operations, ensuring that practices respect human rights, labor standards, and community well-being, while promoting fair labor practices and equitable benefit-sharing.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers in fisheries and aquaculture operations, helping organizations establish safe working environments and comply with safety standards.

ISO 37001: Anti-Bribery Management Systems

Application: Provides requirements for preventing, detecting, and addressing bribery in fisheries and aquaculture operations, ensuring that business practices are ethical and transparent.

5. Food Safety and Quality Management

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Ensures that fisheries and aquaculture products meet food safety standards throughout the supply chain, from harvest to processing and distribution. This standard is essential for managing food safety risks in the production of fish and seafood products.

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Establishes a framework for the traceability of feed and food products, including fish and seafood, ensuring transparency and food safety in aquaculture systems.

ISO 9001: Quality Management Systems – Requirements

Application: Provides a structured approach to quality management in fisheries and aquaculture operations, ensuring that production processes are consistent, efficient, and meet customer expectations.

6. Monitoring, Reporting, and Certification

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Provides guidelines for reporting on the environmental performance of fisheries and aquaculture projects, ensuring transparency and accountability in sustainability claims.

ISO 17029: Conformity Assessment – General Principles and Requirements for Validation and Verification Bodies

Application: Specifies requirements for organizations that validate and verify sustainability claims in fisheries and aquaculture operations, ensuring that claims are accurate and meet international standards.

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Ensures that certification bodies responsible for certifying fisheries and aquaculture products follow rigorous procedures, promoting the credibility and reliability of sustainability certifications (e.g., Marine Stewardship Council (MSC) or Aquaculture Stewardship Council (ASC)

» ISICS Codes

ISIC Code 0311: Marine Fishing

Application: Refers to fishing operations in oceans and seas, including commercial capture of fish, crustaceans, mollusks, and other marine animals. This includes both large-scale commercial fishing and small-scale artisanal fishing.

ISIC Code 0312: Freshwater Fishing

Application: Involves fishing in freshwater bodies such as lakes, rivers, and ponds. This code includes the capture of freshwater fish, crustaceans, and other aquatic animals from natural or managed inland water bodies.

ISIC Code 0321: Marine Aquaculture

Application: Refers to the farming of marine fish, shellfish, seaweed, and other aquatic organisms in coastal waters, estuaries, or marine environments. This includes operations such as fish farms, shellfish farming, and seaweed cultivation in marine ecosystems.

ISIC Code 0322: Freshwater Aquaculture

Application: Covers aquaculture operations in freshwater environments, including the farming of fish, crustaceans, mollusks, and aquatic plants in ponds, rivers, lakes, or recirculating aquaculture systems.

2. Fish Processing and Preservation

ISIC Code 1020: Processing and Preserving of Fish, Crustaceans, and Mollusks

Application: Involves the preparation, preservation, and processing of fish, crustaceans, and mollusks, including freezing, drying, smoking, salting, canning, or otherwise preserving fish and seafood products.

ISIC Code 1075: Manufacture of Prepared Meals and Dishes

Application: Includes the production of ready-made meals containing fish or seafood as a primary ingredient, covering activities like the preparation of fish-based frozen meals, processed seafood, and convenience dishes.

3. Wholesale, Trade, and Distribution of Fisheries Products

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Refers to the wholesale trade of fish and seafood products, including both processed and unprocessed fish, crustaceans, and mollusks, and their distribution to markets, retailers, and food service industries.

ISIC Code 4721: Retail Sale of Food in Specialized Stores

Application: Covers the retail sale of fish, seafood, and other marine products in specialized stores. This includes fish markets, seafood retailers, and other outlets specializing in fish and fish products.

4. Support Activities for Fisheries and Aquaculture

ISIC Code 0161: Support Activities for Crop Production

Application: Includes activities related to the support of aquaculture operations, such as pond preparation, feed supply, water quality management, and disease control services.

ISIC Code 0323: Support Activities for Fishing

Application: Covers services supporting fishing activities, including boat maintenance, equipment rental, fishery management consulting, and other support services that assist commercial and small-scale fishing operations.

ISIC Code 5229: Other Transportation Support Activities

Application: Refers to logistical support services such as cold storage, refrigerated transport, and supply chain management specifically tailored for the transportation of fish and seafood products.

5. Scientific and Technical Services

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Involves technical services such as environmental consulting, fish stock assessments, marine biology research, and monitoring of aquaculture and fisheries operations, supporting sustainable fishery management and aquaculture practices.

ISIC Code 7120: Technical Testing and Analysis

Application: Includes environmental testing and water quality analysis for aquaculture systems, as well as laboratory testing for fish health, feed quality, and disease prevention in fisheries and aquaculture.

6. Water Management

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Relevant for aquaculture projects where water supply, treatment, and management are essential for maintaining healthy fish farming operations and preventing environmental contamination.

ISIC Code 3700: Sewerage

Application: Covers the management of wastewater from aquaculture facilities, including the treatment and disposal of effluent to prevent water pollution and ensure sustainable water use in fisheries operations.

Blue Economy

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Contribution to Carbon Sequestration and Emissions Reduction

Criteria: Blue economy projects must enhance carbon sequestration in marine ecosystems such as mangroves, seagrasses, and salt marshes. Additionally, projects must contribute to a significant reduction in greenhouse gas emissions from sectors like fisheries and aquaculture.

Threshold: Projects should demonstrate at least 1.5 tons of CO_2 sequestered per hectare per year or a 15% reduction in greenhouse gas emissions from operational activities.

DNSH Consideration: Ensure the protection of biodiversity in areas where carbon sequestration projects are developed, avoiding deforestation and habitat degradation.

1.2 Sustainable Resource Use

Criteria: Sustainable management of marine resources, including fisheries and aquaculture, must prioritize long-term ecological balance and avoid overexploitation.

Threshold: Fisheries and aquaculture projects should follow sustainable certification guidelines, such as MSC, with catch levels not exceeding 90% of the maximum sustainable yield.

DNSH Consideration: Avoid harm to local biodiversity, especially endangered marine species, and ensure sustainable harvest levels that maintain the ecological balance.

1.3 Pollution Prevention and Control

Criteria: Projects must implement effective strategies to reduce marine pollution, including marine litter and nutrient runoff from agricultural and industrial activities.

Threshold: Projects should reduce marine litter by 20% or ensure a reduction of nutrient pollution in affected marine areas by 50%.

DNSH Consideration: Ensure that project operations do not lead to the contamination of marine ecosystems or negatively impact water quality.

2. Resource Efficiency and System Performance

2.1 Marine Spatial Planning and Resource Allocation

Criteria: Blue economy projects must align with national marine spatial planning to ensure resource allocation is done sustainably and without conflict between sectors.

Threshold: At least 20% of marine areas involved in projects must be designated as protected zones or low-impact areas.

DNSH Consideration: Avoid significant environmental degradation, ensuring that spatial planning considers the protection of sensitive marine habitats.

2.2 Sustainable Coastal Infrastructure

Criteria: Coastal infrastructure projects must employ climate-resilient designs to protect against sea-level rise, storm surges, and other climate-related impacts.

Threshold: Infrastructure should withstand a 1-in-100-year storm event and consider sea-level rise projections over the next 50 years.

DNSH Consideration: Ensure that construction does not result in habitat destruction or increased vulnerability of coastal ecosystems.

2.3 Energy Efficiency in Fisheries and Aquaculture

Criteria: Projects should adopt energy-efficient technologies and renewable energy sources to minimize carbon footprints in fisheries and aquaculture.

Threshold: Operations must demonstrate a 15% reduction in energy consumption compared to traditional methods.

DNSH Consideration: Avoid significant environmental damage from unsustainable energy use by integrating renewable energy sources in project design.

3. Social and Community Benefits

3.1 Job Creation and Economic Development

Criteria: Blue economy projects must create local jobs, especially for coastal communities, and contribute to inclusive economic development.

Threshold: Projects must generate at least 5 jobs per million USD invested, with 30% targeting women and vulnerable groups.

DNSH Consideration: Ensure fair labor practices and equitable distribution of economic benefits among local populations.

3.2 Community Health and Safety

Criteria: Projects must safeguard community health and safety, particularly regarding safe fishing practices, pollution prevention, and the sustainable use of resources.

Threshold: No activities should take place within 500 meters of residential areas or recognized critical habitats for endangered species.

DNSH Consideration: Ensure that project activities do not increase health risks or hazards for local communities and ecosystems.

3.3 Equitable Access to Marine Resources

Criteria: Projects must ensure equitable access to marine resources, promoting inclusive growth for coastal and low-income populations.

Threshold: At least 10% of project revenue must be allocated to local community development or infrastructure initiatives.

DNSH Consideration: Ensure that marginalized communities are not disproportionately burdened by resource exploitation, and that they have access to project benefits.

4. Climate Resilience and Adaptation

4.1 Resilience to Climate Change Impacts

Criteria: Blue economy projects must incorporate designs that ensure resilience against climate change impacts such as rising sea levels, storm surges, and temperature changes.

Threshold: Projects must include climate adaptation measures capable of withstanding a 1-in-100-year storm event and rising sea levels.

DNSH Consideration: Avoid significant harm by ensuring infrastructure resilience to future climate risks and environmental vulnerabilities.

4.2 Ecosystem-based Adaptation

Criteria: Projects must adopt ecosystem-based approaches, such as the restoration of mangroves, coral reefs, and wetlands, to improve the climate resilience of coastal communities and marine ecosystems.

Threshold: At least 30% of the project area must focus on ecosystem restoration or conservation.

DNSH Consideration: Avoid significant harm by ensuring that restored ecosystems contribute to long-term sustainability and climate resilience.

5. Monitoring and Reporting

5.1 Continuous Monitoring of Environmental Impact

Criteria: Projects must establish systems to continuously monitor environmental impact, focusing on carbon sequestration, resource use, and biodiversity conservation.

Threshold: Projects should track key performance indicators such as emissions reductions and marine ecosystem health.

DNSH Consideration: Ensure early identification of environmental performance issues, minimizing harm to ecosystems.

5.2 Regular Reporting on Social Impact

Criteria: Projects must provide regular reports on social outcomes, including job creation, equitable resource access, and community health.

Threshold: At least bi-annual reporting on social and environmental metrics, including marine resource usage and community benefits.

DNSH Consideration: Ensure transparency and accountability by avoiding misrepresentation of the project's social and environmental benefits.

6. Safety and Regulatory Compliance

6.1 Adherence to Environmental Regulations

Criteria: Projects must comply with all applicable national and international environmental regulations, including marine protection and waste management laws.

Threshold: Projects must complete environmental impact assessments (EIAs) prior to commencement, ensuring full regulatory compliance.

DNSH Consideration: Ensure no violations of environmental laws or harmful impacts on marine and coastal ecosystems.

6.2 Safety Standards for Fisheries and Aquaculture

Criteria: Projects in fisheries and aquaculture must adhere to safety standards that prevent accidents, ensure food safety, and protect workers' health.

Threshold: Projects must demonstrate compliance with national safety standards and best practices.

DNSH Consideration: Avoid significant harm by ensuring that safety risks are minimized for workers and surrounding communities.

7. End-of-Life and Circular Economy Considerations

7.1 Sustainable Decommissioning of Coastal Infrastructure

Criteria: Projects must develop sustainable decommissioning plans for coastal infrastructure, ensuring the safe removal or repurposing of materials at the end of their operational life.

Threshold: Infrastructure must be decommissioned in a manner that restores land or enables its reuse for sustainable purposes.

DNSH Consideration: Ensure no environmental damage from improper disposal of hazardous materials during decommissioning.

7.2 Circular Economy in Marine Resource Use

Criteria: Projects must incorporate circular economy principles, prioritizing the use of recyclable materials and minimizing waste at the end of their operational life.

Threshold: Projects must demonstrate that at least 50% of materials used can be recycled or reused.

DNSH Consideration: Avoid significant harm by ensuring that valuable marine resources are not wasted and that end-of-life products are not sent to landfills.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of blue economy activities, including marine fisheries, aquaculture, and coastal tourism, ensuring that operations minimize harm to marine ecosystems and promote sustainability.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines for sustainable land management practices, which can be applied to coastal and marine resource management to prevent degradation of coastal habitats and ecosystems impacted by the blue economy activities.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in calculating and reducing the carbon footprint of activities in the blue economy, including marine transport, fisheries, and coastal infrastructure, ensuring alignment with efforts to mitigate climate change.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing the water footprint of activities such as aquaculture, fisheries, and marine tourism, ensuring that water resources are managed sustainably and without causing pollution to marine and coastal environments.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Offers a framework for managing energy use in blue economy sectors such as fisheries, marine transportation, and coastal infrastructure, promoting energy efficiency and the use of renewable energy sources to reduce environmental impacts.

2. Sustainable Fisheries and Aquaculture Management

ISO 12875: Traceability of Finfish Products – Specification on the Information to be Recorded in Captured Finfish Distribution Chains

Application: Ensures traceability of fish products through the entire supply chain, from capture to consumer. This standard helps verify the sustainability of fisheries and supports responsible sourcing, critical to sustainable blue economy management.

ISO 12878: Remote Monitoring of Aquaculture – Requirements for the Design, Construction, and Equipment of Installations for Remote Monitoring

Application: Provides guidelines for the remote monitoring of aquaculture systems, helping operators track water quality, fish health, and other key metrics to ensure sustainability and efficient management of marine resources.

ISO 18593: Microbiology of the Food Chain – Horizontal Methods for Sampling Techniques from Surfaces Using Contact Plates and Swabs

Application: Relevant for ensuring that aquaculture facilities meet hygiene and food safety standards, particularly in the handling and processing of fish and seafood products, which is essential for a sustainable and safe blue economy.

ISO 17088: Specifications for Compostable Plastics

Application: Supports the use of sustainable materials in fisheries, aquaculture, and marine industries, including compostable plastics for packaging and equipment, to reduce the environmental impact of plastic waste in aquatic environments.

3. Water Quality and Resource Management

ISO 5667-3: Water Quality – Sampling – Part 3: Preservation and Handling of Water Samples

Application: Provides guidelines for the sampling and handling of water in blue economy activities, such as aquaculture and coastal industries, to monitor water quality and ensure compliance with environmental standards.

ISO 5667-6: Water Quality – Sampling – Part 6: Guidance on Sampling of Rivers and Streams

Application: Supports the monitoring of water quality in rivers and streams affected by inland aquaculture or fisheries, which is critical for assessing the environmental impact of these activities on freshwater and marine ecosystems.

ISO 5667-19: Water Quality – Sampling – Part 19: Guidance on Sampling of Marine Sediments

Application: Offers guidelines for sampling marine sediments in aquaculture areas or marine industry zones, ensuring that sediment quality is maintained and that blue economy practices do not lead to pollution or habitat degradation.

4. Social Responsibility and Labor Standards

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into blue economy operations, ensuring that practices respect human rights, labor standards, and community well-being, while promoting fair labor practices and equitable benefit-sharing in sectors like fisheries and marine tourism.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers in blue economy sectors, such as fisheries, aquaculture, and marine tourism, helping organizations establish safe working environments and comply with international safety standards.

ISO 37001: Anti-Bribery Management Systems

Application: Provides requirements for preventing, detecting, and addressing bribery in blue economy operations, ensuring that business practices in fisheries, marine infrastructure, and other sectors are ethical and transparent.

5. Food Safety and Quality Management

ISO 22000: Food Safety Management Systems – Requirements for Any Organization in the Food Chain

Application: Ensures that fisheries and aquaculture products meet food safety standards throughout the supply chain, from harvest to processing and distribution. This standard is essential for managing food safety risks in the blue economy.

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Establishes a framework for the traceability of feed and food products, including fish and seafood, ensuring transparency and food safety in aquaculture and marine processing systems.

ISO 9001: Quality Management Systems – Requirements

Application: Provides a structured approach to quality management in blue economy sectors, including fisheries, marine manufacturing, and aquaculture, ensuring that production processes are consistent, efficient, and meet customer expectations.

6. Monitoring, Reporting, and Certification

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Provides guidelines for reporting on the environmental performance of blue economy projects, such as marine energy or aquaculture, ensuring transparency and accountability in sustainability claims.

ISO 17029: Conformity Assessment – General Principles and Requirements for Validation and Verification Bodies

Application: Specifies requirements for organizations that validate and verify sustainability claims in blue economy sectors, ensuring that claims are accurate and meet international standards.

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Ensures that certification bodies responsible for certifying fisheries and aquaculture products follow rigorous procedures, promoting the credibility and reliability of sustainability certifications (e.g., Marine Stewardship Council (MSC) or Aquaculture Stewardship Council (ASC)).

» ISICS Codes

1. Marine Fishing and Aquaculture

ISIC Code 0311: Marine Fishing

Application: Refers to fishing operations in oceans and seas, including the commercial capture of fish, crustaceans, mollusks, and other marine animals. This encompasses both large-scale commercial fishing and small-scale artisanal fishing in marine environments.

ISIC Code 0312: Freshwater Fishing

Application: Involves fishing in freshwater bodies such as lakes, rivers, and ponds. It includes the capture of freshwater fish, crustaceans, and other aquatic animals from natural or managed inland water bodies.

ISIC Code 0321: Marine Aquaculture

Application: Refers to the farming of marine fish, shellfish, seaweed, and other aquatic organisms in coastal waters, estuaries, or other marine environments. This includes fish farms, shellfish farming, and seaweed cultivation in marine ecosystems.

ISIC Code 0322: Freshwater Aquaculture

Application: Covers aquaculture operations in freshwater environments, including the farming of fish, crustaceans, mollusks, and aquatic plants in ponds, rivers, lakes, or recirculating aquaculture systems.

2. Fish Processing and Preservation

ISIC Code 1020: Processing and Preserving of Fish, Crustaceans, and Mollusks

Application: Involves the preparation, preservation, and processing of fish, crustaceans, and mollusks. Activities include freezing, drying, smoking, salting, canning, and other methods of preserving fish and seafood products.

ISIC Code 1075: Manufacture of Prepared Meals and Dishes

Application: Includes the production of ready-made meals containing fish or seafood as primary ingredients. This includes the preparation of fish-based frozen meals, processed seafood, and convenience dishes.

3. Wholesale, Trade, and Distribution of Fisheries Products

ISIC Code 4630: Wholesale of Food, Beverages, and Tobacco

Application: Refers to the wholesale trade of fish and seafood products, including both processed and unprocessed fish, crustaceans, and mollusks, for distribution to markets, retailers, and the food service industry.

ISIC Code 4721: Retail Sale of Food in Specialized Stores

Application: Covers the retail sale of fish, seafood, and other marine products in specialized stores, including fish markets, seafood retailers, and other outlets focusing on fish and fish products.

4. Support Activities for Fisheries and Aquaculture

ISIC Code 0161: Support Activities for Crop Production

Application: Includes activities related to supporting aquaculture operations such as pond preparation, feed supply, water quality management, and disease control services for fish farms.

ISIC Code 0323: Support Activities for Fishing

Application: Covers services that support fishing operations, including boat maintenance, equipment rental, fishery management consulting, and other services that assist both commercial and small-scale fishing activities.

ISIC Code 5229: Other Transportation Support Activities

Application: Refers to logistical support services such as cold storage, refrigerated transport, and supply chain management for the transportation of fish and seafood products to ensure freshness and quality.

5. Scientific and Technical Services

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Involves professional and technical services such as environmental consulting, fish stock assessments, marine biology research, and monitoring of aquaculture and fisheries operations to support sustainable fishery management and blue economy practices.

ISIC Code 7120: Technical Testing and Analysis

Application: Includes environmental testing and water quality analysis for aquaculture systems, as well as laboratory testing for fish health, feed quality, and disease prevention in fisheries and aquaculture operations.

6. Water Management

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Relevant for aquaculture and coastal industries where water supply, treatment, and management are essential for maintaining healthy operations and preventing environmental contamination.

ISIC Code 3700: Sewerage

Application: Covers the management of wastewater from aquaculture and fisheries facilities, including the treatment and disposal of effluent to prevent water pollution and ensure sustainable water use in marine and freshwater ecosystems.

Circular Economy and Waste Management

Upcycling industries

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Waste Reduction and Resource Efficiency

Basic:

Ensure that the upcycling process diverts waste from landfills by transforming discarded or end-of-life products into usable or higher-value goods.

Use materials sourced from local waste streams to minimize transportation impacts and promote regional circular economy models.

Implement basic waste management practices, including proper disposal of non-recyclable waste and hazardous materials.

Intermediate:

Achieve a minimum waste diversion rate (e.g., 70%) through the upcycling process, focusing on high-impact materials such as plastics, textiles, metals, and e-waste.

Use efficient material recovery techniques that minimize energy and water consumption during the upcycling process.

Design products for durability, repairability, and recyclability to extend their lifespan and further reduce waste.

Advanced:

Develop zero-waste upcycling processes, where all inputs are reused, repurposed, or recycled, creating a fully circular production system.

Incorporate renewable energy sources into upcycling operations to further reduce the environmental footprint.

Apply eco-design principles to upcycled products, optimizing their environmental performance across the entire life cycle (from material sourcing to end-of-life).

DNSH Consideration: Ensure that the upcycling process does not generate excessive waste or pollutants, such as toxic by-products or emissions that harm ecosystems or human health.

1.2 Circular Economy Integration

Basic:

Integrate basic circular economy principles by focusing on reuse and repurposing materials, reducing the demand for virgin materials.

Use simple mechanical processes for upcycling that require minimal energy and chemicals, such as cutting, welding, or stitching.

Intermediate:

Foster closed-loop material cycles by partnering with local industries, municipalities, or organizations to collect and upcycle waste materials.

Incorporate modular design in upcycled products to allow for easier disassembly, repair, and further upcycling or recycling at the end of the product's life cycle.

Advanced:

Implement advanced circular economy models, such as industrial symbiosis, where waste from one industry becomes the raw material for another, creating interconnected production systems.

Develop business models based on product-as-a-service, where upcycled goods are leased, shared, or provided on a subscription basis, reducing resource consumption and encouraging reuse.

DNSH Consideration: Ensure that circular economy practices do not result in the depletion of local resources or disrupt existing recycling systems by competing for materials in an unsustainable way.

2. Resource Efficiency and Clean Production

2.1 Energy and Water Efficiency

Basic:

Implement energy-saving measures in upcycling processes, such as using energy-efficient machinery and optimizing production schedules.

Monitor and reduce water use in the production process, particularly in industries where water is required for cleaning or material processing (e.g., textiles and plastics).

Intermediate:

Adopt renewable energy sources, such as solar or wind power, for upcycling operations, reducing reliance on fossil fuels.

Use closed-loop water systems that recycle and treat water for reuse in production, minimizing water consumption and wastewater generation.

Advanced:

Achieve near-zero energy consumption through the integration of energy-efficient technologies, process optimization, and renewable energy.

Develop waterless or low-water upcycling techniques to further reduce water consumption and minimize environmental impact.

DNSH Consideration: Ensure that energy and water use do not lead to resource depletion, particularly in regions facing water scarcity or energy shortages.

2.2 Low-Impact Chemicals and Materials

Basic:

Use non-toxic, biodegradable, or recycled inputs where possible to minimize environmental and health impacts during upcycling.

Avoid the use of harmful chemicals, such as solvents or volatile organic compounds (VOCs), in the upcycling process.

Intermediate:

Adopt advanced green chemistry principles in the upcycling process, focusing on reducing the use of hazardous chemicals, minimizing chemical waste, and improving the safety and sustainability of materials used.

Source environmentally certified materials and components, such as those with Cradle to Cradle certification or Forest Stewardship Council (FSC) certification for wood-based products.

Advanced:

Develop new, sustainable materials or processes that eliminate the need for toxic chemicals and minimize environmental impacts, creating a closed-loop, chemical-free production system.

Use life cycle assessments (LCA) to evaluate and optimize the environmental impact of materials and chemicals used in the upcycling process.

DNSH Consideration: Ensure that no hazardous chemicals are introduced into the upcycling process that could result in pollution, human health risks, or contamination of ecosystems.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Materials and Processes

Basic:

Use materials and processes that are resilient to climate variability, such as heat-resistant or flood-resistant products in regions prone to extreme weather conditions.

Ensure that upcycling operations are designed to withstand climate-related disruptions, such as flooding or power outages.

Intermediate:

Develop climate-resilient supply chains by sourcing materials from regions or industries that are less vulnerable to climate-related disruptions, such as droughts, storms, or rising temperatures.

Incorporate climate risk assessments into business planning to identify vulnerabilities and implement strategies to mitigate the impacts of climate change on operations.

Advanced:

Use upcycling as a tool for climate adaptation by developing products that support climate resilience, such as insulation materials, renewable energy technologies, or water-saving devices made from upcycled materials.

Implement climate-positive strategies, such as carbon-neutral or carbon-negative upcycling processes, which sequester carbon or offset emissions through regenerative practices.

DNSH Consideration: Ensure that climate adaptation strategies do not negatively impact local ecosystems or communities, such as increasing resource competition or causing social displacement.

4. Social and Economic Benefits

4.1 Job Creation and Local Economic Development

Basic:

Create employment opportunities in local communities by establishing small-scale upcycling businesses and workshops.

Support artisanal and small-scale industries by providing training and access to upcycling technologies, materials, and markets.

Intermediate:

Develop inclusive business models that involve marginalized or vulnerable groups, such as women, youth, or low-income communities, in the upcycling process.

Foster local entrepreneurship by supporting start-ups and SMEs involved in upcycling, providing them with access to finance, technology, and technical training.

Advanced:

Develop social enterprise models that prioritize social and environmental impact alongside profitability, creating long-term, sustainable economic opportunities for local communities.

Promote fair trade and ethical labor practices in upcycling industries, ensuring safe working conditions, fair wages, and equitable benefit-sharing.

DNSH Consideration: Ensure that upcycling operations do not exploit workers, undermine local industries, or cause social inequities.

4.2 Community Engagement and Awareness

Basic:

Engage local communities in upcycling initiatives by providing education and outreach on waste reduction, recycling, and the benefits of upcycling.

Partner with schools, community centers, and non-governmental organizations (NGOs) to raise awareness about sustainable consumption and production practices.

Intermediate:

Develop community-driven upcycling programs where local residents participate in waste collection, material sorting, and product design, fostering a sense of ownership and environmental stewardship.

Implement community-based monitoring systems to track the success and impact of upcycling projects, ensuring transparency and accountability.

Advanced:

Establish upcycling hubs or innovation centers that serve as knowledge-sharing platforms for sustainable design, recycling, and upcycling technologies, promoting collaboration and innovation in the circular economy.

Integrate upcycling initiatives into broader sustainable development programs, linking them with goals such as poverty alleviation, education, and climate resilience.

DNSH Consideration: Ensure that community engagement is meaningful and inclusive, avoiding tokenism and ensuring that benefits are equitably distributed.

5. Monitoring and Reporting

5.1 Monitoring of Resource Use and Environmental Impact

Basic:

Track the amount of waste diverted from landfills through the upcycling process, ensuring that it contributes to reducing overall waste volumes.

Monitor energy and water use in production to identify inefficiencies and areas for improvement.

Intermediate:

Use digital tools to track resource flows and environmental performance, such as software for monitoring material inputs, production outputs, and waste generation.

Implement environmental reporting frameworks, such as the Global Reporting Initiative (GRI), to disclose the environmental impact of upcycling operations.

Advanced:

Integrate real-time monitoring technologies, such as IoT (Internet of Things) sensors, to optimize resource use and minimize environmental impact during the upcycling process.

Engage third-party auditors to verify environmental claims and ensure compliance with international standards, such as Cradle to Cradle certification or B Corp certification.

DNSH Consideration: Ensure that monitoring data is accurate, transparent, and used to continuously improve environmental performance, avoiding greenwashing or misleading claims.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing environmental impacts in upcycling operations. It ensures that environmental risks are controlled and that processes contribute to sustainability goals, such as waste reduction and resource efficiency.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Offers a method for assessing the environmental impacts of upcycled products across their entire life cycle, from material sourcing to end-of-life disposal. This helps identify areas for improvement in resource efficiency and environmental performance.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in quantifying the carbon footprint of upcycled products. It is useful for upcycling industries to evaluate and reduce greenhouse gas emissions associated with their processes.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing the water footprint of upcycling processes, helping ensure that water use is minimized and managed sustainably throughout the production cycle.

2. Resource Efficiency and Circular Economy

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Offers a framework for improving energy efficiency in upcycling operations, ensuring that energy use is minimized and renewable energy sources are integrated into production where possible.

ISO 18601: Packaging and the Environment – General Requirements for the Use of ISO Standards in the Field of Packaging and the Environment

Application: Relevant for upcycling industries producing packaging materials from recycled or repurposed materials. It ensures that packaging is designed with minimal environmental impact, including considerations for recyclability and resource efficiency.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Offers guidelines that can be applied to upcycling processes to ensure that materials are sourced and processed in ways that avoid contributing to land degradation or resource depletion.

3. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into upcycling operations. It ensures that upcycling activities respect human rights, labor practices, community well-being, and environmental protection while promoting fair and ethical business practices.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in upcycling operations by providing a framework for identifying and mitigating workplace hazards, promoting safe working environments, and improving labor conditions.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes requirements to prevent, detect, and address bribery in upcycling businesses, ensuring ethical conduct in business transactions and partnerships throughout the supply chain.

4. Product Quality and Innovation

ISO 9001: Quality Management Systems – Requirements

Application: Provides a structured approach to managing the quality of upcycled products, ensuring consistency in production, meeting customer expectations, and enhancing overall product quality.

ISO 20400: Sustainable Procurement – Guidance

Application: Offers guidance on sustainable procurement practices, ensuring that upcycling industries source materials responsibly and that suppliers adhere to environmental and social standards.

ISO 17088: Specifications for Compostable Plastics

Application: Relevant for upcycling industries focused on creating compostable products or packaging from recycled or repurposed materials. It ensures that materials used are compostable and environmentally friendly.

5. Circular Economy and Waste Management

ISO 14093: Mechanisms for the Financing of Circular Economy Projects

Application: Provides guidelines for financing projects related to the circular economy, including upcycling. It helps industries identify financial mechanisms to support their transition to more sustainable, circular business models.

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Offers guidelines for reporting on the environmental performance of upcycling projects, ensuring transparency and accountability in sustainability claims, and helping industries communicate their environmental impact to stakeholders.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating environmental performance and sustainability efforts, which is essential for upcycling industries to effectively engage customers and stakeholders in their environmental initiatives.

6. Traceability and Supply Chain Management

ISO 22005: Traceability in the Feed and Food Chain – General Principles and Basic Requirements for System Design and Implementation

Application: Offers principles for traceability, which can be applied to upcycled products to ensure transparency in sourcing and production, especially for products entering the food or packaging sectors.

ISO 28219: Packaging – Labelling and Documentation – Bar Code and Two-Dimensional Symbols for Product Packaging

Application: Provides guidelines for labeling and documentation, ensuring that upcycled products are properly labeled and tracked through the supply chain, supporting traceability and circular economy goals.

» ISICS Codes

ISIC Codes for Upcycling Industries:

1. Waste Collection, Treatment, and Disposal

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Involves the collection of recyclable and upcyclable non-hazardous waste, such as plastics, textiles, paper, and metals. This activity is the first step in the upcycling process.

ISIC Code 3812: Collection of Hazardous Waste

Application: Refers to the collection of hazardous waste that may be repurposed or upcycled through safe and environmentally sound processes, such as certain electronic waste (e-waste).

ISIC Code 3821: Treatment and Disposal of Non-Hazardous Waste

Application: Includes waste processing activities where non-hazardous materials are treated for further use in upcycling processes, such as sorting, cleaning, or shredding.

ISIC Code 3830: Materials Recovery

Application: Refers to the recovery of materials from waste streams, including recycling and upcycling activities that involve transforming waste into raw materials for new products. This code is highly relevant to upcycling industries focused on turning waste into new goods.

2. Manufacturing and Product Transformation

ISIC Code 1311: Preparation and Spinning of Textile Fibers

Application: Covers the transformation of textile waste into fibers that can be spun into yarns for upcycled textile products, such as clothing or upholstery made from recycled fibers.

ISIC Code 1392: Manufacture of Made-Up Textile Articles, Except Apparel

Application: Involves the manufacturing of home furnishings, industrial textiles, and other non-apparel items from upcycled or repurposed textiles.

ISIC Code 1399: Manufacture of Other Textiles n.e.c.

Application: Includes the manufacturing of other textiles from recycled or upcycled materials, which may include carpets, rugs, and other fabric-based products.

ISIC Code 2220: Manufacture of Plastics Products

Application: Relevant for upcycling industries that transform plastic waste into new plastic products, such as packaging, containers, or durable goods.

ISIC Code 2310: Manufacture of Glass and Glass Products

Application: Involves the manufacturing of new glass products from recycled or repurposed glass, such as bottles, glassware, or construction materials.

ISIC Code 2410: Manufacture of Basic Iron and Steel

Application: Covers the recycling and repurposing of scrap metal into new steel products, contributing to circular economy practices in the metal industry.

ISIC Code 2599: Manufacture of Other Fabricated Metal Products n.e.c.

Application: Refers to the production of various metal products from upcycled or recycled metals, including household goods, construction materials, and industrial parts.

ISIC Code 3100: Manufacture of Furniture

Application: Includes the production of furniture from upcycled materials such as reclaimed wood, recycled plastics, or repurposed textiles. This is particularly relevant to sustainable design and circular economy models.

3. Construction and Building Materials

ISIC Code 2399: Manufacture of Other Non-Metallic Mineral Products n.e.c.

Application: Covers the production of construction materials from recycled or upcycled non-metallic minerals, such as bricks, tiles, or aggregates made from construction and demolition waste.

ISIC Code 3290: Other Manufacturing n.e.c.

Application: Includes the production of goods from a variety of materials, particularly those that do not fall into other categories, such as upcycled consumer products made from diverse waste streams.

4. Wholesale and Retail Trade of Recycled and Upcycled Goods

ISIC Code 4669: Wholesale of Waste and Scrap and Other Products n.e.c.

Application: Involves the wholesale trade of waste and scrap materials that are used in upcycling, such as textiles, plastics, and metals. These materials are traded as raw materials for manufacturing upcycled goods.

ISIC Code 4719: Other Retail Sale in Non-Specialized Stores

Application: Covers the retail sale of upcycled products, often in stores that sell a range of goods, including home furnishings, clothing, and accessories made from upcycled materials.

5. Support Services for Upcycling and Circular Economy

ISIC Code 7020: Management Consultancy Activities

Application: Relevant for consulting services related to the circular economy, sustainability, and upcycling, helping companies optimize their processes and products for environmental performance.

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Covers consulting services related to sustainable design and engineering for upcycling projects, including the design of upcycled products and the optimization of material recovery processes.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Includes technical consulting services related to environmental sustainability, product design, and innovation for upcycled goods and circular economy business models.

Sustainable insulation material production

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Low-Impact Raw Materials

Basic:

Use natural, renewable, or recycled raw materials for insulation, such as wool, cellulose (recycled paper), cork, straw, or hemp.

Avoid the use of raw materials that are extracted in environmentally damaging ways, such as through deforestation or non-sustainable mining practices.

Ensure that any synthetic materials used in production (e.g., foams or polymers) are recyclable or have low environmental impacts throughout their life cycle.

Intermediate:

Source raw materials from certified sustainable sources (e.g., Forest Stewardship Council (FSC) certified wood or Global Organic Textile Standard (GOTS) certified textiles).

Prioritize locally sourced materials to reduce transportation emissions and promote local economies.

Advanced:

Develop and use innovative bio-based materials or waste-derived materials (e.g., agricultural waste, industrial by-products) that have minimal environmental impacts and contribute to a circular economy.

Achieve certification for sustainable materials, such as Cradle to Cradle certification, for the entire production process.

DNSH Consideration: Ensure that the sourcing of raw materials does not contribute to deforestation, habitat destruction, or depletion of natural resources, and avoid materials with toxic or hazardous components.

1.2 Minimizing Environmental Impact in Production

Basic:

Implement basic pollution control measures to reduce emissions, waste, and effluent during the insulation material production process.

Ensure that water and energy use are efficiently managed to minimize the environmental footprint.

Intermediate:

Adopt closed-loop production processes that recycle waste materials back into the production cycle, reducing the need for virgin inputs and minimizing waste.

Incorporate renewable energy sources, such as solar or wind power, to reduce the carbon footprint of production.

Advanced:

Achieve zero-waste production, where all waste products are either reused, repurposed, or recycled into new materials.

Use life cycle assessments (LCA) to continuously monitor and optimize the environmental performance of production processes, focusing on reducing emissions, water use, and energy consumption.

DNSH Consideration: Ensure that production processes do not generate significant air, water, or soil pollution, and avoid using hazardous chemicals that can harm ecosystems or human health.

2. Resource Efficiency and Circular Economy

2.1 Efficient Use of Energy and Water

Basic:

Implement energy-efficient manufacturing processes, using energy-saving technologies such as low-energy curing or drying methods.

Optimize water use, particularly in processes requiring cleaning or material treatment, to reduce overall water consumption.

Intermediate:

Use renewable energy to power production processes, reducing the reliance on fossil fuels and lowering greenhouse gas emissions.

Integrate water recycling systems to minimize water use and prevent pollution from wastewater discharge.

Advanced:

Achieve energy-neutral or energy-positive production by generating more energy through renewable sources than is consumed in the production process.

Develop and implement waterless production techniques or advanced water treatment systems to minimize water consumption to near-zero levels.

DNSH Consideration: Ensure that energy and water use do not lead to resource depletion or increased competition for local resources, particularly in water-scarce regions.

2.2 Waste Minimization and Material Efficiency

Basic:

Minimize material waste during the production process by optimizing material cutting, shaping, and handling techniques.

Ensure that production waste (e.g., scraps, offcuts) is recycled or repurposed for other uses.

Intermediate:

Use advanced waste management practices, such as reintroducing manufacturing waste into the production cycle or using waste as raw materials for other products.

Develop modular or easily recyclable insulation materials that allow for disassembly and re-use at the end of the product's life cycle.

Advanced:

Design insulation materials that are fully recyclable or biodegradable at the end of their life cycle, supporting circular economy principles.

Implement take-back programs where old or used insulation materials are collected, recycled, and reintroduced into the production cycle.

DNSH Consideration: Ensure that waste management practices do not result in improper disposal, contamination, or environmental degradation.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Insulation Materials

Basic:

Ensure that insulation materials are designed to withstand a range of climate conditions, such as high heat, humidity, and freezing temperatures, without degradation.

Ensure that materials used do not release harmful substances (e.g., VOCs) into the environment or indoor air quality, particularly under extreme weather conditions.

Intermediate:

Develop materials that not only provide insulation but also enhance building climate resilience, such as materials with fire-resistant or moisture-resistant properties for use in areas prone to wildfires or flooding.

Integrate materials that can help manage indoor climate passively, reducing the need for active heating or cooling systems.

Advanced:

Use climate-adaptive materials that respond to changing weather conditions (e.g., phase-change materials that absorb or release heat depending on the ambient temperature), improving the energy efficiency of buildings.

Implement insulation materials that contribute to building longevity and reduce maintenance requirements in the face of climate extremes (e.g., UV-resistant, mold-resistant, or corrosion-resistant materials).

DNSH Consideration: Ensure that climate-resilient materials do not involve environmentally harmful substances or exacerbate resource use during their production.

4. Social and Economic Benefits

4.1 Job Creation and Local Economic Development

Basic:

Create local employment opportunities in the production of insulation materials, particularly in areas where sustainable or natural raw materials are sourced.

Ensure fair labor practices, providing safe working conditions, fair wages, and opportunities for skill development for workers involved in insulation material production.

Intermediate:

Support local economies by sourcing raw materials from local suppliers and collaborating with local small and medium enterprises (SMEs).

Promote inclusive business models that involve marginalized groups (e.g., women, youth) in the insulation material production process.

Advanced:

Develop social enterprise models where the benefits of insulation material production are reinvested into local communities, supporting broader social and environmental objectives, such as education, health, or climate resilience projects.

Implement capacity-building programs that train workers and communities in the production, installation, and maintenance of sustainable insulation materials.

DNSH Consideration: Ensure that social and economic benefits are distributed equitably, without exploitation or marginalization of local communities or workers.

5. Monitoring and Reporting

5.1 Monitoring of Resource Use and Environmental Impact

Basic:

Track energy and water consumption during production to ensure efficient resource use and identify areas for improvement.

Monitor waste generation and disposal, ensuring that waste is recycled or repurposed where possible.

Intermediate:

Use environmental monitoring systems to continuously track the environmental impact of insulation material production, focusing on emissions, water use, and waste generation.

Report environmental performance using recognized standards, such as the Global Reporting Initiative (GRI), to ensure transparency and accountability.

Advanced:

Use real-time monitoring systems to optimize production processes, reducing energy and water use, minimizing waste, and ensuring continuous improvement in environmental performance.

Engage third-party certification and auditing to verify the environmental claims of insulation materials, ensuring that they meet international sustainability standards such as Cradle to Cradle, LEED, or BREEAM.

DNSH Consideration: Ensure that monitoring and reporting are accurate, transparent, and accessible to stakeholders, and that environmental performance data is used to drive continuous improvement in sustainability.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental impacts of insulation material production, helping manufacturers minimize pollution, reduce resource consumption, and ensure sustainable operations.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Offers a method for evaluating the environmental impacts of insulation materials across their entire life cycle, from raw material sourcing to end-of-life disposal, helping identify opportunities to reduce environmental impact.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing the water footprint of insulation material production, ensuring that water use is minimized and managed sustainably.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in calculating the carbon footprint of insulation materials, helping manufacturers reduce the greenhouse gas emissions associated with production.

ISO 14055-1: Environmental Management – Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification – Part 1: Good Practices Framework

Application: Provides guidance on sustainable land use and resource management, relevant for insulation materials made from natural or renewable sources (e.g., straw, hemp, wool).

2. Resource Efficiency and Circular Economy

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for improving energy efficiency in insulation material production, ensuring that energy use is minimized and optimized, and that renewable energy sources are integrated where possible.

ISO 18601: Packaging and the Environment – General Requirements for the Use of ISO Standards in the Field of Packaging and the Environment

Application: Relevant for insulation materials that are packaged, ensuring that packaging is sustainable, minimizes waste, and adheres to environmental best practices.

ISO 14093: Mechanisms for the Financing of Circular Economy Projects

Application: Supports manufacturers of sustainable insulation materials by offering guidance on how to finance circular economy projects, promoting the use of recycled materials and resource-efficient production.

3. Social Responsibility and Worker Health

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility into insulation material production, ensuring that companies consider labor practices, community well-being, and environmental stewardship in their operations.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of workers involved in insulation material production by providing a framework for identifying and mitigating workplace hazards, promoting a safe working environment.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes guidelines to prevent, detect, and address bribery in the supply chain of insulation materials, ensuring ethical conduct in business transactions and procurement.

4. Product Quality and Performance

ISO 9001: Quality Management Systems – Requirements

Application: Provides a structured approach to managing the quality of insulation materials, ensuring consistency in production and meeting performance and safety standards for thermal, acoustic, and fire-resistant properties.

ISO 14021: Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labelling)

Application: Relevant for manufacturers of sustainable insulation materials who want to make self-declared environmental claims. This standard ensures that environmental marketing claims are credible and verifiable.

ISO 9924-3: Rubber and Rubber Products – Determination of Composition

Application: Ensures that insulation materials made from rubber or similar products adhere to quality standards, contributing to the durability and performance of insulation.

5. Circular Economy and Waste Management

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Provides guidelines for reporting on the environmental performance of insulation material production, ensuring transparency and accountability in sustainability claims.

ISO 17088: Specifications for Compostable Plastics

Application: Relevant for insulation materials made from biodegradable or compostable materials. This standard ensures that products can safely break down without harming the environment.

6. Fire Safety Standards for Insulation Materials

ISO 1182: Reaction to Fire Tests for Products – Non-Combustibility Test

Application: Assesses the non-combustibility of insulation materials, ensuring that products used in buildings meet fire safety standards.

ISO 1716: Reaction to Fire Tests for Products – Determination of the Gross Heat of Combustion (Calorific Value)

Application: Provides guidance on the testing of insulation materials to ensure they do not contribute to fire hazards. This is critical for building safety.

ISO 11925-2: Reaction to Fire Tests – Ignitability of Building Products Subjected to Direct Impingement of Flame

Application: Helps evaluate the ignitability of insulation materials, ensuring that products meet fire safety regulations in building applications.

» ISICS Codes

ISIC Codes for Sustainable Insulation Material Production:

1. Manufacturing of Insulation Materials

ISIC Code 2399: Manufacture of Other Non-Metallic Mineral Products n.e.c.

Application: Covers the production of non-metallic mineral insulation materials such as glass wool, rock wool, and other mineral-based insulations used in construction for thermal and acoustic purposes.

ISIC Code 2219: Manufacture of Other Rubber Products

Application: Involves the production of insulation materials made from rubber, including recycled rubber, for use in thermal insulation, soundproofing, and vibration dampening.

ISIC Code 2220: Manufacture of Plastics Products

Application: Relevant for the production of plastic-based insulation materials, such as expanded polystyrene (EPS) or extruded polystyrene (XPS) foam, as well as innovative sustainable plastics for insulation.

ISIC Code 1709: Manufacture of Other Articles of Paper and Paperboard

Application: Covers the production of cellulose insulation, which is made from recycled paper and used as a sustainable alternative in construction for insulation purposes.

ISIC Code 1629: Manufacture of Other Products of Wood; Manufacture of Articles of Cork, Straw, and Plaiting Materials

Application: Involves the manufacturing of natural fiber insulation materials, including cork, straw, and other bio-based materials that are used for sustainable thermal and acoustic insulation in buildings.

2. Recycling and Recovery of Materials for Insulation

ISIC Code 3830: Materials Recovery

Application: Covers activities related to the recovery of materials such as recycled paper, textiles, glass, or plastics for use in producing insulation materials, supporting circular economy and sustainability practices in insulation material production.

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Involves the collection of recyclable materials, such as glass, paper, or plastics, that can be processed and upcycled into insulation products.

3. Manufacture of Other Construction-Related Products

ISIC Code 2392: Manufacture of Clay Building Materials

Application: Includes the production of clay-based materials used for building insulation purposes, particularly where clay is used in combination with other sustainable materials.

ISIC Code 2310: Manufacture of Glass and Glass Products

Application: Relevant for the production of glass wool and other glass-based insulation products, commonly used in buildings for thermal and soundproofing purposes.

ISIC Code 3290: Other Manufacturing n.e.c.

Application: Covers the production of specialized insulation products that may not fit into traditional categories, such as innovative insulation materials made from non-conventional or composite materials.

4. Wholesale and Distribution of Insulation Materials

ISIC Code 4663: Wholesale of Construction Materials, Hardware, Plumbing, and Heating Equipment and Supplies

Application: Involves the wholesale trade of construction materials, including sustainable insulation products, ensuring their distribution to construction projects and markets.

Sponge City projects.

Sponge City projects aim to enhance urban water management through nature-based solutions, integrating sustainable drainage systems (SuDS), green infrastructure, and permeable surfaces. These projects help cities manage stormwater, reduce flood risks, improve water quality, and mitigate urban heat island effects.

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Stormwater Management and Flood Reduction

Criteria: Sponge City projects must prioritize the capture, retention, and reuse of stormwater to mitigate flood risks and reduce the burden on conventional drainage systems.

Key Actions: Implement green infrastructure such as bioswales, rain gardens, permeable pavements, and constructed wetlands to manage runoff.

DNSH Consideration: Ensure that stormwater management does not lead to unintended ecological impacts, such as waterlogging or erosion in natural habitats.

1.2 Improvement of Water Quality

Criteria: Sponge City projects must include measures to filter pollutants and improve water quality before stormwater recharges into aquifers or is released into nearby water bodies.

Key Actions: Use natural filtration systems, such as vegetated swales, constructed wetlands, and retention ponds, to filter out pollutants from stormwater.

DNSH Consideration: Ensure that filtration systems do not degrade over time, leading to reduced water quality or contamination of local water bodies.

1.3 Promotion of Biodiversity

Criteria: Sponge City projects must enhance urban biodiversity by creating green spaces and ecosystems that support local flora and fauna.

Key Actions: Integrate green roofs, urban forests, and riparian buffers along waterways to create habitats and improve urban biodiversity.

DNSH Consideration: Avoid introducing non-native or invasive species that could disrupt local ecosystems.

1.4 Urban Heat Island Mitigation

Criteria: Sponge City projects must contribute to reducing urban heat island effects through the integration of green infrastructure and water bodies that cool the urban environment.

Key Actions: Incorporate green roofs, tree planting, and water bodies such as ponds or streams to reduce ambient temperatures in urban areas.

DNSH Consideration: Ensure that green infrastructure is maintained properly to prevent it from becoming ineffective in mitigating heat.

2. Resource Efficiency and Circular Economy

2.1 Use of Sustainable Materials

Criteria: Sponge City infrastructure must be constructed using sustainable, recycled, or locally sourced materials to minimize resource consumption and reduce the carbon footprint.

Key Actions: Use permeable materials like recycled concrete, porous asphalt, and natural stones for pathways and parking lots.

DNSH Consideration: Ensure that materials used do not deplete local resources or lead to negative environmental impacts during production or transport.

2.2 Water Reuse and Conservation

Criteria: Sponge City projects must focus on capturing and reusing stormwater for non-potable purposes, such as irrigation and toilet flushing, to conserve fresh water resources.

Key Actions: Install systems for stormwater harvesting, storage, and reuse, such as rainwater tanks and greywater systems integrated into building and landscape designs.

DNSH Consideration: Ensure that water reuse systems do not lead to public health risks or water contamination due to improper filtration or storage.

2.3 Integration of Renewable Energy

Criteria: Sponge City projects should incorporate renewable energy solutions where possible, such as solar-powered water pumps or lighting systems in green spaces.

Key Actions: Install solar panels on green roofs, use solar-powered water features in public spaces, or integrate renewable energy into stormwater treatment facilities.

DNSH Consideration: Ensure that renewable energy systems are designed to complement the project and do not cause visual or noise pollution.

3. Climate Resilience and Adaptation

3.1 Climate-Resilient Design

Criteria: Sponge City projects must be designed to handle increased rainfall, extreme weather events, and rising temperatures associated with climate change.

Key Actions: Use flexible infrastructure such as retention basins, floodable parks, and permeable surfaces that can adapt to varying amounts of rainfall and extreme weather events.

DNSH Consideration: Ensure that climate-resilient infrastructure does not divert floodwaters to areas vulnerable to inundation or exacerbate downstream flooding.

3.2 Integration with Urban Climate Adaptation Plans

Criteria: Sponge City projects must be integrated into broader urban climate adaptation strategies to ensure that water management is aligned with the city's climate resilience goals.

Key Actions: Align Sponge City projects with existing climate action plans, flood risk management strategies, and urban resilience frameworks.

DNSH Consideration: Ensure that adaptation measures do not conflict with existing infrastructure or create barriers to future development.

4. Social and Economic Benefits

4.1 Public Health and Safety

Criteria: Sponge City projects must improve public health by reducing urban flooding, improving water quality, and providing green spaces that promote physical activity and mental well-being.

Key Actions: Develop multifunctional green spaces, such as parks with bioswales or rain gardens, that provide recreational areas while managing stormwater.

DNSH Consideration: Ensure that public spaces are safe, accessible, and free from hazards such as water stagnation or contamination.

4.2 Job Creation and Economic Development

Criteria: Sponge City projects must contribute to local job creation through construction, operation, and maintenance of green infrastructure, as well as boosting local economies through improved urban spaces.

Key Actions: Employ local labor for the construction and maintenance of green infrastructure, and encourage local businesses to benefit from revitalized public spaces.

DNSH Consideration: Ensure that jobs created are sustainable and provide fair wages and safe working conditions.

4.3 Community Engagement and Inclusivity

Criteria: Sponge City projects must actively engage local communities in planning and decision-making processes to ensure that the infrastructure meets the needs of diverse populations, including vulnerable and marginalized groups.

Key Actions: Organize public consultations, incorporate feedback into project designs, and ensure that green spaces are accessible to all, including people with disabilities.

DNSH Consideration: Avoid designs that may exclude certain groups or create inequitable access to the benefits of Sponge City projects.

5. Monitoring and Reporting

5.1 Monitoring of Environmental Impact

Criteria: Sponge City projects must include mechanisms to monitor their impact on water management, biodiversity, and urban heat, as well as their effectiveness in mitigating floods and improving water quality.

Key Actions: Install sensors and monitoring equipment to track water flow, soil moisture, and air temperature, and monitor the health of green spaces and biodiversity.

DNSH Consideration: Ensure that monitoring systems are reliable, cost-effective, and accessible to decision-makers for ongoing project management.

5.2 Reporting on Water Conservation and GHG Emissions

Criteria: Sponge City projects must report on their contributions to water conservation, stormwater management, and greenhouse gas (GHG) emissions reductions.

Key Actions: Provide annual reports on stormwater captured and reused, the amount of GHG emissions reduced through green infrastructure, and improvements in water quality.

DNSH Consideration: Ensure that reporting is transparent and accurately reflects the environmental and social benefits of the project.

6. Safety and Regulatory Compliance

6.1 Compliance with Water Management and Environmental Regulations

Criteria: Sponge City projects must comply with national and local water management, environmental protection, and urban planning regulations to ensure legal and environmental soundness.

Key Actions: Conduct environmental impact assessments (EIAs), secure necessary permits, and ensure compliance with water quality and stormwater management regulations.

DNSH Consideration: Ensure that the project complies with all regulations to avoid legal issues or negative environmental impacts.

6.2 Compliance with Health and Safety Standards

Criteria: Sponge City infrastructure must be designed and maintained to ensure the safety of the public, particularly in flood-prone areas or where water storage is part of the project.

Key Actions: Incorporate safety features such as barriers, signage, and lighting around retention basins, water features, and flood-prone areas.

DNSH Consideration: Ensure that infrastructure does not pose a risk to public health or safety due to improper maintenance or poor design.

» ISO Standards

1. Water Management and Sustainable Drainage Standards

ISO 24516-1: Guidelines for the Management of Assets of Water Supply and Wastewater Systems – Part 1: Drinking Water Distribution Networks

Application: Provides guidelines for managing water supply systems, including the integration of Sponge City elements that help manage stormwater, prevent flooding, and maintain water quality in urban settings.

ISO 24516-2: Guidelines for the Management of Assets of Water Supply and Wastewater Systems – Part 2: Wastewater Collection Networks

Application: Offers guidance on the management of wastewater systems in urban areas, relevant to Sponge City projects that focus on integrating sustainable drainage systems (SuDS) with wastewater management infrastructure to improve resilience against flooding and reduce environmental impact.

ISO 20760-1: Water Reuse in Urban Areas – Guidelines for Centralized Water Reuse System – Part 1: Design and Operation

Application: Addresses the design and operation of centralized water reuse systems, which can be incorporated into Sponge City projects for capturing, treating, and reusing stormwater for non-potable applications, such as irrigation or greywater systems.

ISO 16075-1: Guidelines for Treated Wastewater Use for Irrigation Projects – Part 1: The Basis of a Project for the Use of Treated Wastewater

Application: Provides guidelines for using treated wastewater for irrigation, which is directly applicable to Sponge City projects that integrate green infrastructure to reuse stormwater for irrigating green roofs, parks, and other urban green spaces.

2. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental aspects of Sponge City projects, ensuring that these initiatives align with sustainability goals, such as reducing pollution, improving water quality, and enhancing urban biodiversity.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Assists in assessing the water footprint of Sponge City projects by evaluating the water usage and management strategies implemented in urban drainage and water retention systems. It helps determine how effectively Sponge City projects conserve water and minimize environmental impact.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Provides principles for conducting a life cycle assessment (LCA) to evaluate the environmental impact of materials and processes used in Sponge City projects, including construction, maintenance, and operation of water retention and green infrastructure systems.

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for Use

Application: Provides a framework for sustainable urban development, supporting the integration of Sponge City principles into broader urban planning efforts. It focuses on enhancing urban resilience, water management, and environmental sustainability.

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: Establishes indicators for assessing the sustainability and quality of urban services, including those related to Sponge City projects, such as stormwater management, flood mitigation, and the creation of green spaces for improving urban ecosystems and reducing urban heat islands.

3. Green Infrastructure and Urban Biodiversity Standards

ISO 37123: Sustainable Cities and Communities – Indicators for Resilient Cities

Application: Provides resilience indicators for cities, which are essential for Sponge City projects aiming to improve urban resilience against climate change-related risks such as flooding and extreme weather events.

ISO 21930: Sustainability in Buildings and Civil Engineering Works – Core Rules for Environmental Product Declarations of Construction Products and Services

Application: Provides guidelines for assessing the environmental impacts of building materials used in Sponge City projects, such as permeable pavements, green roofs, and bio-retention systems, to ensure that materials and construction practices are sustainable.

4. Stormwater Management and Drainage Standards

ISO 11863: Hydrometry – Measurement of Suspended Sediment

Application: Provides guidelines for measuring suspended sediment in water bodies, which is relevant for Sponge City projects that aim to manage stormwater runoff and prevent sedimentation in urban waterways through natural filtration systems like wetlands and bioswales.

ISO 22320: Security and Resilience – Emergency Management – Guidelines for Incident Management

Application: Offers guidelines for managing urban flooding incidents, which can be part of a Sponge City project's approach to disaster risk reduction. It provides a framework for emergency response to flooding events and urban water crises.

ISO 20761: Water Reuse in Urban Areas – Guidelines for Performance Evaluation

Application: Provides guidelines for evaluating the performance of water reuse systems in urban areas, which is integral to Sponge City projects that reuse stormwater for irrigation and other non-potable uses, enhancing water sustainability and urban resilience.

5. Energy and Resource Efficiency Standards

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for optimizing energy use in Sponge City projects, particularly in systems that involve stormwater treatment, pumping, and distribution. It promotes the use of energy-efficient technologies to reduce the environmental impact of water management systems.

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works – Part 1: Buildings

Application: Offers a framework for assessing the environmental performance of construction works, applicable to Sponge City projects that involve the construction of green infrastructure, retention systems, and permeable surfaces aimed at improving water management and reducing environmental impact.

6. Occupational Health and Safety Standards

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures that Sponge City projects are designed, constructed, and maintained with a focus on worker safety. It sets out procedures to prevent accidents and manage risks during the construction and maintenance of water management and green infrastructure.

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for identifying, assessing, and managing risks related to the design and operation of Sponge City projects, ensuring that projects are resilient to environmental, social, and economic risks, including flooding, pollution, and resource depletion.

» ISICS Codes

1. Water Management and Drainage Services

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Includes activities related to the collection, treatment, and distribution of water, which is essential for Sponge City projects that involve the capture, treatment, and reuse of stormwater.

ISIC Code 3700: Sewerage

Application: Refers to the operation and management of sewerage systems, including stormwater management and wastewater collection. Sponge City projects focus on integrating sustainable drainage systems (SuDS) with existing sewerage infrastructure.

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Covers environmental remediation activities, such as the restoration of natural water bodies, pollution control, and water quality improvement, which are key components of Sponge City initiatives aimed at reducing water pollution and restoring urban ecosystems.

2. Construction and Civil Engineering

ISIC Code 4210: Construction of Roads and Railways

Application: Includes the construction of urban infrastructure, such as roads and railways, where Sponge City features like permeable pavements, bioswales, and rain gardens can be integrated to manage stormwater and reduce flooding.

ISIC Code 4290: Construction of Other Civil Engineering Projects n.e.c.

Application: Refers to the construction of civil engineering projects, including flood control infrastructure, water retention basins, green roofs, and other Sponge City elements designed to manage urban stormwater and improve water infiltration.

ISIC Code 4312: Site Preparation

Application: Involves site preparation activities for the construction of green infrastructure, such as preparing land for bioswales, constructed wetlands, and retention ponds, which are integral parts of Sponge City projects.

3. Environmental Protection and Green Infrastructure

ISIC Code 8130: Landscape Care and Maintenance Service Activities

Application: Includes the care and maintenance of green spaces and landscapes, such as parks, green roofs, and bioswales, which are key components of Sponge City projects. This code covers activities related to the ongoing upkeep of green infrastructure to ensure its effectiveness in stormwater management.

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Refers to forestry activities, including urban forestry and tree planting, which contribute to Sponge City projects by enhancing green infrastructure and improving stormwater absorption in urban areas.

ISIC Code 0240: Support Services to Forestry

Application: Includes support services for urban forestry and landscaping, such as managing tree nurseries, planting urban forests, and maintaining riparian buffers, which contribute to the goals of Sponge City projects by increasing urban greenery and water retention capacity.

4. Wastewater Treatment and Water Reuse

ISIC Code 3700: Sewerage

Application: Involves wastewater collection and treatment activities, including the reuse of treated water in urban environments for irrigation, cooling, and other non-potable uses, which align with Sponge City principles of water conservation and recycling.

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Also relevant for water reuse systems integrated into Sponge City designs, where captured stormwater is treated and reused for various purposes, reducing the demand for potable water and improving water sustainability.

5. Public Administration and Regulatory Activities

ISIC Code 8413: Regulation of and Contribution to More Efficient Operation of Businesses

Application: Covers government activities related to the regulation and oversight of urban development, including Sponge City projects. This includes setting standards for urban water management, issuing permits, and ensuring compliance with environmental regulations.

ISIC Code 9499: Activities of Other Membership Organizations n.e.c.

Application: Refers to the work of non-governmental organizations (NGOs) and advocacy groups that promote sustainable urban development, including Sponge City initiatives, through public campaigns, education, and collaboration with government entities.

6. Architectural and Engineering Services

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes architectural and engineering design services for Sponge City projects, such as planning urban water management systems, designing green roofs, bioswales, and permeable pavements, and providing technical consultancy for sustainable urban infrastructure.

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Involves research and development activities focused on advancing green infrastructure, water management technologies, and nature-based solutions, all of which are essential for Sponge City projects to improve urban resilience and sustainability.

7. Environmental Research and Development

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Supports R&D activities related to water management, sustainable urban development, and climate resilience, which are critical to the success of Sponge City projects that rely on innovative solutions to manage stormwater and improve urban ecosystems.

8. Urban Planning and Landscape Design

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Provides urban planning and landscape design services for Sponge City projects, including designing parks, green spaces, and urban water retention systems that integrate with the city's broader stormwater management strategies.

Green roofs

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Climate Change Mitigation

Criteria: Green roofs must contribute to reducing greenhouse gas emissions by improving building energy efficiency (e.g., reducing the need for air conditioning in hot weather and insulation in cold weather).

DNSH Consideration: Ensure no significant harm by avoiding the use of construction materials with high embodied carbon (e.g., unsustainable or non-recyclable materials).

1.2 Biodiversity Enhancement

Criteria: Green roofs must be designed to support local biodiversity by using native plant species and creating habitats for pollinators, birds, and other urban wildlife.

DNSH Consideration: Ensure that the plant selection does not introduce invasive species or lead to excessive water or resource use.

1.3 Stormwater Management

Criteria: Green roofs must contribute to urban water management by retaining rainwater, reducing runoff, and mitigating the risk of urban flooding.

DNSH Consideration: Ensure no significant harm by designing systems that avoid overloading local drainage systems or causing water damage to the building or neighboring properties.

2. Energy Efficiency and Building Performance

2.1 Improved Insulation and Energy Efficiency

Criteria: Green roofs must improve the energy efficiency of buildings by providing natural insulation that reduces heating and cooling requirements.

DNSH Consideration: Ensure that green roof systems are properly designed and maintained to avoid compromising the building’s structural integrity or causing energy inefficiencies due to poor implementation.

2.2 Reduction of Urban Heat Island Effect

Criteria: Green roofs must help mitigate the urban heat island effect by cooling the surrounding air and reducing the ambient temperature in urban areas.

DNSH Consideration: Ensure that the materials and design do not trap excess heat or create localized warming, which could harm urban biodiversity or living conditions.

3. Sustainable Resource Management

3.1 Water Efficiency

Criteria: Green roofs must incorporate water-efficient irrigation systems, including the use of rainwater harvesting or greywater systems, to reduce the need for external water inputs.

DNSH Consideration: Avoid significant harm by ensuring that water management systems do not deplete local water resources or cause water wastage.

3.2 Sustainable Materials

Criteria: Green roofs must use sustainable, durable, and low-impact materials, such as recycled or locally sourced substrates, for their construction and maintenance.

DNSH Consideration: Ensure that no significant harm is caused by the use of materials that contribute to pollution, resource depletion, or environmental degradation.

3.3 Waste Minimization

Criteria: During construction and maintenance, green roof projects must prioritize waste reduction by reusing materials, recycling construction waste, and minimizing non-recyclable inputs.

DNSH Consideration: Ensure that construction waste is handled responsibly to avoid harming local ecosystems or contributing to landfill waste.

4. Social and Community Benefits

4.1 Public Access and Community Engagement

Criteria: Where feasible, green roofs should provide public access or community spaces, offering recreational, educational, or cultural benefits.

DNSH Consideration: Ensure no harm to public safety by implementing appropriate access controls, safety features, and maintenance plans.

4.2 Health and Well-Being

Criteria: Green roofs must contribute to improving the health and well-being of building occupants and nearby residents by improving air quality, reducing noise pollution, and providing aesthetic benefits.

DNSH Consideration: Ensure that the green roof does not lead to health hazards such as mold growth, water leaks, or pest infestations.

4.3 Green Jobs Creation

Criteria: Green roof projects must promote the creation of green jobs related to design, installation, and maintenance, particularly focusing on local employment and skills development.

DNSH Consideration: Ensure that labor practices are fair, safe, and inclusive, avoiding exploitation or unsafe working conditions.

5. Climate Resilience and Adaptation

5.1 Resilience to Climate Change

Criteria: Green roofs must enhance the building's resilience to climate change impacts such as extreme heat, heavy rainfall, and drought by providing natural climate regulation.

DNSH Consideration: Ensure that green roofs are designed to withstand climate stressors without requiring excessive maintenance or resources, and avoid designs that exacerbate vulnerability to extreme weather.

5.2 Storm Resilience and Water Absorption

Criteria: Green roofs must be designed to absorb and slow down stormwater, reducing the risk of flash floods and soil erosion in urban areas.

DNSH Consideration: Ensure that the green roof design does not cause waterlogging or damage to the building's structure.

6. Maintenance and Longevity

6.1 Low-Maintenance Design

Criteria: Green roofs must be designed to require minimal maintenance, using hardy, drought-resistant plant species and durable construction materials that ensure long-term performance.

DNSH Consideration: Ensure that maintenance activities do not involve harmful chemicals or excessive resource use, which could harm the environment or reduce the sustainability of the project.

6.2 Monitoring and Performance Evaluation

Criteria: Green roof projects must incorporate a system for monitoring and evaluating their environmental performance (e.g., energy savings, water retention, biodiversity), ensuring continuous improvement over time.

DNSH Consideration: Ensure that monitoring systems are accurate, transparent, and capable of identifying any unintended negative impacts, allowing for timely corrective measures.

7. Compliance and Regulatory Standards

7.1 Adherence to Building Codes

Criteria: Green roofs must comply with all relevant local and international building codes, including structural safety, fire safety, and environmental regulations.

DNSH Consideration: Ensure that green roofs do not compromise the structural integrity of buildings, leading to safety risks or environmental harm.

7.2 Environmental Certification

Criteria: Green roof projects should seek relevant certifications such as LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method) to verify their environmental performance.

DNSH Consideration: Ensure that the certification process is credible and prevents greenwashing, ensuring genuine environmental benefits.

» ISO Standards

1. Environmental Management and Sustainability Standards

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for implementing environmental management systems (EMS) in green roof projects. It ensures that the planning, installation, and maintenance of green roofs align with environmental sustainability objectives, including reducing urban heat island effects and improving air quality.

ISO 14040: Environmental Management – Life Cycle Assessment – Principles and Framework

Application: Assists in evaluating the environmental impacts of green roof systems throughout their lifecycle, including materials used, energy savings, and their contribution to reducing stormwater runoff and improving biodiversity.

ISO 14046: Environmental Management – Water Footprint – Principles, Requirements, and Guidelines

Application: Provides guidelines for assessing the water footprint of green roofs, including water use for irrigation and the potential for stormwater retention and management.

2. Building Materials and Structural Safety Standards

ISO 15392: Sustainability in Building Construction – General Principles

Application: Establishes general principles for sustainability in building construction, which are applicable to green roofs. It addresses resource efficiency, environmental impact, and the use of sustainable building materials in green roof systems.

ISO 21930: Sustainability in Building Construction – Environmental Declaration of Building Products

Application: Specifies requirements for environmental declarations of building products, including materials used in green roofs (e.g., waterproof membranes, insulation, and vegetation systems). This ensures transparency in the environmental impact of materials used in green roof construction.

ISO 12491: Statistical Methods for Quality Control of Building Materials and Components

Application: Provides guidelines for quality control of materials used in green roofs, ensuring that materials such as soil substrates, drainage layers, and plant materials meet performance and safety standards.

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works – Part 1: Buildings

Application: Provides a framework for assessing the environmental performance of green roofs as part of a building's overall environmental impact, considering factors such as energy efficiency, stormwater management, and biodiversity enhancement.

3. Energy Efficiency Standards

ISO 52016-1: Energy Performance of Buildings – Calculation of Energy Needs for Heating and Cooling, Internal Temperatures, and Humidity – Part 1: Calculation Procedures

Application: Supports the assessment of green roofs' contribution to building energy efficiency by calculating their impact on heating and cooling needs. Green roofs can provide natural insulation, reducing energy consumption for temperature regulation in buildings.

ISO 18292: Energy Performance of Fenestration Systems – Calculation Procedure

Application: Although primarily for fenestration systems, this standard can be adapted to green roofs by assessing how green roofs influence the energy performance of buildings, especially in reducing heat gain in summer and insulating buildings in winter.

ISO 23045: Building Environment Design – Guidelines to Assess Energy Efficiency of New Buildings

Application: Provides guidelines for assessing the energy efficiency of buildings with green roofs, ensuring that they meet energy performance standards and contribute to reducing the building's overall carbon footprint.

4. Stormwater Management and Drainage Standards

ISO 24516-1: Guidelines for the Management of Assets of Water Supply and Wastewater Systems – Part 1: Drinking Water Distribution Networks

Application: Addresses the role of green roofs in stormwater management, including how they can be integrated with water management systems to reduce runoff, manage stormwater, and improve the overall efficiency of drainage systems in urban environments.

ISO 15798: Water Quality – Guidance on New Approaches to Improve the Detection and Identification of Microorganisms

Application: Provides guidelines for monitoring water quality in stormwater runoff from green roofs, ensuring that runoff water does not contribute to water pollution and is safe for reuse in non-potable applications such as irrigation.

ISO 16075-1: Guidelines for Treated Wastewater Use for Irrigation Projects – Part 1: The Basis of a Project for the Use of Treated Wastewater

Application: Supports the use of treated wastewater for irrigation in green roof systems, reducing the demand for fresh water and promoting water reuse in urban green infrastructure projects.

5. Occupational Health and Safety Standards

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures that green roof installation and maintenance processes comply with occupational health and safety standards. This is particularly important for workers involved in constructing and maintaining rooftop systems, ensuring safety procedures are followed.

ISO 31000: Risk Management – Guidelines

Application: Provides a framework for identifying and managing risks associated with green roof installations, including structural integrity, water infiltration, and worker safety during installation and maintenance.

6. Monitoring and Reporting Standards

ISO 37120: Sustainable Cities and Communities – Indicators for City Services and Quality of Life

Application: Defines indicators related to sustainable urban development, including green infrastructure like green roofs. It supports the integration of green roofs into broader urban sustainability strategies by providing metrics for their impact on air quality, biodiversity, and stormwater management.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating the environmental benefits of green roofs, such as reducing urban heat islands, managing stormwater, and improving air quality. It ensures transparency and public awareness of the positive impacts of green roof projects.

» ISICS Codes

1. Construction and Installation of Green Roofs

ISIC Code 4321: Electrical Installation

Application: Covers electrical installation services related to green roofs, such as installing solar panels or energy systems integrated with the green roof.

ISIC Code 4329: Other Construction Installation

Application: Includes installation activities for green roofs, such as waterproofing, drainage systems, and substrate preparation, as well as the installation of the green roof structure itself.

ISIC Code 4390: Other Specialized Construction Activities

Application: This category covers specialized construction activities related to the installation of green roofs, including rooftop gardens, vegetation layers, irrigation systems, and the integration of green infrastructure.

2. Maintenance and Landscaping of Green Roofs

ISIC Code 8130: Landscape Care and Maintenance Service Activities

Application: Includes the ongoing care and maintenance of green roofs, such as planting, irrigation, pruning, fertilization, and pest control. It also covers landscaping services for aesthetic and ecological management.

ISIC Code 8110: Combined Facilities Support Activities

Application: Covers comprehensive facility management services, including maintenance and upkeep of green roofs as part of the overall building maintenance plan, ensuring their long-term functionality and environmental performance.

3. Architectural and Engineering Design

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes architectural and engineering design services related to green roofs, such as structural design, sustainable building integration, energy efficiency planning, and water management systems.

4. Energy Efficiency and Renewable Energy Integration

ISIC Code 3510: Electric Power Generation, Transmission, and Distribution

Application: Covers the integration of renewable energy systems, such as solar panels, into green roof projects. This is relevant for green roofs that incorporate renewable energy technologies for building energy efficiency.

ISIC Code 7110: Architectural and Engineering Activities

Application: Includes consulting services for integrating energy-efficient systems into green roof designs, including solar panel installations and building energy management systems.

5. Environmental Consulting and Sustainability Services

ISIC Code 7120: Technical Testing and Analysis

Application: Includes services related to environmental testing and analysis for green roofs, such as soil testing, water retention studies, stormwater management assessments, and overall environmental impact assessments.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Covers consulting services related to the sustainability aspects of green roofs, including environmental impact assessments, certifications (such as LEED), and compliance with green building standards.

6. Water Management and Irrigation

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Involves water collection and supply systems, such as rainwater harvesting and greywater recycling, integrated with green roofs to support irrigation and water-efficient landscaping.

ISIC Code 3700: Sewerage

Application: Includes services related to the management of stormwater and drainage systems for green roofs, preventing overflow and ensuring efficient water management during heavy rainfall.

7. Waste Management and Recycling for Green Roof Installation

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Covers the collection and recycling of construction waste generated during the installation of green roofs, including packaging materials, soil, and other non-hazardous waste.

ISIC Code 3830: Materials Recovery

Application: Includes the recovery and recycling of construction materials used in green roofs, such as recycled substrates, eco-friendly roofing materials, and other sustainable components.

» Other international or adapted Certifications & Standards

FLL Green Roofing Guidelines (German Landscape Research, Development and Construction Society)

Comprehensive standards for the planning, execution, and upkeep of green roofs, widely regarded as a benchmark in the industry.

LEED (Leadership in Energy and Environmental Design)

Sustainable Sites (SS): credits for green roof installations that reduce heat islands and manage stormwater.

• Water Efficiency (WE): credits for green roofs that help reduce potable water use for irrigation.

BREEAM (Building Research Establishment Environmental Assessment Method):

• Land Use and Ecology: credits for green roofs that enhance urban biodiversity and provide ecological benefits.

• Surface Water Run-off: credits for green roofs that manage and mitigate surface water runoff.

WELL Building Standard:

• Air and Water: credits for green roofs that improve air and water quality.

• Mind: credits for green roofs that provide spaces for mental health and well-being.

Green Roofs for Healthy Cities (GRHC) Green Roof Professional (GRP) Certification

• Professional certification program that sets standards for green roof design, installation, and maintenance.

SITES (Sustainable Sites Initiative):

• Site Design: Credits for green roof projects that integrate sustainable design and contribute to site sustainability.

Water management projects using nature-based solutions

» Technical Screening Criteria

1. Environmental Impact and Conservation

1.1 Ecosystem Preservation and Restoration

Criteria: The project must contribute to the restoration, protection, or enhancement of natural ecosystems (e.g., wetlands, forests, rivers) that provide water-related services.

DNSH Consideration: Ensure that the project does not degrade existing ecosystems or reduce biodiversity. Projects must avoid significant harm to sensitive or protected ecosystems.

1.2 Sustainable Water Cycle Management

Criteria: The project must enhance the natural water cycle by increasing groundwater recharge, improving water retention, or reducing surface runoff.

DNSH Consideration: Avoid significant harm by ensuring that changes in water management do not lead to downstream flooding or water scarcity in other areas.

1.3 Water Quality Improvement

Criteria: The project must improve water quality through natural filtration, such as the use of wetlands, riparian buffers, or vegetated drainage systems.

DNSH Consideration: Ensure that the project does not result in contamination or degradation of water bodies through the use of harmful chemicals or materials.

1.4 Climate Change Mitigation and Adaptation

Criteria: The project must incorporate climate resilience strategies, using NBS to adapt to climate change impacts, such as increased flooding, droughts, or extreme weather events.

DNSH Consideration: Avoid harm by ensuring the project does not increase vulnerability to climate risks, such as poor site selection in flood-prone areas.

2. Sustainable Resource Management

2.1 Efficient Water Use

Criteria: The project must promote efficient water use, improving water availability for ecosystems, agriculture, and communities through natural processes like wetlands restoration, reforestation, or soil management.

DNSH Consideration: Avoid harm by ensuring that water usage does not compromise downstream water availability or harm ecosystems reliant on natural water flows.

2.2 Natural Infrastructure

Criteria: The project must use nature-based infrastructure, such as wetlands, mangroves, or floodplains, to manage water-related risks, such as floods and droughts.

DNSH Consideration: Ensure no significant harm to ecosystems or communities by avoiding large-scale engineering projects that could disrupt natural water flows.

2.3 Pollution Control

Criteria: Projects must naturally manage pollution (e.g., using riparian buffers or constructed wetlands) to filter and absorb pollutants before they reach water bodies.

DNSH Consideration: Ensure that nature-based solutions do not lead to unintended consequences, such as the accumulation of harmful substances in restored wetlands.

3. Community and Social Benefits

3.1 Community Engagement and Benefit

Criteria: Projects must involve local communities in the planning and implementation process, ensuring the benefits of the project are equitably shared, such as improved access to clean water and flood protection.

DNSH Consideration: Ensure no significant harm by avoiding displacement, land-use conflicts, or exclusion of marginalized groups from project benefits.

3.2 Support for Livelihoods

Criteria: Projects should enhance local livelihoods, particularly for communities that rely on natural water systems for agriculture, fisheries, or tourism.

DNSH Consideration: Avoid harm by ensuring that changes to natural water systems do not disrupt traditional livelihoods or reduce access to water resources for local communities.

3.3 Public Health and Well-Being

Criteria: Projects must enhance public health by improving water quality, reducing waterborne diseases, and providing reliable access to clean water.

DNSH Consideration: Avoid harm by ensuring that changes in water management do not increase the risk of water-related health issues (e.g., contamination from stagnating water).

4. Biodiversity and Habitat Protection

4.1 Biodiversity Enhancement

Criteria: The project must protect and enhance biodiversity by creating or restoring habitats that support wildlife, particularly species that depend on aquatic ecosystems.

DNSH Consideration: Ensure no significant harm by avoiding projects that would reduce biodiversity, fragment habitats, or harm endangered species.

4.2 Protection of Natural Water Bodies

Criteria: Projects must protect natural water bodies (e.g., rivers, lakes, and wetlands) from degradation, maintaining their ecological functions.

DNSH Consideration: Ensure that the project does not alter natural water systems in ways that would harm wildlife or reduce ecosystem services.

5. Regulatory Compliance and Certification

5.1 Compliance with Environmental Regulations

Criteria: Projects must comply with all relevant environmental and water management regulations, including permits for water use, pollution control, and land-use changes.

DNSH Consideration: Ensure that the project adheres to legal and regulatory frameworks to avoid significant harm to water resources and ecosystems.

5.2 Certification of Nature-Based Approaches

Criteria: Projects should seek certification from relevant bodies that verify the sustainability and environmental benefits of nature-based water management solutions.

DNSH Consideration: Ensure that the certification process rigorously evaluates the project's potential environmental impacts and avoids harm to local ecosystems.

6. Monitoring, Reporting, and Adaptive Management

6.1 Environmental Monitoring

Criteria: The project must include a robust monitoring program to track the environmental performance of nature-based solutions, including water quality, ecosystem health, and biodiversity.

DNSH Consideration: Ensure that monitoring systems identify and mitigate any potential harm caused by the project, such as unexpected pollution or habitat loss.

6.2 Adaptive Management

Criteria: Projects must incorporate adaptive management strategies to adjust practices based on monitoring results, ensuring long-term sustainability and resilience.

DNSH Consideration: Avoid harm by promptly addressing any negative environmental or social impacts detected through monitoring.

6.3 Reporting on Social and Environmental Impact

Criteria: Transparent reporting on the project's social and environmental impact is required, including progress toward water conservation goals and community benefits.

DNSH Consideration: Ensure that stakeholders are informed of potential risks or unintended consequences, and corrective measures are taken to avoid significant harm.

7. Climate Resilience and Adaptation

7.1 Flood and Drought Resilience

Criteria: Projects must enhance resilience to floods and droughts by utilizing natural floodplains, wetlands, and vegetation to store and manage water.

DNSH Consideration: Ensure no significant harm by avoiding projects that increase vulnerability to floods or droughts due to poor design or inappropriate site selection.

7.2 Site Selection and Ecosystem Integrity

Criteria: Projects must be located in areas where they can have the most positive impact, such as flood-prone zones, and must avoid locations where they could disrupt critical ecosystems.

DNSH Consideration: Ensure that site selection does not harm ecosystems critical for carbon sequestration, biodiversity, or water filtration. Assess current land use and its impact on water management. Identify ecosystem services provided by the area, such as groundwater recharge, habitat provision, and water purification.

Maintenance Plan: Develop a maintenance schedule for regular upkeep of vegetation, removal of debris, and inspection of structures. Use monitoring data to adapt and improve management practices over time.

» ISO Standards

1. Environmental Management and Conservation

ISO 14001: Environmental Management Systems

Application: Provides a framework for setting up an environmental management system that supports sustainable water management projects, including NBS. It covers the planning, implementation, monitoring, and continuous improvement of environmental performance.

ISO 14055-1: Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification

Application: Offers guidelines for sustainable land use, essential for NBS projects that restore or conserve ecosystems like wetlands, forests, and watersheds.

ISO 14007: Environmental Management – Guidelines for Determining Environmental Costs and Benefits

Application: Assists in evaluating the costs and benefits of water management projects using NBS, ensuring that projects deliver environmental benefits such as water quality improvement, flood regulation, and biodiversity enhancement.

ISO 14040: Environmental Management – Life Cycle Assessment (LCA) – Principles and Framework

Application: Helps assess the environmental impacts of NBS projects across their entire life cycle, from planning and construction to operation and decommissioning, ensuring sustainable practices throughout the project's duration.

2. Sustainable Resource Management

ISO 46001: Water Efficiency Management Systems

Application: Provides guidelines for improving water efficiency in water management projects, ensuring that NBS approaches conserve water and enhance the natural water cycle (e.g., through wetlands restoration, rainwater harvesting).

ISO 24518: Activities Relating to Drinking Water and Wastewater Services – Crisis Management of Water Utilities

Application: Offers guidance on managing water utilities during crises, such as floods or droughts, using NBS to build resilience in water infrastructure and manage water-related risks.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Provides methods for assessing the water footprint of NBS projects, ensuring sustainable water use and minimal environmental impacts on water resources.

ISO 24516-1: Guidelines for the Management of Water and Wastewater Utilities – Drinking Water Distribution Networks

Application: Supports the management of natural water systems by promoting sustainable infrastructure for water distribution, aligned with NBS principles.

3. Community and Social Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance on integrating social responsibility in water management projects, emphasizing community engagement, fair practices, and equitable distribution of benefits from NBS.

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development

Application: Provides a framework for integrating sustainability in community development, which is essential for NBS projects that rely on local ecosystems and stakeholder collaboration.

ISO 20400: Sustainable Procurement – Guidance

Application: Offers guidelines for procuring materials and services sustainably, ensuring that NBS projects support local economies and avoid harmful environmental and social impacts.

4. Biodiversity and Ecosystem Protection

ISO 14064: Greenhouse Gases – Quantification and Reporting of GHG Emissions and Removals

Application: Provides guidance for calculating the carbon sequestration benefits of NBS projects, such as reforestation and wetland restoration, which can act as carbon sinks.

ISO 14072: Environmental Management – Life Cycle Assessment – Requirements and Guidelines for Organizations

Application: Supports the assessment of environmental impacts related to biodiversity, focusing on the entire life cycle of the NBS project and ensuring that ecosystems are protected and enhanced.

ISO 14034: Environmental Management – Environmental Technology Verification (ETV)

Application: Verifies the environmental performance of technologies used in NBS projects, such as constructed wetlands or green infrastructure, ensuring they meet sustainability standards.

5. Climate Resilience and Adaptation

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Provides principles for integrating climate resilience into NBS projects, ensuring that the project can adapt to climate change impacts such as increased flooding, drought, or changing precipitation patterns.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Offers guidance on assessing the vulnerability of water systems to climate risks and designing NBS projects that mitigate these risks.

ISO 22301: Business Continuity Management Systems – Requirements

Application: Helps organizations plan for business continuity in the face of climate impacts, ensuring that NBS projects maintain operational resilience under adverse conditions.

6. Monitoring and Reporting

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Offers a framework for monitoring and evaluating the environmental performance of NBS projects, including water quality improvement, biodiversity restoration, and flood risk reduction.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating environmental performance to stakeholders, ensuring transparency and accountability in NBS projects.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Helps assess and report the impact of investments in NBS projects, ensuring alignment with climate change mitigation and adaptation goals.

» ISICS Codes

1. Water Collection, Treatment, and Supply

ISIC Code 3600: Water Collection, Treatment, and Supply

Application: Includes activities related to the collection, treatment, and distribution of water using sustainable practices and nature-based solutions, such as the restoration of wetlands for water filtration, use of constructed wetlands for water treatment, and the use of green infrastructure for urban water management.

2. Sewerage and Wastewater Management

ISIC Code 3700: Sewerage

Application: Covers the management of sewerage systems and wastewater treatment using nature-based solutions, such as the use of reed beds or constructed wetlands to treat wastewater, and the integration of sustainable drainage systems (SuDS) for stormwater management in urban areas.

3. Environmental Restoration and Conservation

ISIC Code 0210: Silviculture and Other Forestry Activities

Application: Involves activities related to reforestation and afforestation as nature-based solutions for managing water resources, such as using forests to regulate water flow, reduce flood risks, and enhance groundwater recharge.

ISIC Code 0240: Support Services to Forestry

Application: Covers support services such as forest management and restoration activities that promote nature-based solutions for watershed management and flood control through reforestation and riparian buffer zone restoration.

ISIC Code 0220: Logging

Application: Includes sustainable logging practices that incorporate nature-based solutions to maintain water quality and reduce soil erosion, which can negatively impact watersheds and water bodies.

ISIC Code 8130: Landscape Care and Maintenance Service Activities

Application: Refers to activities that involve the design and maintenance of green infrastructure and other nature-based solutions for managing water resources, including the creation of green roofs, rain gardens, and bioswales to reduce stormwater runoff and improve water filtration.

4. Flood Control and Water Management Services

ISIC Code 4290: Construction of Other Civil Engineering Projects n.e.c.

Application: Includes the construction of water management infrastructure projects that incorporate nature-based solutions, such as floodplain restoration, riverbank stabilization, and the construction of levees that integrate natural features like wetlands and riparian forests to manage water flow and mitigate flood risks.

ISIC Code 4220: Construction of Utility Projects for Electricity and Telecommunications

Application: Covers the construction of hydropower infrastructure that integrates nature-based solutions to minimize environmental impact, such as using green infrastructure to manage runoff and erosion near hydropower facilities.

ISIC Code 4312: Site Preparation

Application: Involves site preparation activities that integrate nature-based solutions for water management, including preparing land for the construction of green infrastructure, water retention basins, and floodplains to mitigate the impacts of stormwater runoff.

5. Water Pollution Control and Remediation Activities

ISIC Code 3900: Remediation Activities and Other Waste Management Services

Application: Includes environmental remediation projects that use nature-based solutions to improve water quality, such as the restoration of wetlands to filter pollutants, riparian buffer restoration for nutrient management, and bioremediation techniques using plants to absorb and neutralize contaminants in water bodies.

ISIC Code 3811: Collection of Non-Hazardous Waste

Application: Involves activities related to the collection and treatment of waste that integrates nature-based solutions for water management, such as the use of wetlands and other natural systems to filter stormwater and treat greywater.

ISIC Code 3830: Materials Recovery

Application: Covers activities that focus on recycling and resource recovery using nature-based solutions to manage water quality, including the use of composting and organic waste processing for soil improvement and water retention in natural water management systems.

6. Agricultural and Land Management Activities Related to Water Conservation

ISIC Code 0161: Support Activities for Crop Production

Application: Includes sustainable farming practices that integrate nature-based solutions for water conservation, such as agroforestry, rainwater harvesting, and the use of cover crops and riparian buffers to reduce water use and improve water infiltration in agricultural landscapes.

ISIC Code 0162: Support Activities for Animal Production

Application: Covers activities related to livestock farming that involve nature-based solutions for managing water resources, such as the restoration of wetlands and grasslands for water filtration and flood control, and the use of rotational grazing to improve soil water retention.

ISIC Code 0130: Plant Propagation

Application: Involves the cultivation of plants used in nature-based water management projects, such as trees and plants for wetland restoration, riparian buffer zones, and constructed wetlands for wastewater treatment.

7. Marine and Coastal Water Management

ISIC Code 0311: Marine Fishing

Application: Involves sustainable fishing practices that support marine biodiversity conservation and water management, such as the restoration of mangroves, seagrass beds, and coral reefs to enhance coastal water quality and provide natural flood protection.

ISIC Code 0321: Marine Aquaculture

Application: Covers sustainable marine aquaculture practices that integrate nature-based solutions, such as using mangrove forests or seagrass beds to enhance water filtration and reduce the environmental impact of aquaculture activities.

» Other international or adapted Certifications & Standards

LEED (Leadership in Energy and Environmental Design) - Certification system for green buildings and communities. Maximization of water efficiency within buildings to reduce the burden on potable water supply and wastewater systems.

BREEAM (Building Research Establishment Environmental Assessment Method) - Certification system for sustainable buildings. Measures to reduce water consumption and enhance water quality. Sustainable land use and ecological enhancement.

Nature-based Solutions for Climate Adaptation (NbSCA) Guidelines

• Climate Resilience: Design NBS to enhance resilience to climate change impacts.

• Community Benefits: Ensure that NBS provide tangible benefits to local communities, such as improved livelihoods and health.

• Ecosystem Services: Enhance ecosystem services, including water purification, flood regulation, and habitat provision.

• Monitoring and Evaluation: Establish robust monitoring and evaluation frameworks to assess the effectiveness of NBS.

Natural Capital Protocol

• Valuation of Ecosystem Services: Assess and value the ecosystem services provided by NBS.

• Integration into Decision-Making: Incorporate natural capital assessments into project planning and decision-making processes.

• Stakeholder Collaboration: Engage stakeholders in valuing and managing natural capital.

UN Environment Programme (UNEP) Guidelines

• Holistic Approach: Implement NBS that address multiple environmental, social, and economic challenges.

• Sustainable Development: Ensure that NBS contribute to sustainable development goals.

• Scalability and Replicability: Design NBS that can be scaled up and replicated in different contexts.

UN Sustainable Development Goals (SDGs) - global blueprint for sustainable development, including water management and ecosystem conservation, particularly, Goals 6 & 13.

Eco-Tourism (Development of eco-tourism projects, Infrastructure and services supporting green tourism)

» Technical Screening Criteria

1. Environmental Impact and Conservation

Conservation of Natural Habitats

Criteria: Eco-tourism projects must support the preservation and restoration of natural habitats and biodiversity.

DNSH Consideration: Ensure that tourism infrastructure does not contribute to deforestation, habitat fragmentation, or the displacement of wildlife.

1.2 Low Environmental Footprint

Criteria: Projects must minimize pollution, resource consumption, and waste generation through sustainable operations.

DNSH Consideration: Avoid activities that generate significant pollution (e.g., untreated wastewater discharge, non-renewable resource use) or degrade natural resources.

1.3 Wildlife Protection

Criteria: Tourism activities must not disrupt wildlife or their habitats. Any interaction with wildlife must adhere to ethical and sustainable practices.

DNSH Consideration: Ensure no significant harm to local species by maintaining appropriate distances, avoiding interference with breeding areas, and prohibiting harmful activities such as feeding wildlife.

1.4 Sustainable Land Use

Criteria: Projects must use land sustainably, ensuring minimal environmental disruption.

DNSH Consideration: Avoid significant harm by preventing land degradation, erosion, or improper land use that could lead to habitat destruction or biodiversity loss.

2. Community and Social Benefits

2.1 Support for Local Communities

Criteria: Projects must create employment opportunities and promote income generation for local communities.

DNSH Consideration: Ensure that eco-tourism activities do not lead to exploitation, dislocation, or other negative social impacts on local populations.

2.2 Cultural Preservation

Criteria: The project must respect and promote the preservation of local cultural heritage and traditions.

DNSH Consideration: Avoid commercialization or degradation of cultural heritage by ensuring tourism respects the authenticity of local customs.

2.3 Fair Labor Practices

Criteria: Projects must comply with fair labor standards, ensuring decent wages, safe working conditions, and equitable treatment of employees.

DNSH Consideration: Ensure no significant harm by avoiding exploitative labor practices or unsafe working environments.

3. Sustainable Resource Management

3.1 Energy Efficiency

Criteria: Eco-tourism facilities must use energy-efficient systems and prioritize renewable energy sources to minimize carbon emissions.

DNSH Consideration: Ensure that energy systems do not lead to environmental harm, such as habitat destruction for renewable energy installations.

3.2 Water Conservation

Criteria: Projects must implement water-saving technologies and manage water resources efficiently to minimize consumption and waste.

DNSH Consideration: Avoid significant harm by ensuring water extraction or usage does not deplete local water resources or negatively affect ecosystems.

3.3 Waste Management

Criteria: Projects must have comprehensive waste management systems that prioritize waste reduction, recycling, and responsible disposal.

DNSH Consideration: Ensure that waste management practices do not result in pollution of water bodies, soil, or air, and avoid harm by eliminating the use of harmful materials like single-use plastics.

4. Visitor Education and Engagement

4.1 Environmental Education

Criteria: Eco-tourism must include educational programs for visitors on local ecosystems, environmental conservation, and sustainable practices.

DNSH Consideration: Ensure that educational activities do not inadvertently cause harm to the environment or cultural sites, and promote responsible behavior among visitors.

4.2 Visitor Impact Management

Criteria: Projects must regulate visitor numbers and behavior to minimize their environmental footprint and ensure that the tourism activities do not exceed the carrying capacity of the site.

DNSH Consideration: Ensure no significant harm by managing visitor access to sensitive areas and limiting activities that could degrade ecosystems or disrupt wildlife.

5. Transportation and Access

5.1 Low-Impact Transportation

Criteria: Eco-tourism projects must promote low-carbon transportation methods, such as electric vehicles or non-motorized transport.

DNSH Consideration: Avoid significant harm by ensuring that transportation infrastructure does not lead to habitat fragmentation, increase emissions, or cause environmental degradation.

5.2 Sustainable Access Infrastructure

Criteria: Access roads, paths, and other infrastructure must be designed and built to minimize environmental disruption and prevent erosion.

DNSH Consideration: Ensure that the construction of access infrastructure does not lead to soil erosion, habitat loss, or other forms of environmental harm.

6. Regulatory Compliance and Certification

6.1 Compliance with Environmental Regulations

Criteria: Projects must comply with national and international environmental regulations and standards.

DNSH Consideration: Ensure compliance with all relevant environmental laws to prevent significant harm to ecosystems and local communities.

6.2 Green Certification

Criteria: Projects should seek certification from recognized eco-tourism certification bodies (e.g., Green Globe, EarthCheck) to demonstrate their commitment to sustainability.

DNSH Consideration: Certification should confirm that projects are not causing significant harm to environmental, social, or cultural assets.

7. Monitoring and Reporting

7.1 Environmental Monitoring

Criteria: Projects must regularly monitor their environmental impact and adjust operations to minimize harm where necessary.

DNSH Consideration: Ensure that monitoring systems detect and mitigate any potential significant harm caused by eco-tourism activities, such as overuse of natural resources or unregulated visitor activities.

7.2 Reporting on Social and Environmental Performance

Criteria: Projects must transparently report their environmental and social performance to stakeholders, including any measures taken to avoid harm.

DNSH Consideration: Ensure no significant harm by regularly updating stakeholders on potential risks and how they are being mitigated.

8. Climate Resilience

8.1 Climate Change Adaptation

Criteria: Projects must integrate climate resilience measures to ensure they can adapt to changing environmental conditions, including extreme weather events.

DNSH Consideration: Ensure that climate adaptation measures do not inadvertently harm local ecosystems or displace vulnerable communities.

8.2 Sustainable Site Selection

Criteria: Projects must avoid areas vulnerable to climate risks or that are critical for climate change mitigation, such as wetlands or carbon sinks.

DNSH Consideration: Avoid significant harm by ensuring site selection does not increase the vulnerability of ecosystems or undermine local climate resilience efforts.

» ISO Standards

Environmental Impact and Conservation

ISO 14001: Manages overall environmental responsibilities, including biodiversity and pollution reduction.

ISO 14055-1: Focuses on good practices to prevent land degradation and ensure sustainable land use.

ISO 14007: Assesses environmental costs and benefits, helping measure eco-tourism's impact on conservation.

Community and Social Benefits

ISO 26000: Provides guidance on social responsibility, including community engagement, cultural preservation, and fair labor practices.

ISO 20611: Offers sustainability practices for adventure and eco-tourism, promoting local economies and respecting cultures.

ISO 20400: Supports sustainable procurement of local products and services to benefit local communities.

Sustainable Resource Management

ISO 50001: Enhances energy efficiency in eco-tourism operations.

ISO 46001: Focuses on water efficiency, promoting reduced water use.

ISO 14051: Encourages waste reduction by improving resource efficiency and minimizing waste.

Visitor Education and Engagement

ISO 14063: Provides guidelines on effective environmental communication and education for visitors.

ISO 21101: Ensures safety and sustainability in managing visitor activities within eco-tourism.

Transportation and Access

ISO 14064: Assesses and manages greenhouse gas emissions, particularly from transportation.

ISO 39001: Ensures road traffic safety and low-impact transportation for eco-tourism sites.

Regulatory Compliance and Certification

ISO 17021-2: Sets high standards for environmental compliance certification bodies.

ISO 19011: Provides auditing principles for environmental and social performance.

Monitoring and Reporting

ISO 14031: Evaluates environmental performance for continuous improvement.

ISO 26030: Measures and reports social impacts on local communities and stakeholders.

Climate Resilience

ISO 14090: Guides the integration of climate adaptation strategies into eco-tourism projects.

ISO 14091: Supports the assessment of climate risks and vulnerabilities for eco-tourism sites.

» ISICS Codes

1. Nature-Based and Recreational Activities

ISIC Code 7990: Other Reservation Service and Related Activities

Includes travel agencies and tour operators specializing in eco-tourism and nature-based tourism services.

ISIC Code 7911: Travel Agency Activities

Involves travel agencies that may focus on eco-tourism packages and sustainable travel options.

ISIC Code 7721: Renting and Leasing of Recreational and Sports Goods

Relevant for eco-tourism activities such as the rental of bicycles, hiking gear, or boats for environmentally friendly tourism.

ISIC Code 9319: Other Sports Activities

Includes sports and adventure tourism activities like hiking, kayaking, and other nature-based tourism that align with eco-tourism principles.

3. Cultural and Heritage Management

ISIC Code 9103: Operation of Historical Sites and Buildings and Similar Visitor Attractions

This covers the management and operation of heritage sites, cultural landmarks, and eco-cultural tourism destinations.

ISIC Code 9102: Museums and Preservation of Historical Sites and Buildings

Includes eco-tourism activities focused on promoting cultural heritage and educational tours in an environmentally sustainable way.

4. Environmental Conservation and Education

ISIC Code 8890: Other Social Work Activities Without Accommodation

Relevant for organizations that provide environmental education and conservation activities related to eco-tourism.

ISIC Code 8130: Landscape Care and Maintenance Service Activities

Includes eco-tourism-related activities like the maintenance of nature parks, gardens, and protected areas.

5. Sustainable Transportation

ISIC Code 4922: Other Passenger Land Transport

Includes transportation activities such as eco-friendly buses or shuttles serving eco-tourism destinations.

ISIC Code 5011: Sea and Coastal Water Transport of Passengers

Involves eco-friendly water transport services such as boat tours in protected marine areas.

ISIC Code 5110: Passenger Air Transport

Relevant for eco-tourism destinations accessed by air, particularly low-emission or carbon-offset air travel services.

6. Wildlife and Nature Conservation Activities

ISIC Code 0240: Support Services to Forestry

Includes eco-tourism services related to forest conservation, nature parks, and wildlife sanctuaries.

ISIC Code 9104: Botanical and Zoological Gardens and Nature Reserves Activities

Covers eco-tourism operations related to nature reserves, wildlife protection areas, and botanical gardens focused on conservation and education.

7. Food and Beverage Services (Eco-Friendly Options)

ISIC Code 5610: Restaurants and Mobile Food Service Activities

Includes eco-friendly restaurants and catering services that focus on sustainable food practices and local sourcing, often as part of an eco-tourism experience.

ISIC Code 5629: Other Food Service Activities

Includes specialized eco-tourism food services, such as catering at nature lodges or eco-tourism resorts.

8. Arts, Entertainment, and Recreation

ISIC Code 9329: Other Amusement and Recreation Activities

Involves recreational activities that are a part of eco-tourism, such as eco-tours, wildlife watching, and adventure activities that emphasize sustainability.

ISIC Code 9000: Creative, Arts and Entertainment Activities

Includes eco-tourism experiences focused on local arts, cultural performances, and traditional heritage in an environmentally sustainable manner.

9. Conservation and Sustainable Development Activities

ISIC Code 9499: Activities of Other Membership Organizations

Includes environmental and conservation organizations involved in eco-tourism development, advocacy, and conservation programs.

ISIC Code 9609: Other Personal Service Activities

Includes personal services, such as eco-tour guides, environmental consultants, and other specialized eco-tourism activities.

Green Jobs and Entrepreneurship

Green Entrepreneur Hubs (also known as green incubators or accelerators, Green Entrepreneurship Hubs are key platforms for fostering sustainable business ideas, supporting eco-friendly startups, and driving innovation in green technologies. These hubs play a crucial role in helping Ghana's green economy by providing resources, mentoring, and funding to entrepreneurs focused on sustainability)

» Technical Screening Criteria

1. Environmental Sustainability of Supported Business Ideas

1.1 Contribution to Environmental Goals

Criteria: Business ideas supported by the hub must directly contribute to at least one of the following environmental objectives:

Climate change mitigation (e.g., renewable energy, energy efficiency).

Climate change adaptation (e.g., resilience-building technologies).

Biodiversity conservation (e.g., agroforestry, reforestation).

Pollution prevention and control (e.g., waste recycling, circular economy).

DNSH Consideration: Ensure that supported businesses do not cause significant harm to other environmental objectives, such as biodiversity, water quality, or greenhouse gas emissions.

1.2 Resource Efficiency

Criteria: Supported business ideas must promote efficient use of natural resources, including energy, water, and raw materials.

DNSH Consideration: Avoid supporting businesses that rely on unsustainable resource extraction or consumption practices that degrade ecosystems or deplete non-renewable resources.

1.3 Low Carbon Footprint

Criteria: Business ideas must aim to reduce carbon emissions by promoting renewable energy, energy efficiency, or sustainable transport solutions.

DNSH Consideration: Ensure that projects do not unintentionally increase emissions through the use of non-renewable materials or inefficient processes.

2. Social and Economic Impact

2.1 Job Creation and Inclusion

Criteria: The hub must prioritize business ideas that create green jobs and support inclusive economic growth, particularly for vulnerable or underserved communities (e.g., youth, women, and rural populations).

DNSH Consideration: Ensure that job creation initiatives do not lead to labor exploitation or poor working conditions.

2.2 Community Benefits

Criteria: Business ideas must provide tangible benefits to local communities, such as improving access to sustainable energy, clean water, or food security.

DNSH Consideration: Ensure no significant harm to communities, such as displacement, social exclusion, or disruption of local ecosystems.

2.3 Fair Trade and Ethical Practices

Criteria: Supported businesses must adhere to fair trade principles and ethical practices, ensuring transparency and fair wages in their operations.

DNSH Consideration: Avoid supporting businesses that engage in unethical labor practices or contribute to social inequalities.

3. Innovation and Scalability

3.1 Green Innovation

Criteria: The hub must prioritize startups and business ideas that introduce new technologies, processes, or business models that contribute to environmental sustainability, such as innovations in renewable energy, circular economy, or sustainable agriculture.

DNSH Consideration: Ensure that innovation does not result in significant harm to ecosystems, biodiversity, or public health through unintended consequences.

3.2 Scalability and Market Potential

Criteria: Business ideas must demonstrate potential for scalability and replication in other regions or markets, maximizing their environmental and social benefits.

DNSH Consideration: Ensure that scaling up does not increase environmental degradation or resource consumption.

4. Sustainable Resource Management

4.1 Circular Economy Principles

Criteria: Supported businesses must incorporate circular economy principles, such as reducing waste, promoting recycling, and extending product life cycles.

DNSH Consideration: Avoid supporting businesses that generate excessive waste, use hazardous materials, or contribute to land degradation.

4.2 Water and Energy Efficiency

Criteria: The hub must support businesses that promote water conservation and energy efficiency in their operations and supply chains.

DNSH Consideration: Ensure no significant harm to water resources or energy infrastructure, such as over-extraction of water or reliance on fossil fuels.

4.3 Sustainable Sourcing

Criteria: Business ideas must focus on sourcing materials and inputs sustainably, ensuring that raw materials are renewable, recycled, or sourced from certified sustainable suppliers.

DNSH Consideration: Avoid businesses that rely on unsustainable raw materials or practices that harm ecosystems or biodiversity.

5. Climate Resilience and Adaptation

5.1 Resilience to Climate Change

Criteria: The hub must prioritize businesses that contribute to climate resilience, helping communities or industries adapt to the impacts of climate change (e.g., flood-resistant infrastructure, drought-resistant crops).

DNSH Consideration: Ensure that resilience projects do not lead to adverse effects on ecosystems or increase vulnerability in other areas (e.g., flooding in downstream regions).

5.2 Disaster Risk Reduction

Criteria: Supported businesses must incorporate disaster risk reduction strategies, such as early warning systems, nature-based solutions (e.g., mangrove restoration for coastal protection), or resilient infrastructure.

DNSH Consideration: Ensure no significant harm by avoiding projects that increase risk in other areas, such as by disrupting natural floodplains or causing erosion.

6. Financial Sustainability and Access to Green Finance

6.1 Access to Green Financing

Criteria: Green entrepreneur hubs must facilitate access to green financing options, including green bonds, sustainability-linked loans, or impact investment, ensuring that business ideas have the financial support they need to grow sustainably.

DNSH Consideration: Ensure that financial mechanisms do not support projects with potential negative environmental or social impacts.

6.2 Financial Viability and Profitability

Criteria: Supported businesses must demonstrate financial viability, ensuring that they can scale sustainably without relying on continuous subsidies or external funding.

DNSH Consideration: Ensure that financial goals do not override environmental or social considerations, and that sustainability remains central to the business model.

7. Compliance and Regulatory Standards

7.1 Adherence to Environmental Regulations

Criteria: Businesses supported by the hub must comply with all national and international environmental regulations, including emissions, waste disposal, and resource extraction standards.

DNSH Consideration: Ensure no significant harm by enforcing compliance with environmental regulations to avoid pollution or habitat destruction.

7.2 Certification and Eco-Labeling

Criteria: Encourage supported businesses to obtain environmental certifications, such as ISO 14001 (Environmental Management) or other relevant eco-labels, to verify their commitment to sustainability.

DNSH Consideration: Ensure that certifications reflect genuine environmental performance and are not used for "greenwashing."

8. Monitoring, Reporting, and Transparency

8.1 Environmental and Social Performance Monitoring

Criteria: The hub must implement a monitoring and evaluation framework to track the environmental and social impact of supported businesses, including carbon emissions, resource use, and community benefits.

DNSH Consideration: Ensure that negative impacts are identified early and mitigated through adaptive management.

8.2 Transparent Reporting

Criteria: Supported businesses must publicly report on their environmental and social performance, including efforts to reduce carbon footprints, improve resource efficiency, and enhance social inclusion.

DNSH Consideration: Ensure that reporting is accurate and transparent, avoiding the risk of greenwashing or misrepresentation of sustainability performance.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems

Application: Provides the framework for developing and maintaining an environmental management system. It can help green entrepreneur hubs and supported businesses manage their environmental impacts effectively.

ISO 14004: Environmental Management Systems – General Guidelines on Principles, Systems, and Support Techniques

Application: Offers further guidance on establishing environmental management systems, ensuring continuous improvement of sustainability practices.

ISO 14040: Life Cycle Assessment – Principles and Framework

Application: Assists businesses in assessing the environmental impact of their products or services throughout their lifecycle, from raw material extraction to disposal, supporting the hub's focus on sustainable business models.

ISO 14046: Water Footprint – Principles, Requirements, and Guidelines

Application: Helps businesses assess their water usage and its environmental impacts, ensuring that supported ventures minimize water consumption and pollution.

2. Social Responsibility and Community Engagement

ISO 26000: Guidance on Social Responsibility

Application: Provides guidance for organizations to operate in a socially responsible manner, emphasizing community engagement, fair labor practices, and ethical business conduct. This is vital for hubs that support inclusive and community-focused green businesses.

ISO 20400: Sustainable Procurement – Guidance

Application: Helps green entrepreneur hubs and businesses adopt sustainable procurement practices, ensuring that raw materials and services are sourced responsibly.

3. Energy and Resource Efficiency

ISO 50001: Energy Management Systems

Application: Supports businesses in improving energy efficiency, reducing energy consumption, and cutting greenhouse gas emissions, which is essential for green ventures focused on energy efficiency or clean energy.

ISO 46001: Water Efficiency Management Systems

Application: Provides a framework for managing water use efficiently, ensuring that businesses supported by the hub optimize water consumption and reduce wastage.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists businesses in calculating and reducing the carbon footprint of their products or services, crucial for green ventures with a focus on climate change mitigation.

4. Circular Economy and Resource Management

ISO 14051: Material Flow Cost Accounting (MFCA)

Application: Helps businesses identify opportunities to reduce waste and use resources more efficiently by tracking material flows and costs, supporting green hubs that promote circular economy principles.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines

Application: Offers a detailed approach to conducting life cycle assessments, ensuring that businesses supported by the hub can fully evaluate and reduce the environmental impacts of their products.

5. Innovation and Product Development

ISO 56002: Innovation Management – Innovation Management System – Guidance

Application: Provides guidelines for setting up an innovation management system, ensuring that green entrepreneur hubs foster innovation in sustainability-focused businesses.

ISO 9001: Quality Management Systems

Application: Supports businesses in developing high-quality products and services while integrating sustainability principles. This is key for ensuring the scalability and market potential of the supported business ideas.

6. Sustainable Development and Climate Resilience

ISO 37101: Sustainable Development in Communities – Management System for Sustainable Development

Application: Provides a framework for enhancing sustainability in communities, guiding green entrepreneur hubs to support businesses that have a positive social and environmental impact on local communities.

ISO 14090: Adaptation to Climate Change – Principles, Requirements, and Guidelines

Application: Assists businesses in integrating climate change adaptation strategies, ensuring that supported ventures are resilient to climate risks like flooding, droughts, and extreme weather.

ISO 14091: Adaptation to Climate Change – Vulnerability, Impacts, and Risk Assessment

Application: Helps businesses assess their vulnerability to climate change, supporting green entrepreneur hubs in promoting ventures that improve resilience and disaster preparedness.

7. Fair Trade and Ethical Business Practices

ISO 17033: Ethical Claims and Their Verification

Application: Provides guidelines for making and verifying ethical claims about products or services, ensuring that green entrepreneur hubs and their supported businesses can credibly market their environmental and ethical credentials.

ISO 37301: Compliance Management Systems – Requirements with Guidance for Use

Application: Offers a framework for ensuring compliance with environmental, social, and governance regulations, ensuring that supported businesses adhere to all relevant laws and sustainability standards.

8. Monitoring, Reporting, and Transparency

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidance on effective environmental communication, helping green entrepreneur hubs and supported businesses transparently report their environmental performance to stakeholders.

ISO 14031: Environmental Management – Environmental Performance Evaluation – Guidelines

Application: Assists organizations in measuring, evaluating, and improving their environmental performance, ensuring that green entrepreneur hubs monitor the progress of supported businesses.

ISO 14097: Framework for Assessing and Reporting Investments and Financing Activities Related to Climate Change

Application: Helps hubs and businesses assess and report the impact of their investments in climate-related projects, aligning with the green finance goals of Ghana's Green Finance Taxonomy.

» ISICS Codes

1. Green Entrepreneur Hub Operations

ISIC Code 7020: Management Consultancy Activities

Application: Covers business management consultancy services, including sustainability consulting, green innovation support, and advising startups on eco-friendly business practices. Entrepreneur hubs provide such services to incubated businesses.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities

Application: Includes advisory services related to green technology development, environmental assessments, and sustainable innovation, essential activities provided by green entrepreneur hubs.

ISIC Code 8559: Other Education

Application: Pertains to training and skill development services, including sustainability-focused workshops, seminars, and courses offered by green hubs to entrepreneurs.

ISIC Code 6311: Data Processing, Hosting, and Related Activities

Application: Relevant for hubs that provide research, data management, and digital support for green tech startups, such as platforms for environmental monitoring or sustainable business operations.

2. Education, Training, and Awareness

ISIC Code 8530: Higher Education

Application: Includes educational programs and research activities related to sustainability, often provided by hubs or in collaboration with universities to support green entrepreneurship.

ISIC Code 8550: Educational Support Activities

Application: Covers the support services for education and training, such as curriculum development or capacity-building activities related to sustainable business practices, typically organized by green entrepreneur hubs.

3. Financial and Investment Services for Green Ventures

ISIC Code 6619: Other Activities Auxiliary to Financial Services

Application: Covers activities related to venture capital, funding facilitation, and financial advisory services that green hubs provide to help startups secure investment for sustainable business models.

ISIC Code 6499: Other Financial Service Activities

Application: Pertains to funding mechanisms such as sustainability-linked loans, impact investment, and green bonds, where hubs may assist startups in securing green financing.

4. Research, Consulting, and Technical Services

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Includes technical consultancy services provided by green entrepreneur hubs, especially those assisting startups in areas such as sustainable infrastructure, green building, and renewable energy technologies.

ISIC Code 7210: Research and Experimental Development on Natural Sciences and Engineering

Application: Covers R&D activities supported by green hubs, particularly for startups working on innovative environmental technologies, renewable energy, or sustainable agriculture.

ISIC Code 7120: Technical Testing and Analysis

Application: Relevant for green entrepreneur hubs that support startups with technical testing and environmental impact analysis, ensuring compliance with environmental standards.

5. Administrative and Support Activities

ISIC Code 8211: Combined Office Administrative Service Activities

Application: Involves administrative services provided by entrepreneur hubs, such as office space management, business support services, and shared facilities that help green startups operate efficiently.

ISIC Code 8219: Photocopying, Document Preparation, and Other Specialized Office Support Activities

Application: Includes specialized administrative support for green entrepreneurs, such as business documentation, marketing materials preparation, and other logistical support services.

6. Monitoring, Reporting, and Transparency

ISIC Code 6910: Legal Activities

Application: Covers legal advisory services provided by entrepreneur hubs to startups, including support with regulatory compliance, intellectual property protection, and ensuring alignment with sustainability goals.

ISIC Code 7310: Advertising

Application: Involves the marketing and promotion services that green entrepreneur hubs may offer to help startups promote their sustainable products and services.

» Other international or adapted Certifications & Standards

1. ISO 50001 energy management system and the Renewable Energy Directive can help ensure the hub's supported projects meet high quality standards.

2. Global Reporting Initiative (GRI) Standards: Enables the hub to report on its sustainability performance and impact transparently and standardised.

3. B Corp Certification: Demonstrates a commitment to balancing purpose and profit, with a focus on environmental and social impact.

» Specific Government Policy (National Standards or Certification)

1. National Energy Policy and the NDC under the Paris Agreement.

2. Renewable Energy Master Plan.

3. Energy Commission Act (Act 541, 1997) and Environmental Protection Agency Act.

» Responsible Agencies/ Regulators

1. Energy Commission

2. Ghana Investment Promotion Center (GIPC).

3. Ministry of Environment, Environment Protection Agency and

4. National Development Planning Commission

Training and re-skilling programs for green jobs

» Technical Screening Criteria

1. Environmental Sustainability

1.1 Curriculum Content Aligned with Environmental Goals

Basic:

Ensure that the curriculum includes fundamental concepts of sustainability, climate change, and environmental protection, with a focus on green technologies and practices relevant to the local context (e.g., renewable energy, waste management, sustainable agriculture).

Provide basic training in environmental best practices for various sectors, including energy efficiency, waste reduction, and resource conservation.

Intermediate:

Offer specialized training in sectors such as renewable energy (solar, wind, hydro), energy efficiency, sustainable construction, circular economy, and sustainable land management.

Ensure that the curriculum is aligned with national environmental strategies and international standards, such as the Paris Agreement, SDGs, and Ghana's Nationally Determined Contributions (NDCs).

Advanced:

Develop advanced courses that incorporate cutting-edge green technologies, innovation in sustainability practices, and eco-design principles (e.g., green building certifications, climate-smart agriculture, and energy transition strategies).

Promote continuous learning through upskilling programs, focusing on emerging green technologies like hydrogen energy, electric vehicle infrastructure, carbon capture, and nature-based solutions.

DNSH Consideration: Ensure that the content does not promote unsustainable practices or industries that contribute to environmental degradation, such as fossil fuels or non-renewable extractive industries.

1.2 Integration of Practical and Hands-on Experience

Basic:

Provide hands-on training in basic green technologies, such as installing solar panels, energy audits, or waste sorting and recycling.

Include site visits to renewable energy projects, waste management facilities, or sustainable farms to offer practical exposure.

Intermediate:

Incorporate industry partnerships to provide trainees with internships, apprenticeships, and real-world projects that allow them to apply their skills in green industries.

Develop simulation-based learning modules where trainees can practice skills in virtual environments (e.g., renewable energy systems, building retrofitting).

Advanced:

Establish green training hubs or centers of excellence that focus on innovation in green technologies and research, promoting industry-led R&D projects as part of the learning process.

Partner with green businesses to provide cutting-edge practical training in technologies such as smart grids, advanced water management systems, or sustainable manufacturing.

DNSH Consideration: Ensure that practical experience does not expose trainees to hazardous environments or involve unsustainable practices.

2. Inclusivity and Social Impact

2.1 Equitable Access to Training Programs

Basic:

Ensure that training programs are accessible to all, particularly marginalized and underrepresented groups, such as women, youth, rural communities, and low-income individuals.

Offer free or subsidized training programs to reduce financial barriers for vulnerable groups.

Intermediate:

Provide targeted outreach to underserved regions and communities, ensuring that information about training programs is widely available.

Ensure that training programs are available in multiple languages and are culturally appropriate to promote broad participation.

Advanced:

Develop inclusive programs that focus specifically on empowering women, youth, and minority groups in the green economy, ensuring that these groups are represented in leadership roles and high-growth green sectors.

Create partnerships with local organizations, NGOs, and government agencies to support the participation of disadvantaged groups through financial support, scholarships, or mentorship programs.

DNSH Consideration: Ensure that the programs do not perpetuate inequalities or exclude vulnerable groups from accessing green job opportunities.

2.2 Job Placement and Economic Mobility

Basic:

Provide career counseling and job placement services to help trainees transition into green jobs.

Ensure that training programs are linked to industries and sectors with a high demand for green skills, such as renewable energy, sustainable agriculture, and waste management.

Intermediate:

Develop partnerships with private sector companies, industry associations, and government agencies to ensure that training programs align with labor market demands and create job opportunities for trainees.

Monitor and report on job placement rates, ensuring that a significant portion of trainees successfully transition into green jobs.

Advanced:

Establish green incubators or start-up hubs that support trainees in developing their own green businesses or social enterprises, providing them with access to finance, mentorship, and networks.

Focus on creating long-term career pathways that promote upward mobility in the green economy, helping trainees move from entry-level positions to leadership or entrepreneurial roles.

DNSH Consideration: Ensure that job placement efforts do not steer participants into sectors that contribute to environmental harm or exploitation.

3. Resource Efficiency and Circular Economy

3.1 Training for Resource Efficiency

Basic:

Provide basic training in resource efficiency practices, such as energy conservation, water management, and waste reduction, in the context of various industries.

Encourage the adoption of energy-efficient equipment and renewable energy in training facilities.

Intermediate:

Train participants in circular economy principles, such as product lifecycle management, eco-design, recycling, and sustainable production.

Develop resource efficiency skills that can be applied in various sectors, such as sustainable manufacturing, agriculture, and construction.

Advanced:

Offer specialized courses in circular economy business models, such as waste-to-energy, materials recovery, and closed-loop supply chains.

Implement sustainability practices in the training center itself, making the facility a model of resource efficiency through energy-efficient infrastructure, water conservation, and waste reduction.

DNSH Consideration: Ensure that the promotion of resource efficiency does not lead to trade-offs that cause harm in other areas, such as increased emissions or resource depletion elsewhere in the value chain.

4. Climate Resilience and Adaptation

4.1 Training for Climate-Resilient Skills

Basic:

Incorporate climate change adaptation into the curriculum by teaching participants how to mitigate climate risks in their respective sectors (e.g., agriculture, construction, energy).

Provide basic training in climate-smart practices, such as water management, crop diversification, and infrastructure retrofitting.

Intermediate:

Offer training in the design and implementation of climate adaptation projects, such as flood defenses, drought-resistant agriculture, or resilient energy systems.

Provide participants with tools to assess climate risks and integrate resilience into their work.

Advanced:

Develop programs focused on innovative climate resilience solutions, such as nature-based solutions (e.g., reforestation, wetland restoration) and the integration of climate resilience into urban planning and infrastructure.

Foster the development of new technologies and practices for climate adaptation through research and partnerships with climate-focused organizations.

DNSH Consideration: Ensure that climate resilience strategies do not lead to maladaptation or negative impacts on other environmental or social systems.

5. Monitoring and Reporting

5.1 Monitoring Program Effectiveness

Basic:

Track participant enrollment and completion rates to measure program engagement and success.

Monitor feedback from participants and instructors to identify areas for improvement.

Intermediate:

Collect data on job placement rates, income improvements, and career progression of trainees after program completion, ensuring that the training leads to tangible employment outcomes.

Use performance metrics to assess the program's impact on gender equality, inclusion, and sustainability.

Advanced:

Use digital platforms and data analytics to monitor real-time progress, performance, and the environmental impact of the training program.

Engage third-party evaluators to assess program outcomes, providing independent validation of the program's effectiveness in creating green jobs and promoting sustainability.

DNSH Consideration: Ensure that monitoring and reporting systems are transparent and accurate, avoiding misrepresentation of the program's impact.

» ISO Standards

1. Environmental Management and Sustainability

ISO 14001: Environmental Management Systems – Requirements with Guidance for Use

Application: Provides a framework for managing the environmental aspects of training programs, ensuring that the facilities and operations of training centers minimize environmental impact and align with sustainability goals.

ISO 14021: Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labelling)

Application: Relevant for training programs that aim to market themselves as environmentally friendly or sustainable. This standard ensures that environmental claims related to green job training are credible and verifiable.

ISO 14067: Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification

Application: Assists in quantifying the carbon footprint of the training program itself, particularly if the program focuses on sustainable practices or offers training in carbon footprint reduction. It helps measure the program's environmental impact.

ISO 50001: Energy Management Systems – Requirements with Guidance for Use

Application: Provides a framework for improving energy efficiency in training facilities, ensuring that energy consumption is minimized and that renewable energy sources are utilized when possible.

2. Social Responsibility and Inclusivity

ISO 26000: Guidance on Social Responsibility

Application: Offers guidance on integrating social responsibility into training and re-skilling programs, ensuring that programs promote inclusivity, gender equality, fair labor practices, and community well-being.

ISO 45001: Occupational Health and Safety Management Systems – Requirements with Guidance for Use

Application: Ensures the health and safety of trainees and instructors by providing a framework for identifying and mitigating workplace hazards in training environments, promoting safe learning conditions.

ISO 37001: Anti-Bribery Management Systems

Application: Establishes guidelines for preventing, detecting, and addressing bribery within the administration and management of training programs, ensuring ethical practices in the organization and delivery of green job training.

ISO 29993: Learning Services Outside Formal Education – Service Requirements

Application: Provides a framework for ensuring the quality and effectiveness of non-formal education programs, including training and re-skilling programs for green jobs. This standard ensures that programs are learner-focused and meet performance criteria.

3. Quality Management and Performance Evaluation

ISO 9001: Quality Management Systems – Requirements

Application: Offers a structured approach to managing the quality of the training programs, ensuring consistency in course delivery, content, and outcomes. This standard also helps monitor and improve the overall effectiveness of the program.

ISO 29990: Learning Services for Non-Formal Education and Training – Basic Requirements for Service Providers

Application: Provides guidelines for ensuring the quality of training services, particularly non-formal education such as green job training programs. This standard covers the management, development, and delivery of learning services.

ISO 14063: Environmental Management – Environmental Communication – Guidelines and Examples

Application: Provides guidelines for communicating the environmental performance and sustainability aspects of the training program to stakeholders, including participants, instructors, and external partners.

ISO 10015: Quality Management – Guidelines for Training

Application: Provides specific guidance on how to design and implement effective training programs, focusing on the planning, delivery, and evaluation of training to ensure it meets the needs of both learners and the labor market.

4. Energy Efficiency and Green Building Practices

ISO 52000-1: Energy Performance of Buildings – Overarching EPB Assessment – Part 1: General Framework and Procedures

Application: Provides a framework for assessing the energy performance of the buildings where training is conducted. This is particularly relevant for green job training centers that aim to model best practices in sustainable building and energy efficiency.

ISO 21931-1: Sustainability in Building Construction – Framework for Methods of Assessment of the Environmental Performance of Construction Works – Part 1: Buildings

Application: Relevant for training programs focused on sustainable construction, green building, and energy efficiency, ensuring that the infrastructure used in training meets international sustainability standards.

5. Monitoring, Reporting, and Certification

ISO 17024: Conformity Assessment – General Requirements for Bodies Operating Certification of Persons

Application: Relevant for certification programs in green job training, ensuring that the certifications provided to trainees meet international standards for competence and skill assessment.

ISO 14016: Environmental Management – Guidelines on Environmental Reporting

Application: Provides guidelines for reporting on the environmental performance of training programs, ensuring transparency and accountability in the program's sustainability claims.

ISO 17065: Conformity Assessment – Requirements for Bodies Certifying Products, Processes, and Services

Application: Ensures that certification bodies responsible for accrediting green job training programs follow rigorous procedures, promoting the credibility and reliability of certifications awarded to trainees.

6. Skills Development and Competence

ISO 21500: Project Management – Guidance

Application: Provides a framework for managing training programs as projects, ensuring that the design, development, and delivery of the program are well-organized and meet the intended objectives for skill development in green jobs.

ISO 30405: Human Resource Management – Guidelines on Recruitment

Application: Offers guidance on recruitment strategies for selecting trainees and instructors for green job training programs, ensuring diversity, inclusion, and alignment with green job market needs.

ISO 10667-1: Assessment Service Delivery – Procedures and Methods to Assess People in Work and Organizational Settings – Part 1: Requirements for the Client

Application: Provides guidance for assessing the skills and competencies of trainees in work-related settings, ensuring that green job training programs effectively prepare participants for the workforce.

» ISICS Codes

ISIC Codes for Training and Re-skilling Programs for Green Jobs:

1. Education and Vocational Training

ISIC Code 8530: Higher Education

Application: Covers universities and other institutions providing higher education programs, including degrees and certifications related to green technologies, environmental sciences, and sustainability.

ISIC Code 8549: Other Education n.e.c.

Application: Involves specialized education programs outside formal academic degrees, such as training in renewable energy, sustainable agriculture, circular economy, and energy efficiency.

ISIC Code 8550: Educational Support Activities

Application: Includes support services related to education, such as curriculum design and instructional material development, particularly for green job training and re-skilling programs.

ISIC Code 8542: Cultural Education

Application: This code covers educational programs that may focus on traditional knowledge and skills related to environmental conservation, biodiversity, and nature-based solutions, which are often included in green jobs training programs.

2. Vocational and Technical Training

ISIC Code 8541: Sports and Recreation Education

Application: Can be relevant for training programs focusing on eco-tourism, sustainable recreation, and green hospitality, which are part of green job sectors.

ISIC Code 8522: Technical and Vocational Secondary Education

Application: Includes formal secondary technical education programs that focus on vocational skills, including those for the green economy, such as energy auditing, green construction, and renewable energy system installation.

ISIC Code 8541: Adult Education and Other Education

Application: Covers adult education and continuing education programs, particularly those designed for re-skilling workers in green technologies and sustainable practices across sectors like construction, manufacturing, and agriculture.

3. Skills Development and Employment Promotion

ISIC Code 7830: Other Human Resources Provision

Application: Includes training and employment services focused on green job placement and re-skilling, including consulting services for workforce development in green sectors like renewable energy, waste management, and sustainable agriculture.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Covers professional services and consulting related to environmental sustainability and green job skills development, such as workshops, seminars, and certification programs focused on renewable energy, green building, and sustainable resource management.

ISIC Code 7020: Management Consultancy Activities

Application: Covers consulting services related to management training for green businesses, including leadership development and re-skilling programs for companies transitioning to sustainable business models.

4. Green Employment and Skills Development

ISIC Code 7830: Human Resources Provision and Management of Human Resources Functions

Application: Includes human resources management services, such as recruiting and re-skilling for the green economy, providing placement in green jobs and facilitating training for sustainable employment opportunities.

ISIC Code 8560: Educational Support Services

Application: Covers activities that support educational initiatives, particularly those that assist with green job placements, internships, and apprenticeships in sustainability-related sectors.

5. Environmental and Sustainability Consulting

ISIC Code 7110: Architectural and Engineering Activities and Related Technical Consultancy

Application: Involves technical consulting services related to sustainable construction, green building, energy efficiency, and environmental engineering, often included in re-skilling and training programs for professionals in the construction and urban development sectors.

ISIC Code 7490: Other Professional, Scientific, and Technical Activities n.e.c.

Application: Includes a wide range of professional activities related to environmental sustainability, including advisory services for green job re-skilling, sustainability consulting, and circular economy business models.

» Other international or adapted Certifications & Standards

1. ISO 14090 Adaptation to Climate Change

2. LEED (Leadership in Energy and Environmental Design) for Building Design and Construction

3. IREC (Interstate Renewable Energy Council) Clean Energy Workforce certifications

4. ISO 50001 Energy Management System

5. GFANZ (Glasgow Financial Alliance for Net Zero) training and certification programs

6. CFA (Chartered Financial Analyst) Institute Sustainability Investing certificate

7. IEMA (Institute of Environmental Management and Assessment) certifications for environmental impact assessment and management

8. SA8000 (Social Accountability International) standard for decent working conditions and social accountability

9. ABET (Accreditation Board for Engineering and Technology) accreditation for engineering and technology education

10. IRENA (International Renewable Energy Agency) Certified Training Network

» Specific Government Policy (National Standards or Certification)

1. Ghana Green Jobs and Skills Development Program

2. National Accreditation and Quality Assurance Framework for Green Job Training: Mandates the accreditation of all green job training providers by the National Accreditation Board (NAB).

3. Tax Incentives and Financial Schemes for Green Skills Development

4. Collaboration with Technical and Vocational Education Institutes.

» Responsible Agencies/ Regulators

1. Ghana Energy Commission

2. Ministry of Employment, Science, Technology and Innovation

3. National Accreditation Board

4. Ghana Green Job and Skills Development.

Climate Resilient Infrastructure

Transport Infrastructure

» Technical Screening Criteria

Non - Motorised Transport: Provision of non-motorised transport infrastructure namely walklanes and bicyle lanes (Mitigation)

Design: Designs should factor in future climate scenarios and infrastructure constructed to withstand projected climate-related hazards. (Adaptation)

Drainage system: Effective drainage systems to handle increased precipitation, measures to control erosion and water harvestion and storage capacity (Adaptation)

Materials and resources

Use of sustainable, low-maintenance, durable, environmental friendly and locally sourced materials for construction. (Adaptation and Mitigation)

Efficient Waste Reduction and Recycling (Adaptation)

Biodiversity and Ecology (Mitigation and Adapation)

Maintenance and operation: Regular maintenance schedules and operational procedures (Adaptation)

Incorporation of green infrastructure: Integration with natural, green landscape, and other urban greenery (Mitigation and Adaptation)

» ISO Standards

Pedestrian walkways and cycling lanes should comprise at least 15% of the overall road infrastructure usage for new project. Pedestrian walkways and cycling lanes should comprise at least 5% of the overall infrastructure usage for upgraded/rehabilitated project. ISO 18751: Walking and pedestrian infrastructure — Pedestrian accessibility and safety

Design and construction should integrate a minimum of 30% climate resilient parameters. ISO 21931: Sustainability in buildings and civil engineering works - General principles

10-year return period for minor drainage systems (Parking lots, and sidewalks)

25-year return period for major drainage systems (Highways, railways and airports)

50-year return period for critical drainage systems (Flood protection and emergency response) ISO 21931: Sustainability in buildings and civil engineering works - General principles

Recycled content: Minimum of 20%

Sustainably sourced materials: Minimum of 50%

Low-carbon materials: Minimum of 20%

Locally sourced materials: Minimum of 20% ISO 14001: Environmental Management System (EMS)

Restore 25% of the site's native habitat, increase biodiversity by 20% through plant species selection ISO 14001: Environmental Management System (EMS) - includes biodiversity considerations

Regular inspections and maintenance of infrastructure (100%)

Preventive maintenance program (100%)

O&M personnel training on climate-resilient design and operation (80%)

Emergency response plan (90%)

Review and update of O&M procedures (80%)

ISO 21931: Sustainability in buildings and civil engineering works - General principles

Sustainable Sites (SS) credit: 20% of site area dedicated to green landscape

Rainwater Management (RM) credit: 50% reduction in stormwater runoff through green infrastructure ISO 22493: Green Infrastructure - Guidelines for Urban Green Space Planning and Design

» ISICS Codes

Sustainable pavement materials for the lanes construction. (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Design and construction should consider future climate hazards such as flooding, droughts, high temperature, increase precipitation, and rising sea levels, etc. (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Drainage system should be based on the hydrology and hydraulic studies. (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Exploring and identifing local mateterials that are both sustainable, recyclable and of low maintenance. (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Implement Waste Management Plan (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Avoid ecosystems, habitats and wetlands for the infrastructure. Implement ecological maintenance practices. Minimise polutions during construction (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Plan for the effective execution of emergency repairs of the transport infrastructure damaged in disasters; and integrate operational plans for continuity of service during disasters and extreme weather events. (ISIC: 4210 Construction of roads and railways; 4290 Construction of other civil engineering projects)

Using native plants adapted to the local climate, thereby reducing maintenance and irrigation needs. Using natural and organic maintenance practices, and avoiding chemical pesticides and fertilisers. (ISIC: 8130 Landscape care and maintenance service activities)

» Other international or adapted Certifications & Standards

AASHTO Guide for the Development of Bicycle Facilities and WHO's Pedestrian Safety Manual

FHWA's Climate Change Adaptation Guide for Transportation; LEED (Leadership in Energy and Environmental Design) for Transportation and Envision (Sustainable Infrastructure Rating System).

LEED (Leadership in Energy and Environmental Design) for Transportation

LEED Certification

Envision (Sustainable Infrastructure Rating System) and LEED (Leadership in Energy and Environmental Design) for Transportation

LEED (Leadership in Energy and Environmental Design) for Transportation AASHTO GDPS-1: Green Infrastructure for Highway Projects

AASHTO GDPS-2: Landscape Design for Highway Projects

» Specific Government Policy (National Standards or Certification)

Ghana Road Design Guide 2023, Ghana Roads Maintenance Operation Manual 2023, Ghana Bridge Management and Inspection Manual 2023, National Transport Policy 2020, and Ghana: Roadmap for Resilient Infrastructure in Changing Climate

» Responsible Agencies/ Regulators

Ministry of Roads and Highways and agencies, Ministry of Tranport and agencies, and Ministry of Railways and agencies.

Building infrastructure

» Technical Screening Criteria

Design: Designs and structural assessment should factor in future climate scenarios. The infrastructure should be constructed to withstand projected climate-related hazards. (Adaptation)

Water management:

Efficiency in the usage of water (Adaptation)

Energy efficiency and renewable energy:

Energy-efficient systems and insulation

Integration of renewable energy sources (Mitigation)

Materials and resources

Use of sustainable, low-maintenance, durable, environmental friendly and locally sourced materials for construction. (Adaptation and Mitigation)

Efficient Waste Reduction and Recycling (Adaptation)

Biodiversity and Ecology (Mitigation and Adapation)

Incorporation of green infrastructure:

Integration with natural, green landscape, and other urban greenery (Mitigation and Adaptation)

» ISO Standards

Design and construction should integrate a minimum of 50% climate resilient parameters. ISO 21931: Sustainability in buildings and civil engineering works - General principles

Water-efficient fixtures: 80%

Low-flow showerheads: 90%

Dual-flush toilets: 80%

Smart irrigation controllers: 70%

Greywater reuse systems: 50%

Rainwater harvesting systems: 40% ISO 21931: Sustainability in buildings and civil engineering works - General principles”

Lighting: 90% LED or equivalent, 50% smart or controlled by BMS

Power Distribution: 80% smart or remote monitoring capable

Heating, Ventilation, and Air Conditioning (HVAC) and Building Controls: 90% smart controls or part of Building Management Systems (BMS)

Plugs and Sockets: 50% smart or USB charging ports

Electrical Panels and Switchboards: 80% easy maintenance and smart monitoring ISO 21931: Sustainability in buildings and civil engineering works - General principles"

Low Embodied Carbon: New Construction: ≤ 500 kg CO2e/m²

Major Renovations: ≤ 750 kg CO2e/m² Sustainable materials: 50% of materials must meet one or more of the following criteria:

Recycled content (≥ 10%)

Sustainably sourced (Forest Steward Council-certified or equivalent)

Low Volatile Organic Compound emissions

Locally sourced (within 150km radius) ISO 14001: Environmental Management System (EMS)

Waste Reduction: Minimum 50% of reduction in waste generation

Recycling: Minimum 75% of construction waste must be recycled or salvaged

Material Recycling: Minimum 50% of materials must be recycled or salvaged

ISO 21931: Sustainability in buildings and civil engineering works - General principles

Restore 25% of the site's native habitat, increase biodiversity by 20% through plant species selection ISO 14001: Environmental Management System (EMS)

Sustainable Sites: 20% of site area dedicated to green landscape

Rainwater Management: 50% reduction in stormwater runoff through green infrastructure ISO 22493: Green Infrastructure - Guidelines for Urban Green Space Planning and Design

» ISICS Codes

Ensure stratural integrity and durability to withstand extreme weather events. (ISIC: 4100 Construction of buildings)

Efficient water mangement should achieve increase water savings, lower water consumptions and higher recycling of water in the builidng. (ISIC: 4100 Construction of buildings)

Energy efficiency in the building should acheive lower energy consumptions and energy intensity use, and higher energy savings. (ISIC: 4100 Construction of buildings)

Materials should be non-toxic and safe for occupants and the environment. (ISIC: 4100 Construction of buildings)

Waste should be sorted at the point of collection into organic and non-organic categories. Non-organic waste should then be further separated into plastic, paper, glass, metal, and e-waste. (ISIC: 4100 Construction of buildings)

Avoid ecosystems, habitats and wetlands for building activities. Implement ecological maintenance practices. Minimise polutions during construction. (ISIC: 4100 Construction of buildings)

Using native plants adapted to the local climate, thereby reducing maintenance and irrigation needs. Using natural and organic maintenance practices, and avoiding chemical pesticides and fertilisers. (ISIC: 8130 Landscape care and maintenance service activities)

» Other international or adapted Certifications & Standards

LEED (Leadership in Energy and Environmental Design) Certification; World Green Building Council's Net Zero Certification and Climate-Resilient Buildings and Core Public Infrastructure (CRBCPI) Initiative

Water Efficiency Labeling Scheme; ISO 31600:2020 and LEED (Leadership in Energy and Environmental Design)

LEED Certification

» Specific Government Policy (National Standards or Certification)

Ghana: Roadmap for Resilient Infrastructure in Changing Climate and Ghana Building Code, 2018

» Responsible Agencies/ Regulators

Ministry of Works and Housings, State Housing Corporation Limited and Department of Rural Housing

Water Infrastructure

» Technical Screening Criteria

Design: Designs for the water capacity should factor in future climate scenarios. The infrastructure should be constructed to withstand projected climate-related hazards. (Adaptation)

Efficient water management:

Efficiency in the transmission of water to the distrubution points (Adaptation)

Energy efficiency:

Energy-efficient systems in the operations of the water infrastructure (Adaptation)

Incorporation of green infrastructure:

Integration with natural, green landscape, and other urban greenery (Mitigation and Adaptation)

Maintenance and operation:

Include regular maintenance schedules and operational procedures (Adaptation)

» ISO Standards

Flood protection: 100-year flood event design

Water storage: 1-2 years of water storage capacity

Water treatment: 99.99% removal of pathogens

Pipe durability: 50-100 year design life

Stormwater management: 80-90% reduction in stormwater runoff ISO 24512: Guidelines for the management of drinking water utilities"

Water Efficiency (WE) credit: 20% reduction in water transmission losses compared to baseline ISO 24512: Guidelines for the management of drinking water utilities

Energy and Atmosphere (EA) credit: 10% reduction in energy consumption for water transmission compared to baseline ISO 24512: Guidelines for the management of drinking water utilities

Sustainable Sites (SS) credit: 20% of site area dedicated to green landscape

Rainwater Management (RM) credit: 50% reduction in stormwater runoff through green infrastructure ISO 22493: Green Infrastructure - Guidelines for Urban Green Space Planning and Design

Regular inspections and maintenance of infrastructure (100%)

Preventive maintenance program (100%)

O&M personnel training on climate-resilient design and operation (80%)

Emergency response plan (90%)

Review and update of O&M procedures (80%) ISO 24512: Guidelines for the management of drinking water utilities

» ISICS Codes

Design and construction should consider future climate hazards such as flooding, droughts, high temperature, increase precipitation, and rising sea levels, etc. (ISIC: 3600 Water collection, treatment and supply)

Sensitising the community/public on water - wise principles. (ISIC: 3600 Water collection, treatment and supply)

Energy efficiency should acheive lower energy consumptions and energy intensity use, and higher energy savings on facility. (ISIC: 3600 Water collection, treatment and supply)

Using native plants adapted to the local climate, thereby reducing maintenance and irrigation needs. Using natural and organic maintenance practices, and avoiding chemical pesticides and fertilisers. (ISIC: 8130 Landscape care and maintenance service activities)

Plan for the effective execution of emergency repairs of water infrastructure damaged in disasters; and integrate operational plans for continuity of supply/service during disasters and extreme weather events. (ISIC: 3600 Water collection, treatment and supply)

» Other international or adapted Certifications & Standards

LEED Certification

LEED O+M (Leadership in Energy and Environmental Design - Operations and Maintenance)

» Specific Government Policy (National Standards or Certification)

Ghana: Roadmap for Resilient Infrastructure in Changing Climate, and Water Use Regulation 2001 (L.I. 1692)

Water Use Regulation 2001 (L.I. 1692)

Ghana: Roadmap for Resilient Infrastructure in Changing Climate

» Responsible Agencies/ Regulators

Ministry of Sanitation and Water Resources, Ghana Water Compnay Limited, Water Resources Commission and Community Water and Snitation Agency

Energy Infrastructure

» Technical Screening Criteria

Design Designs should factor in projected climate - related hazards. The infrastructure should be robust and integrative to withstand projected climate-related hazards. (Adaptation)

Incorporation of green infrastructure:

Integration with natural, green landscape, and other urban greenery (Mitigation and Adaptation)

Maintenance and operation:

Regular maintenance schedules and operational procedures (Adaptation)

Biodiversity and Ecology (Mitigation and Adapation)

» ISO Standards

Design and construction should integrate a minimum of 50% climate resilient parameters. ISO 61400: Wind turbines - Design requirements ISO 9060: Solar energy - Solar thermal collectors ISO 15387: Solar energy - Solar photovoltaic systems ISO 4373: Hydroelectric power plants - Control systems ISO 7753: Hydroelectric power plants - Mechanical equipment

Sustainable Sites (SS): 20% of site area dedicated to green landscape

Rainwater Management (RM): 50% reduction in stormwater runoff through green infrastructure. ISO 22493: Green Infrastructure - Guidelines for Urban Green Space Planning and Design

Regular inspections and maintenance of infrastructure (100%)

Preventive maintenance program (100%)

O&M personnel training on climate-resilient design and operation (80%)

Emergency response plan (90%)

Review and update of O&M procedures (80%)

ISO 55000: Asset Management System for energy infrastructure

Restore 25% of the site’s native habitat, increase biodiversity by 20% through plant species selection. ISO 14001: Environmental Management System (EMS)

» ISICS Codes

Design and construction should consider future climate hazards such as flooding, droughts, high temperature, increase precipitation, and rising sea levels, etc. (ISIC: 3510 Electric power generation, transmission and distribution)

Using native plants adapted to the local climate, thereby reducing maintenance and irrigation needs. Using natural and organic maintenance practices, and avoiding chemical pesticides and fertilisers. (ISIC: 8130 Landscape care and maintenance service activities)

Plan for the effective execution of emergency repairs of the energy infrastructure damaged in disasters; and integrate operational plans for continuity of service during disasters and extreme weather events. (ISIC: 3510 Electric power generation, transmission and distribution)

Avoid ecosystems, habitats and wetlands for the infrastructure. Implement ecological maintenance practices. Minimise polutions during construction. (ISIC: 3510 Electric power generation, transmission and distribution)

» Other international or adapted Certifications & Standards

LEED Certification IEC (International Electrotechnical Commission) certifications: For electrical energy infrastructure and equipment

LEED Certification IEC (International Electrotechnical Commission) certifications: For electrical energy infrastructure and equipment

LEED O+M (Leadership in Energy and Environmental Design - Operations and Maintenance)

LEED Certification

» Specific Government Policy (National Standards or Certification)

Ghana: Roadmap for Resilient Infrastructure in Changing Climate, Ghana National Energy Transition Framework (2022 - 2070), National Energy Policy (2021) and Ghana Renewable Energy Master Plan (2019)

Ghana: Roadmap for Resilient Infrastructure in Changing Climate, Ghana National Energy Transition Framework (2022 - 2070), National Energy Policy (2021) and Ghana Renewable Energy Master Plan (2019)

» Responsible Agencies/ Regulators

Ministry of Energy, Energy Commission,Volta River Authority, Ghana Grid Company and Electricity Company of Ghana

Buildings and Construction

Building and Constructions

» Technical Screening Criteria

Greenhouse Gas Emissions (Mitigation)

Energy efficiency (Mitigation)

Water efficiency and consumption (Adaptation)

Indoor Environmental Quality (Mitigation and Adaptation)

» ISO Standards

New buildings: 10-20% reduction in operational emissions intensity annually Renovated buildings: 20-30% reduction in operational emissions intensity on annually ISO 16757: Framework for energy efficiency and renewables in buildings

New buildings: ≤ 100 kg CO2/MWh (minimum requirement) Renovated buildings: ≤ 150 kg CO2/MWh (minimum requirement) ISO 16757: Framework for energy efficiency and renewables in buildings

New buildings: Thermal efficiency: 80-90%; Boiler efficiency: 90-95%; Chiller efficiency: 0.5-0.7 kW/ton Renovated buildings: Thermal efficiency improvement: 10-20%; Boiler efficiency: 80-85%; Chiller efficiency: 0.6-0.8 kW/ton ISO 16757: Framework for energy efficiency and renewables in buildings

New buildings: Minimum COP: 4.0 (air-cooled), 5.0 (water-cooled) Renovated buildings: Minimum COP: 3.5 (air-cooled), 4.5 (water-cooled) ISO 16757: Framework for energy efficiency and renewables in buildings

New building: A minimum of 30% water reuse rate Renovated building: A minimum of 20% water reuse rate ISO 16757: Framework for energy efficiency and renewables in buildings

New Building: Minimum of 20% reduction in potable water consumption compared to baseline Renovated Building: Minimum 15% reduction in potable water consumption compared to baseline ISO 16757: Framework for energy efficiency and renewables in buildings

New building: Minimum of 30% reduction in total water withdrawal compared to baseline Renovated Building: 20% reduction in total water withdrawal compared to baseline ISO 16757: Framework for energy efficiency and renewables in buildings

Air Quality:

Ventilation rate: 8-10 L/s/p

CO2 levels: <600 ppm

Particle matter (PM): <10 μg/m³

Volatile Organic Compounds (VOCs): <200 μg/m³

Thermal Comfort:

Temperature: 20-24°C (68-75°F)

Humidity: 30-60%

Air movement: <0.2 m/s (39.4 ft/min)

Lighting:

Illuminance: 300-500 lux (28-46 foot-lamberts)

Color temperature: 3500-5000K

Noise:

Background noise: <40 dBA

Speech intelligibility: >80% ISO 16757: Framework for energy efficiency and renewables in buildings

» ISICS Codes

(ISIC:4100 Construction of Buildings)

» Other international or adapted Certifications & Standards

LEED Certification

LEED Certification WHO (World Health Organization) guidelines for indoor air quality.

» Specific Government Policy (National Standards or Certification)

Ghana National Cooling Plan (Framework for Green and Efficient Cooling, Draft Report)

Water Use Regulation 2001 (L.I. 1692)

» Responsible Agencies/ Regulators

Ministry of Environment, Science, Technology, and Innovation, and Environmental Protection Agency

Ministry of Energy, and Energy Commission Ministry of Sanitation and Water Resources, and Water Resources Commission

Ministry of Works and Housings