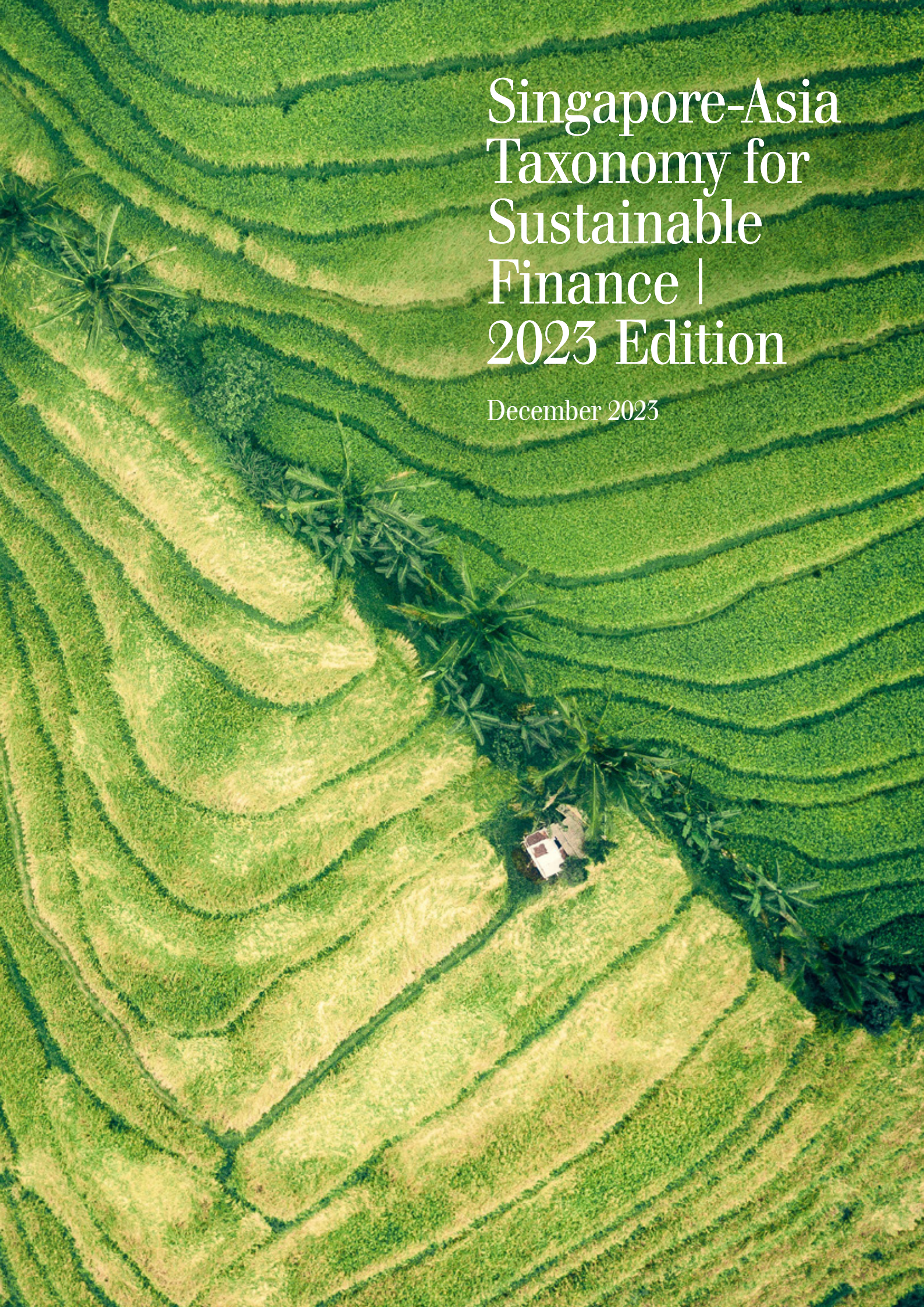


Singapore-Asia Taxonomy for Sustainable Finance | 2023 Edition

December 2023

Contents

* Not covered in this version.

Contents

Member list

Green Finance Industry Taskforce (Workstream-1 members)		
David Smith (Co-Lead)	abrdn	Senior Investment Director
Sylvia Chen (Co-Lead)	Amundi Singapore Limited	Head of ESG, South Asia
Andrew Ashman	Barclays Bank PLC	Head of Loan Syndicate, APAC
Nadia Humphreys	Bloomberg	Sustainable Finance Solutions Business Manager
Cinzia Chiriac	Bloomberg	Head of ESG Regulatory Affairs
Isaac Lee	Bloomberg	Sustainable Finance Solutions, APAC Lead
Vicky Cheng	Bloomberg	Head of Government and Regulatory Affairs, APAC
Shilpa Gulrajani	BNP Paribas	Head, Corporate Development & Sustainability, APAC
Andrew Kong Yuan	China Merchants Bank	COO
Shirley Xue	China Merchants Bank	Head of Business Development Department
Esther An	City Developments Limited	Chief Sustainability Officer
Bridget Boulle	Climate Bonds Initiative	Director of Technical Development
Matteo Bigoni	Climate Bonds Initiative	Head of Taxonomies
Haran Siva	Climate Bonds Initiative	Senior Advisor and Country Manager
Mireille Martini	Climate Bonds Initiative	Taxonomy Outreach Manager
Zofia Wetmańska	Climate Bonds Initiative	Senior Taxonomy Analyst
Vishwas Vidyaranya	Climate Bonds Initiative	Consultant
Jaclyn Yeo	DBS Bank Ltd	Senior Vice President (Chief Sustainability Office)
Kalpana Seethepalli	Deutsche Bank	Director of ESG, APAC
Seng Bingxun	EY	Partner, Strategy & Transactions
Tan Jenn-Hui	Fidelity International	Chief Sustainability Officer
Gabriel Wilson-Otto	Fidelity International	Head of Sustainable Investing Strategy
Lily Dai	FTSE Russell	Senior Research Lead, Sustainable Investment
Rachel Teo	GIC Pte Ltd	Head, Sustainability and Total Portfolio Sustainable Investing
Xiang Long Ng	GIC Pte Ltd	Vice President, Sustainability Office
Frances Chen	HSBC	Head of Sustainability, ASEAN

Richard Lim	HSBC	Manager, Corporate Sustainability, Singapore
Alexandra Simion	Igneo Infrastructure Partners	ESG Executive
Norbert Ling	Invesco Ltd	ESG Credit Portfolio Manager
Irvin Goh	London Stock Exchange Group	Head of Index & Analytics, Asia Pacific
Eric Nietsch	Manulife	Head of ESG, Asia
Chiang Yi-Chen	Manulife	Senior Sustainable Investment Analyst
Miranda Carr	MSCI	Executive Director, ESG Research
Amanpreet Singh	MUFG	Director & Deputy Head, ESG Finance APAC
Mike Ng	OCBC	Chief Sustainability Officer
Jeong Yoonmee	OCBC	Head of Sustainability Office, Global Wholesale Banking
Alyssa Ng	OCBC	Director, Sustainability Office
Timothy Colyer	Oliver Wyman	Partner, Head of Indonesia, Climate & Sustainability Lead Asia Pacific
Adam Vuaran	Société Générale	Head of Sustainability APAC
Yasmine Djeddai	Société Générale	Head of Sustainable and Positive Impact Finance APAC
Ronald Young	Société Générale	Head of Sustainable Finance Asia
Michael Salvatico	S&P Global	Head of Asia Pacific, Middle East & Africa ESG Solutions
Karunia Tjuradi	UOB	Managing Director, Head of Sector Solutions Group, SSG
Adrian Ow	UOB	Executive Director, Head of ESG Solutions, SSG
Ivan Cheng	UOB	ESG Solutions - Lead
Adam Ng	WWF	Asia-Pacific Lead (Greening Financial Regulation Initiative)
Kristina Anguelove	WWF - Singapore	Head of Asia Sustainable Finance
Pina Saphira	WWF - Singapore	Assistant Vice President

The Taxonomy is the outcome of contributions from a wide range of participants and do not represent the individual positions from each of the participants.

Introduction

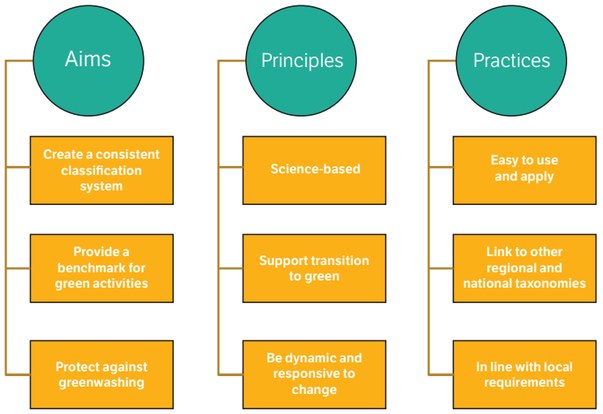
Climate change is already having widespread effects on nature and people around the world. There is clear scientific evidence that climate change poses one of the greatest existential threats to humanity and the planet. It is a problem which demands action now. While climate change is a global threat, Asia, home to majority of the world's population, is warming faster than the global average according to the World Meteorological Organization.[1]

Singapore, as an international financial centre, is well-placed to support the sustainable economy agenda and catalyse sustainable and transition financing needs for the region and globally. To advance on the development, the Monetary Authority of Singapore (MAS) has convened an industry-led initiative called the Green Finance Industry Taskforce (GFIT) to focus on a few key initiatives, including the development of a Taxonomy.

This is the final version of the first Singapore-Asia Taxonomy (Taxonomy) issued by GFIT[2], convened by MAS and with technical support and recommendations from the Climate Bonds Initiative (CBI). GFIT comprises of representatives from financial institutions, corporates, non-governmental organisations, and financial industry associations. All relevant Singapore Government agencies, as well as the public via rounds of consultations, have provided input and feedback into the process. GFIT, MAS, CBI, and the agencies have taken a consensus-based approach to develop the Taxonomy. Regular GFIT meetings and communications were held to discuss and review material points about the Taxonomy. In situation where divergence of views were presents, GFIT would consider the recommendations from key parties, revise the criteria and the Taxonomy where required with a pragmatic stance, and explain the rationale in the Taxonomy.

The Taxonomy is designed to promote the development of an environmentally sustainable economy for Singapore and ASEAN through defining science-based and robust technical screening criteria for economic activities and projects that are aligned with Singapore and region's overall environmental objectives. In line with the vision of Singapore's 2030 Nationally Determined Contribution (NDC) for carbon emissions, as well as achieving the targets under the Singapore Green Plan 2030, the Taxonomy aims to define the green and transition economy and opportunities. In addition, it serves as a practical guidance for market participants such as asset owners, investment managers, financial institutions, as well as issuers, policymakers, regulators, and other stakeholders to identify and allocate capital to green and transition activities and projects.

The Taxonomy's main aims, principles and practices are as follows:



The Taxonomy includes a list of economic activities and projects that are classified as Green (environmentally sustainable), Amber (transition) or Ineligible on the basis of their contribution to at least one of the Taxonomy's five environmental objectives, whilst at the same time not causing any significant harm to the other four.

These five main environmental objectives are aligned with the EU Taxonomy, although at present this Taxonomy has only determined economic activities and technical screening criteria for climate change mitigation. The other four environmental objectives will be added in future iterations.

- Climate change mitigation
- Climate change adaptation
- Protect healthy ecosystems and biodiversity
- Promote resource resilience and circular economy
- Pollution prevention and control

The Taxonomy should allow allocators and providers of capital to align their investments in and lending to different companies, assets and strategies with activities that are classified as green (environmentally sustainable), amber (transition) or ineligible within a flexible classification framework. It is not designed to be an exhaustive or mandatory list of activities or projects for investment, nor does it seek to make any judgments or assessments of the benefits or financial performance of any of the activities and their classification.

Economic activities must meet technical screening criteria under each classification to be aligned under the Taxonomy. The technical screening criteria set requirements for substantial contribution to at least one environmental objective.

Benefits of the Taxonomy

The key benefits of the Taxonomy are:

1 — Provide clarity via a common language for financiers, issuers, policymakers and regulators.

Market participants can use the Taxonomy to express their environmental goals in their investment decisions. Providers of debt and equity capital can align their investing and lending practices with these environmental goals. Companies and project developers can use it to plan and raise finance, developing the pipeline of sustainable investment opportunities. Policymakers and regulators can use it to shape national policies and priorities, as well as direct capital flows to sustainable companies and activities. All can use it to avoid unintended greenwashing.

2 — Help translate commitments to the Paris Agreement and other sustainable investment goals for investors.

The Taxonomy bridges the gap between international goals and financing practices, clearly signalling the types of activities that are consistent with the low-carbon transition, adaptation to climate change and other environmental objectives.

[1] See: https://public.wmo.int/en/media/press-release/climate-change-impacts-increase-asia
[2] GFIT was convened from Nov 2019 to Apr 2023. In its place, a new Singapore Sustainable Finance Association (SSFA) will be set up.

3 — Provide clarity and consistency for financiers, companies and government agencies.

The criteria have been developed by environmental and industry experts and reference the latest Singaporean, ASEAN, EU and international thinking. This allows investors to have clarity, consistency and harmonized reporting for their investments in both Singapore and the global markets.

4 — Support understanding of risk and opportunities based on environmental factors and support different investment styles and strategies for green and transition investment.

Investors marketing environmentally sustainable funds can invest in Taxonomy-eligible activities, engage companies on how they are progressing towards Taxonomy thresholds, or provide their own explanation for how they will achieve the fund's goals. The Taxonomy also allows a better understanding of the environmental risks facing Singaporean companies under a low-carbon transition pathway. Investing in Taxonomy-eligible activities is not mandatory.

5 — Put environmental data in context and make it easier to understand how companies are working towards a low-carbon transition and building resilience to climate change.

Investors need to understand which companies are contributing to the low-carbon transition and which are building resilience to climate change, not just carbon footprints.

6 — Avoid reputational risks.

By screening out economic activities that undermine broader environmental, climate and social objectives, investors can avoid reputational risk and ensure that their strategy is robust.

7 — Incentivise companies.

A science and evidence-based framework to define what is environmentally sustainable provides companies with clear direction. It will help companies access finance for R&D while rewarding those undertaking environmentally sustainable activities.

Assessing the success of the Taxonomy

There are a number of key stakeholders that need to embrace the Taxonomy in order for it to be considered a success; the measures of success therefore relate to these stakeholders. In particular, the following could be considered as useful measures of success:

a) The extent to which the Taxonomy is compatible / consistent with other taxonomies. Given capital is global, as are capital market participants, it is important that the Taxonomy is compatible / consistent with other taxonomies. This does not mean that it is identical, more that the Taxonomy should make use of a consistent approach and language and be inter-operable with other taxonomies. There should not be elements that are incompatible. Efforts at tracking such developments are being conducted by the International Platform on Sustainable Finance.

b) The extent to which new products are developed that (or existing products are modified to) align with the Taxonomy. Given the Taxonomy sets the foundations for directing capital to activities that are demonstrably 'green', one measure of success is the extent to which capital market participants either develop (or modify existing) products to align with or map to the Taxonomy. The number of products that align with or map to the Taxonomy can be easily tracked.

c) The extent to which regulators reference the Taxonomy when approving products or services. Given consumers of products and services have voiced concerns over 'greenwashing' of products, the ability of regulators to refer to a universal reference point (i.e. the Taxonomy) in approving a product as green or otherwise would provide comfort to users. We could see, for example, the development of a labelling system that makes use of the Taxonomy to demonstrate the "green" credentials of a product or service. This can be easily tracked.

d) The extent to which other frameworks / standards reference the Taxonomy. Linking with the point below on the compatibility / consistency with other taxonomies, if this outcome can be achieved then one measure of success is the extent to which other frameworks / standards (as they relate to 'green' bonds etc.) reference the Taxonomy. The Taxonomy, if successful, should become the common language and architecture that underpins products and standards.

e) The extent to which the Taxonomy is embedded within frontline regulatory disclosure requirements. Given this paper identifies a lack of applicable data as a significant hurdle, one measure of success is the way frontline regulators (stock exchanges, for

example) require corporate disclosure that directly maps to the requirements of the Taxonomy. This should include, where possible, information on the "Do No Significant Harm" clause of the Taxonomy. Disclosure requirements can be easily tracked.
f) The extent to which the disclosure requirements present an 'undue burden' on corporates. Disclosing data and information that map to the requirements of the Taxonomy will require effort from corporates; this cannot be avoided. However, one success of the Taxonomy would be the extent to which this effort represents an undue burden. Every effort should be taken so as to ensure that tools and support are available for all issuers, including and in particular small and mid-sized enterprises. This is an issue which can and should be monitored at regular intervals.

g) The extent to which providers of data align with the Taxonomy. Many capital market participants make use of data provide by a third-party research firm when considering their investments. These third-party data providers collect, and aggregate data disclosed by corporates, and then provide it to capital markets participants either as raw data or within a proprietary framework. Given capital market participants will look to these data providers for assistance in understanding activities as they relate to the Taxonomy, it is important that these third-party data providers align their products and services to the Taxonomy, allowing for a fuller implementation of the Taxonomy. This should, where possible, include information on the "Do No Significant Harm" clause of the Taxonomy. This can be easily tracked.

It is recommended that the successful adoption of the Taxonomy be assessed with reference to these measures periodically.

The success of an orderly transition to net zero has a particular significance in Asia. The Taxonomy will play a critical role in financing green and in particular, transition activities that are much needed in Asia. It seeks to provide specific criteria and approach on how to identify and classify activities that can help users to consider green and transition activities that are relevant for the region.

Environmental objectives

The key purpose of developing the Taxonomy for Singapore-based Financial Institutions (FIs) is to encourage the flow of capital to support the low-carbon transition needed to avoid catastrophic climate change, as well as the environmental objectives of Singapore and the ASEAN nations, which are serviced by Singapore-based FIs.

Globally, while taxonomies focus on slightly different objectives based on their jurisdictional context, they are broadly consistent with the six environmental objectives in the EU Taxonomy[3]. In the EU Taxonomy and others, environmental objectives are interlinked – i.e. an activity is included in the Taxonomy if it contributes substantially to one of the objectives while not significantly harming any other objectives.

As the ASEAN region undergoes rapid urbanisation and economic development, it is currently expected to depend on fossil fuels at least in the medium term[4]. The region's rising fossil fuel demand will increase greenhouse gas (GHG) emissions and exacerbate local air pollution. Hence, economic activities that enable the transition from fossil fuels to increase their carbon efficiency and/or to more sustainable energy sources are essential to mitigate climate change. For instance, in Singapore, even with the scale up in solar energy solutions, Singapore will still have a heavy reliance on natural gas in the coming decades due to its limited access to other renewable energy sources. Therefore, it is also important to direct financial resources to activities aimed at making natural gas plants more carbon efficient to support the country's carbon abatement goals. Beyond the energy sector, the supporting the transition of key industry segments whose carbon emissions are hard to abate is important to consider because the decarbonization of sectors such as steel, aluminium, and cement may constitute a large part of ASEAN green/transition financing opportunities due to the required infrastructure buildout over the next decade.

The policy contexts in Singapore and ASEAN countries are different from elsewhere. Thus, a transition taxonomy that is dynamic and captures the transition pathways of entities from high to low or zero carbon intensity is more appropriate.

The Taxonomy intends to cover both green and transition activities with the following five environmental objectives:

1 — Climate change mitigation
2 — Climate change adaptation
3 — Protect healthy ecosystems and biodiversity
4 — Promote resource resilience and circular economy
5 — Pollution prevention and control

[3]The six objectives are: climate change mitigation, climate change adaptation, the sustainable use and protection of water and marine resources; The transition to a circular economy; Pollution prevention and control; The protection and restoration of biodiversity and ecosystems
[4]Source : Renewable Energy Outlook for ASEAN by ASEAN Centre for Energy (ACE) and International Renewable Energy Agency (IRENA)

The current version of the Taxonomy Criteria and thresholds for economic activities are focused on contribution climate change mitigation. Other objectives may be added in future developments.

Objective 1: Climate change mitigation (focus of this Taxonomy)

Mitigating climate change requires reducing the release of GHG emissions in the atmosphere, with the key objective of enacting measures to limit the extent of climate change. An activity can be considered to have met this objective if it makes substantial contribution to:

a) Avoid GHG emissions: These are 'green activities', which are already having very low or near-zero emissions. More capital is required to increase their development and wider deployment.

b) Reduce GHG emissions: These are transition activities that are currently high carbon and critical to the functioning of the economy but are in transition to less carbon-intensive business models. This Taxonomy includes transition activities involving fossil fuels, albeit limited to abated natural gas and managed coal phase-out under certain circumstances. This is because ASEAN governments have highlighted that, while fossil fuels will remain important energy sources for the foreseeable future, companies involved in these activities need to find ways to lower the carbon intensity of their activities. They must significantly improve their performance over time, demonstrated by tracking, monitoring, and disclosing CO_2 equivalent emissions, and their investments must not lock-in carbon intensive assets or processes for the future. They must demonstrate a pathway to approach climate objectives of the country they are operating. Abated natural gas is a relatively clean fossil fuel, as compared to oil or coal, and burning gas results in materially lower emissions of CO_2 (and other air pollutants) for an equivalent amount of energy produced[5]. It has consequently been argued that, in certain circumstances, abated gas will play a role as a transition fuel for some coal-heavy economies.

c) Enable activities that facilitate low-carbon performance or substantial emissions reduction.

d) Enable activities that are engaged in transiting to cleaner energy either through the renewable power generating sources or via decarbonisation technologies such as i) diversification of renewable energy sources (i.e. solar, wind) as a key solution for the region to keep pace with the increasing energy needs in secure and sustainable ways and remains relevant for a smooth transition from major fossil fuel use to clean energy, ii) accelerate clean energy innovations (i.e. battery storage, electrification of transport, carbon capture utilisation and storage), including the development and deployment of carbon capture and sequestration in certain industrial processes.

Climate change mitigation is a key environmental objective for Singapore and the ASEAN nations as seen in their nationally determined contributions (NDCs) under the Paris Agreement. Singapore has aimed to reduce emissions to around 60MtCO_2e in 2030 after peaking emissions earlier and committed to reach net-zero emissions by 2050. The Singapore Green Plan 2030, launched in early 2021, articulates further targets and action plans under its City in Nature, Sustainable Living, Energy Reset and Green Economy pillars to contribute to mitigating climate change.

Singapore aims to increase solar energy deployment by five-fold to a least 2 gigawatt-peak by 2030. However, due to limitations such as its small physical size and land scarcity, Singapore faces challenges in relying on renewable sources to generate sufficient baseload electricity. Therefore, mitigation efforts have also focused on transitioning to natural gas, a comparatively less carbon-intensive fuel, as well as enhancing energy efficiency across the key sectors of power generation, industry, transport, buildings, and households. For example, Singapore has a set the target of reducing peak land transport emissions by 80% by 2050 from the 2016 peak, with vehicle electrification as the main driver.

Other complementary initiatives include the implementation of a carbon tax and development and initiatives related to low-carbon technologies such as hydrogen and carbon capture, utilisation and storage.

Objective 2: Climate change adaptation (not covered in this version)

Climate change adaptation refers to activities that substantially reduce the adverse impact of the current and expected future climate on either (i) other people, nature or assets or (ii) the economic activity itself, in each case without increasing the risk of an adverse impact on other people, nature and assets.

[5]It is recognised that there is also considerable discussion around the issue of methane leakage and natural gas, with scientific evidence growing over time. This is an issue that requires consideration and monitoring.

Adaptation measures respond to physical risks that are mostly location and context specific, hence, it is impossible to produce a stand-alone and exhaustive list of activities. As such, the adaptation approach is a set of guiding principles, which can be applied in any sector.

An economic activity can be considered to meet the objective of climate change adaptation by meeting one, or both, of the following principles:

a) Principle 1: The economic activity implements measures to increase own resilience. E.g. raising building heights above projected sea level rises, installing more efficient cooling facilities in anticipation of an increase in the number of warmer days.

b) Principle 2: The economic activity enables other economic activities to adapt to climate change. E.g. providers of cooling systems for buildings, sensors for flood monitoring.

Additionally, the economic activity should not adversely affect adaptation efforts by others, or increase the physical risks posed to others. E.g. water storage solutions should not deprive others in the communities from accessing water during dry weather.

By the year 2100, it is projected that Singapore could experience an increase in daily mean temperature by 1.4˚C to 4.6˚C, more frequent and intense heavy rainfall events, and mean sea level rise of up to 1 meter.[6] Singapore has adopted a Resilience Framework that frames its overall approach to climate change adaptation, which involves assessment of risks, formulation of adaptation pathways, prioritisation and implementation of measures. Additionally, under the Resilient Future vision of the Singapore Green Plan, initiatives have been introduced to (i) complete the formulation of coastal protection plans for certain areas by 2030, and (ii) moderate the rise in urban heat.

Objective 3: Protect healthy ecosystems and biodiversity (not covered in this version)

Climate change and biodiversity are interconnected. Climate change has compounded biodiversity losses globally, with around a million plant and animal species threatened with extinction within decades. The IPCC has warned that failure to limit global warming to 1.5ºC will long-lasting and in some cases irreversible ecosystem losses.[7] At the same time, the sustainable management of ecosystems and efforts to restore biodiversity is critical to climate change mitigation. For example, conserved or restored habitats such as forests and wetlands are natural carbon sinks and have the added benefit of preventing climatic hazards such as rising sea levels, floods and droughts.[8]

Ecosystem restoration is not only important in terms of reducing the carbon load in the atmosphere. It is also important to protect water basins and support biodiversity, both of which are crucial for food and water security. Ecosystem-based adaptation uses biodiversity and ecosystem services in an overall adaptation strategy. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change.

Examples of ecosystem-based adaptation activities include:

a) Coastal defense through the maintenance and/or restoration of mangroves and other coastal wetlands against flooding and protection of natural carbon sinks.

b) Promote protection, restoration and sustainable use of coastal and marine environment, which provide essential ecological, economic and social services in the ASEAN region.

c) Enhancing sustainable forest management including afforestation, reforestation and maintenance of forest ecosystem health and vitality to increase carbon storage capacity in forest ecosystems.

d) Establishment of diverse agroforestry systems to cope with increased risk from changed climatic conditions.

e) Conservation of agrobiodiversity to provide specific gene pools for crop and livestock adaptation to climate change.

Singapore places strong emphasis on ecosystem and biodiversity protection. As also highlighted earlier, an explicit goal of the City in Nature vision under the Singapore Green Plan is to implement species recovery plans for 100 species of plants and 60 species of animals, restore 30 hectares of forest, marine, and coastal habitats, and enhance habitats in at least 50% of Singapore's gardens, parks, and streetscapes.[9]

[6]Source: The Centre for Climate Research Singapore.
[7]https://wwfint.awsassets.panda.org/downloads/wwf_climate__nature_and_our_1_5c_future_report.pdf
[8]https://www.uncclearn.org/wp-content/uploads/library/unep248.pdf
[9]https://www.nparks.gov.sg/about-us/city-in-nature

As an international finance hub, Singapore is well placed to accelerate sustainable financing to address ecosystems and biodiversity threats. The United Nations Environment Programme (UNEP) estimates that the global investment in nature-based solutions will need to triple in real terms by 2030 and increase four-fold by 2050 if the world is to meet its climate change, biodiversity and land degradation targets as set out in the three Rio Conventions. The 2050 requirement represents cumulative total investment of up to USD 8.1 trillion. On annual terms, this equates to USD 536 billion each year, up from the current USD 133 billon.[10]

Objective 4: Promote resource resilience and circular economy (not covered in this version)

Promoting resource resilience can ensure the safe and secure supply of critical resources such as food and water, and to overcome resource constraints by maximizing resource productivity. On food supply, Singapore's 30 by 30 goal intends to meet 30% of nutritional needs locally by 2030, up from less than 10% today. According to Public Utilities Board (PUB), Singapore's total water demand could almost double by 2065. Apart from ongoing innovations in water and environment technologies to diversify water supply, water conservation strategies continue to play an important role to maximise efficient resource use.

Examples of activities that could contribute significantly to resource efficiency and resilience include:

a) Management of wastes from chemicals, plastics, packaging, electronics, textiles, construction materials, food as well as from oil & gas mining.

b) Promote water pollution control measures and cross-border cooperation prioritising water-related development activities.

c) Eco-friendly consumer packaging.

d) Sustainable food and agriculture technologies to increase shelf life, reduce wastage from farm to table.

The promotion of circular economy strategies can help Singapore strengthen resource resilience and promote environmental sustainability. A circular economy differs from the traditional linear economy (take, make, waste) and seeks to reduce waste, recovers resources at the end of a product's life, and channels them back into production. Singapore may position itself as a regional financing hub for the circular economy transition which requires massive investments to reap its full potential. For instance, an UNDP study estimates that Indonesia needs over USD 20 billion in annual capital investments to unlock circular economy opportunities in five key economic sectors.[11]

Objective 5: Pollution prevention and control (not covered in this version)

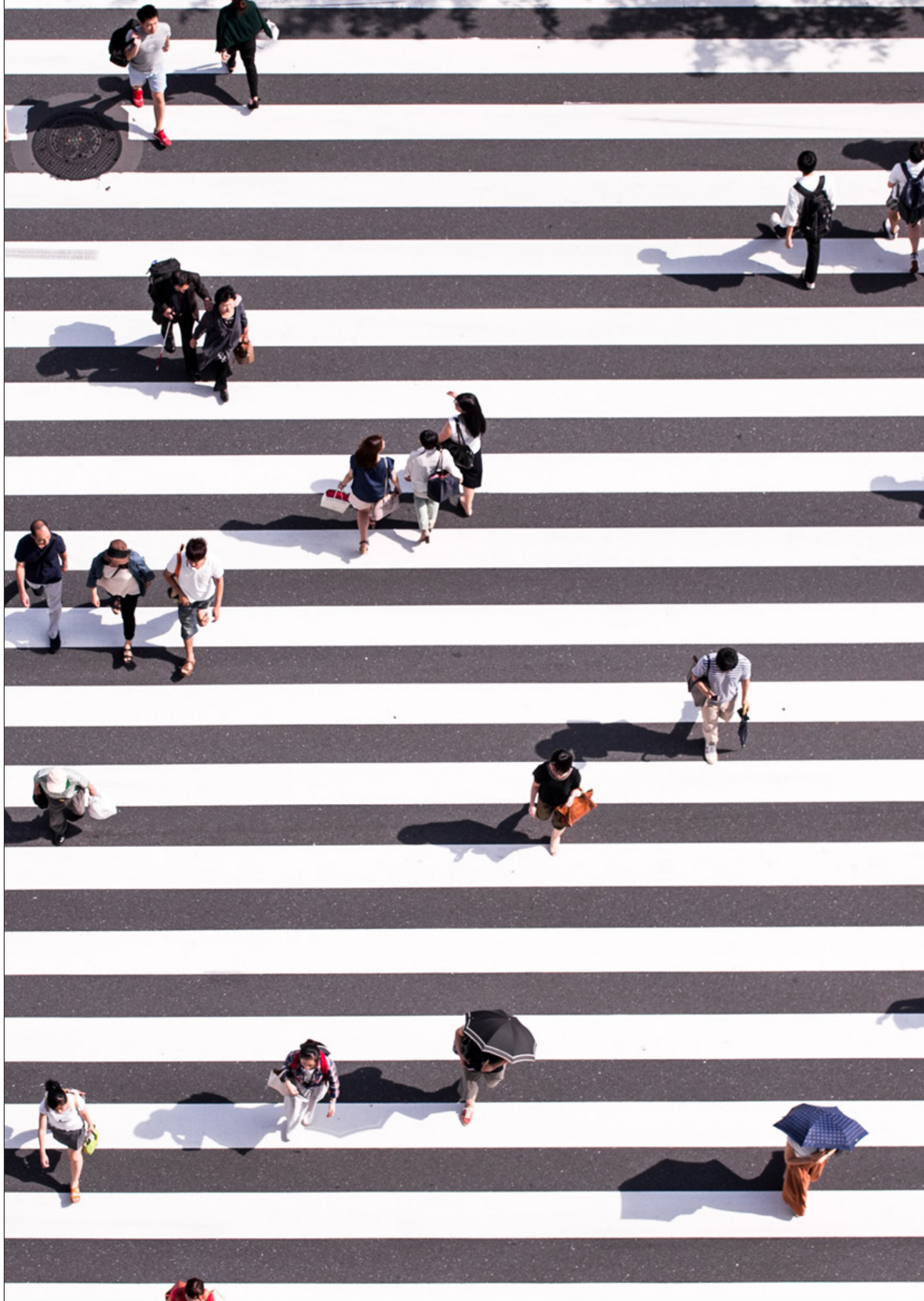
Pollution prevention and control involves practices that prevent, reduce and/or eliminate pollution of air, water or land, and in doing so, mitigate risks or harmful effects to the environment, and to human health. This is important as pollution is a key driver of (i) biodiversity loss and (ii) human diseases. Biodiversity loss as explained earlier is expected to exacerbate global warming through the reduction of natural carbon sinks. Climate change and pollution are thus interconnected; for example, preventing air pollution could contribute to climate change mitigation, while reducing emissions could in turn improve air quality. Pollution is also a significant environmental cause of human diseases which we need to seek to ameliorate. According to the WHO, exposure to air pollution is estimated to cause 7 million premature deaths every year.[12]

Activities that could contribute significantly to pollution prevention and control include those that (i) prevent or reduce direct or indirect pollution; (ii) remediate or improve the state of the environment; or (iii) enable any of the above.

Guiding principles for the development of the Taxonomy

The aim of a taxonomy is to provide a common framework for the classification of economic activities to enable stakeholders in gathering information related to green financing, funding, and investment, as well as gain an understanding of risk management and promote investments that meet robust sustainability goals. A taxonomy should allow stakeholders to determine which financial products and services can be classified as green, or environmentally sustainable, over the long term. Furthermore, it should enable transparent and consistent disclosures by corporates of their own economic activities and environmental profile, which then permits transparent and

[10] https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/36148/SFN_ESEN.pdf
[11] https://www.id.undp.org/content/indonesia/en/home/presscenter/pressreleases/2021/A-New-Report-On-Circular.html



consistent classifications and disclosures for associated equity and debt investment, financing, and financial products. In doing so, a Taxonomy would enable growth in sustainable products and services by removing ambiguity and uncertainty around classifications and labels, which in turn may stimulate demand for further environmentally sustainable financing and investment. A taxonomy would also facilitate reporting and classification of portfolios by Financial Institutions, which in turn may further stimulate demand for financial products and services.

On top of this, a taxonomy could also help Financial Institutions engage with issuers through a common language; the Taxonomy would allow Financial Institutions and issuers to discuss with reference to a benchmark classification system, based in and informed by science, the contribution of their activities to sustainable development.

Finally, a taxonomy could be helpful for macro-prudential regulators that wish to understand potential risks to financial stability that stem from "unsustainable" activities.

Science-based

The overall objective of the Taxonomy is to help identify investment consistent with achieving the necessary yet ambitious climate actions. The Taxonomy aims to draw a direct bridge between climate science and usable guidance for the financial sector. The criteria for the Taxonomy are hence based on science as far as possible, and on solid data, with references to data sources provided. In specific cases where a reference to scientific data cannot be provided, this is clearly signaled.

The technical screening tables indicate which sources have been used as the basis for the science which include the EU Taxonomy, Science-based Targets Initiative, Transition Pathway Initiative, Climate Bonds Initiative as well as academic sources. The selection of science basis was based on what was readily available and usable in the context. As a priority, EU Taxonomy was considered as the first priority. Other sources were chosen in discussion with GFIT, relevant agencies within Singapore and based on available and usable data.

Singapore-focused

This version of the Taxonomy has been developed on the basis of Singapore-based activities, metrics and thresholds. Although different regions should pursue similar environmental objectives - as the environmental issues we face, such as climate change and biodiversity loss, are global challenges, specific pathways, resources, and transition plans will differ by nature of economic, geophysical, and meteorological realities. GFIT decided to look both global and Singapore specific decarbonisation pathways (where available) and set up thresholds accordingly while keeping in mind international interoperability and regional usability considerations.

International and regional interoperability is particularly important given that Singapore-based financial institutions have global portfolios, with notable investments in other ASEAN countries. While GFIT has decided to focus on Singapore usability as a first priority, the majority of metrics are not locally specific and are usable in any country or region.

Economic activity structure

To identify the economic activities to be covered by this Taxonomy, GFIT defined activities on the basis of ISIC codes (level 3 for activity) given the wide coverage and usage of ISIC. Moreover, this would enable interoperability with other taxonomies such as the Common Ground Taxonomy developed by the International Platform for Sustainable Finance which similarly uses ISIC codes. For this version of the Taxonomy which proposes activity-level criteria and thresholds for three of the eight focus sectors (energy, transport, and buildings), GFIT decided to use a selection of ISIC codes within each of these three sectors. This selection was based on the importance to the Singapore and regional economy, the impact of each activity on GHG emissions (and emission reduction) as well as the ASEAN Taxonomy activity selection (which was also based on similar selection criteria pertaining to the region).

Globally interoperable

Capital is global, so are capital market participants, so a key objective of the Taxonomy is to be as interoperable as possible with other international taxonomies, with a particular focus on the EU Taxonomy and the ASEAN Taxonomy.

The GFIT notes that the ASEAN Taxonomy was developed in parallel to this Taxonomy and, while

[12]https://www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution

there are similarities, especially with respect to certain green criteria and principles, there also some notable differences. This is due, in part to the more complex structure of the ASEAN Taxonomy with multiple tiers of amber to allow for different levels of adoptions depending on the individual member state's readiness.

GFIT expects further work to be developed to map more closely the interoperability of the Singapore-Asia Taxonomy with ASEAN, EU and other taxonomies where necessary.

Traffic lights: green, amber, and ineligible classifications

The key principle of the Taxonomy is to distinguish between green, amber (transition), and ineligible activities under the traffic light system.[13]

Green activities

The principle for building the traffic light system is to consider the science-based 1.5°C pathway and the EU Taxonomy criteria for substantial contribution to climate change mitigation as a first option for "green" criteria. In certain cases, the metric and thresholds have then been adapted to reflect Singapore and regional specific circumstances.

The Green category definition for the Taxonomy is activities that contribute substantially to climate change mitigation by operating at near zero emissions, or are on a 1.5°C-aligned pathway. This encompasses both activities that are already near zero and those that are not near zero but are aligned with the 1.5°C pathway (See 'Green transition' in Figure 1). The pathway and accompanying thresholds are based on climate science and are consistent with the approach used in the EU Taxonomy where, for example, sectors such as buildings and industry utilise thresholds that are not currently near zero but will ratchet down over time.

Generally speaking, any new activities[14] (e.g. new power plant, new building etc.) have to meet the green criteria. This is consistent with the need for transformational changes for all new infrastructure to meet a 1.5°C pathway. In particular, this would also help to prevent the lock in of higher carbon activities, assets and infrastructure long into the future.

Given that green criteria are not necessarily near zero emissions at this point in time but are consistent with a 1.5°C trajectory, there is sufficient flexibility in the short term for new activities to meet Green thresholds.

Amber activities

The Amber category in the Taxonomy includes activities that are not presently on 1.5°C pathway, but are either:

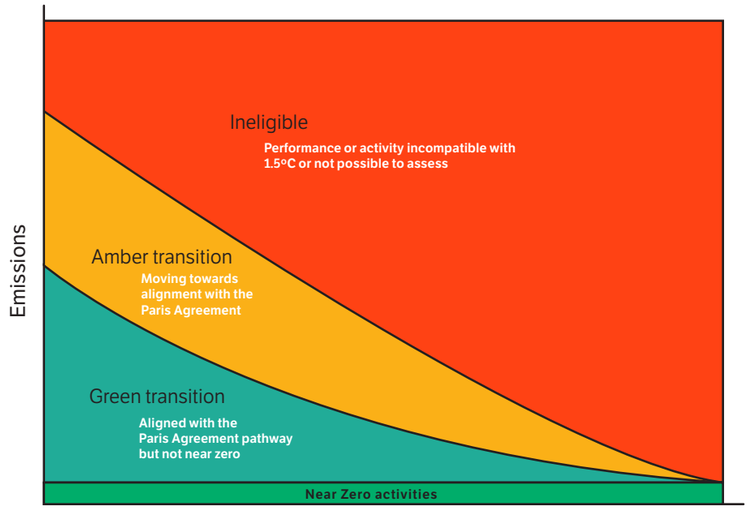


Figure 1: Net-zero pathway for Green, Amber, Ineligible

[13]The Green, Amber and Ineligible thresholds are defined only for the activities within the pre-defined scope of each activity.

- Moving towards a Green transition pathway within a defined time frame; or

- Facilitating significant emissions reductions in the short term with a prescribed sunset date.

The amber category is, unless otherwise stated, relevant only for transitioning of existing infrastructure and activities and it does not apply to new projects. This is in recognition of the fact that the amber category is, by definition, not aligned with a 1.5°C trajectory and building of new activities with long lifespans beyond the sunset dates, would lock in assets longer into the future, resulting in stranded assets.

Two further issues were discussed in relation to ensuring the robustness of the amber criteria and to ensure that the criteria are not synonymous with greenwashing:

- A transition cannot last indefinitely – at some point in time, the amber activity should be following a 1.5°C pathway to net zero otherwise there is no real impact

- Transition requires change over time and therefore to demonstrate the transition, there is a need to show how change is happening over time but this is difficult to capture in a binary taxonomy threshold that are static at a point in time

To address both issues, Amber criteria have a defined sunset date. At the sunset date, there is no longer an amber category and either the activity is aligned with the 1.5°C pathway (Green category) or it is downgraded to "Ineligible activities" category. As above, this does not mean that the activity has to be zero emissions by the sunset date but rather aligned with the 1.5°C pathway. The intention is that this ensures that transition is not forever and it facilitates change over time by ensuring taxonomy users move towards aligning with Green criteria or risk being ineligible. Generally, the sunset date is 2030 (some industrial sectors have longer sunset dates) and all amber traffic lights will disappear after this time unless stated otherwise in the criteria.

Another addition that was made which is different to other taxonomies is to introduce amber measures – these help to demonstrate change over time and are discussed in more detailed below.

For some activities, there are no Amber criteria. This means that the technological options to operate in line with a 1°C pathway are sufficiently developed. Hence, the activity can reasonably meet criteria and thresholds to be considered green in line with the Taxonomy.

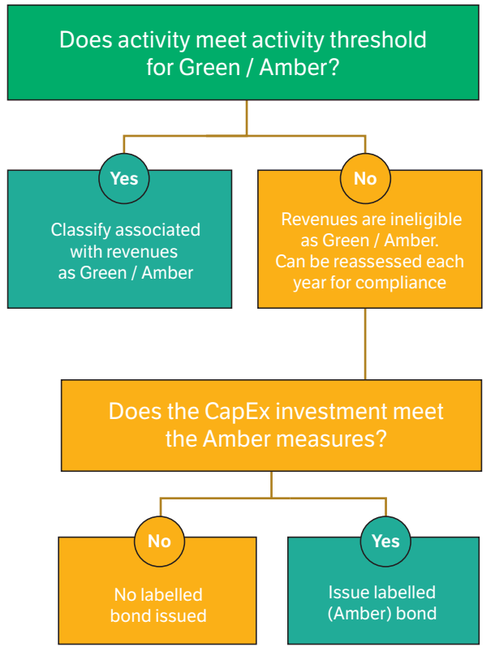
Amber (measures)

In some sectors of the Taxonomy, Amber (measures) have been proposed to provide additional options for users.

At the date of publication of this Taxonomy, there was no detail available as to how the Taxonomy would be applied and used. This means that it may be used for classifying CapEx or assets investments through, for example, debt instruments such as green bonds/loans (e.g. China Taxonomy) or disclosure of green revenues (e.g. EU Taxonomy) or both.

Given this uncertainty as well as the fact that the amber category provides an additional layer of complexity and flexibility to the Taxonomy, amber measures are specified separately to amber activities to provide options at a point in time that are greening the activity even though it may not meet the criteria.

This will work as follows:



[14]New activities are defined as activities that have reached financial investment decision (i.e., date by which investor commitments to invest in activities must be finalised) before 31 Dec 2023. Retrofits to existing infrastructure are not considered new activities but can instead follow criteria for existing activities.

Understanding 1.5°C pathways and relationship to Green/Amber thresholds

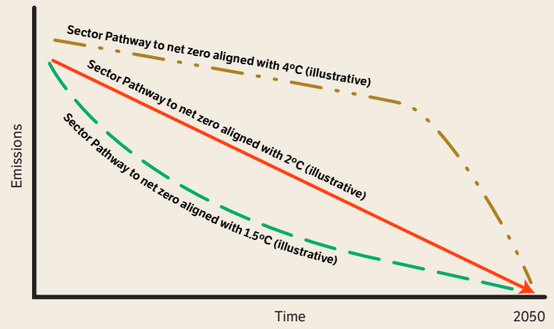


Figure 2: Illustrative 2050 pathways aligned with a range of temperatures

The concept behind the Green criteria as defined above is that they are following a science-based 1.5°C pathway to net zero. This pathway is consistent with the carbon budget allowed for this sector to reach 1.5°C.

A 1.5°C-aligned pathway is not the same as a pathway to net zero by 2050 – focusing on 2050 as the end goal misses the most important concept which is the steepness of the curve. Figure 2 illustrates 2050 transition pathways that are aligned with a net-zero 2050 end point that are aligned with 4°C. In other words, the end points is not as important as the rate of change.

Given the above, the Green criteria are, as far as possible, indicating this 1.5°C pathway. Amber activities are not on this pathway even if they have a downwards trajectory towards 2050. We note that the amber criteria are not necessarily bounded by a temperature alignment (in part due to the lack of granularity of temperature pathways) but intends to recognise movements towards Green.

Ineligible activities

The Ineligible activities category concerns activities that are not currently eligible under the Taxonomy.

This means that they are either:

- Activities that do not comply with green or amber criteria. For e.g., activities that are not currently compatible nor moving sufficiently rapidly towards with a 1.5°C-aligned trajectory and will require emissions reductions (incl. Scope 3) to be in line with a green transition pathway (e.g. high-carbon cement producer) or

- Directly unsustainable activities – these are activities that are incompatible with a 1.5°C-aligned pathway and will need to be phased out if emissions (including Scope 3) cannot be reduced (e.g. fossil fuels).

Ineligible activities under the Taxonomy may not always indicate significant harm.

The intention of this Taxonomy and the technical work was not to produce a definitive guide to what significant harm (to climate mitigation) or directly unsustainable activities mean across sectors. In some sectors/activities this is intuitive but in others, the line between ineligible and amber is difficult to define and counterproductive.

This classification therefore indicates performance/thresholds for activities that are not eligible for financing in this Taxonomy. In some cases, this can be implied as harmful and in others, it is less clear. The result remains the same (ineligible) but the perception is different.

For example, emissions of some activities can and should be improved over time – these should receive investment. Other activities are incompatible with 1.5°C and will require phase out. See more information on this approach in Industry Sector.

Further, there are some activities or components of activities that are not yet assessed against and fall outside the scope of this Taxonomy are not eligible for financing but do not necessarily pose significant harm. These activities are not assessed against the traffic light system at this point in time and are not in scope (i.e., they are neither Green, Amber, nor Ineligible).

Pathways for criteria changes

Where possible, thresholds and criteria have been provided for future time periods to provide visibility over how thresholds will change over time following a science-based pathway to net zero. Inclusion of pathways offers the investors and industry planning advantage and greater predictability of potential future conditions, a quality sought from taxonomies that in most cases focused on providing thresholds only for a given point in time.

GFIT notes that these pathways are indicative and may be subject to revisions based on scientific evidence, new available technologies etc. GFIT notes that particularly for criteria far into the future (beyond 2035), there is some uncertainty as to which technologies will be available and the extent to which they are low-carbon. These thresholds should be seen as indicative and may be revised in future iterations.

Sunset dates

The Amber criteria have a sunset date to ensure that transition does not last forever and that the thresholds facilitate movement towards green.

The sunset dates for the transition period are generally set at 2030. However, for activities that are very hard to abate, a longer period was given.

GFIT does not anticipate that these sunset dates will be altered unless there is a strong case to do so e.g. they are not aligned with up-to-date transition trends in various industries.

In this way, the Amber category can be seen as a 'catch up' time period or grace period to move to the green pathway. The length of time before the sunset date was based on discussion within GFIT, agencies, industry bodies and research of technology pathways and was seen as an ambitious but realistic time period to move to the Green pathway.

Do No Significant Harm

A set of Do No Significant Harm (DNSH) criteria will be proposed in a separate chapter. To ensure ease of use of the Taxonomy and encourage its adoption, DNSH is currently best practice disclosure in its early implementation phase. However with the evolution of taxonomy, it is could potentially be incorporated as a component of eligibility criteria in the future.

Application of the Taxonomy

The application of the Taxonomy to financial markets, debt instruments such as Green bond/loan, corporate disclosure regulations as well as its voluntary or mandatory status have not yet been decided or put forward for public consultation and are, therefore, at this stage beyond the scope of the Taxonomy.

Further work will be provided on:

- mandatory/voluntary nature of the Taxonomy
- use of Taxonomy in disclosure guidance/ regulation
- use of Taxonomy in debt financing such as Green bond/loan
- expectations on frequency of reporting and compliance

Governance and ownership of the Taxonomy

This final version of the first Singapore-Asia taxonomy is issued by the Green Finance Industry Taskforce (GFIT)[15], convened by the Monetary Authority of Singapore, with technical support and recommendations from the Climate Bonds Initiative (CBI). GFIT comprises of representatives from financial institutions, corporates, non-governmental organisations, and financial industry associations. All relevant Singapore Government agencies and the public via rounds of consultations have also provided input and feedback into the process.

GFIT, MAS, CBI, and the agencies have taken a consensus-based approach to develop the Taxonomy. Regular GFIT meetings and communications were held to discuss and review material points about the Taxonomy. In situations where divergence of views were present, GFIT would consider the recommendations from key parties, revise the criteria and the Taxonomy where required with a pragmatic stance, and explain the rationale in the Taxonomy.

This Taxonomy is intended to be a living document and will be revised over time. The precise time periods for review have not yet been finalised and will be published in due course. Future iterations of the Taxonomy, as well as taxonomy maintenance, will fall under the the Singapore Sustainable Finance Association (SSFA), convened by MAS.

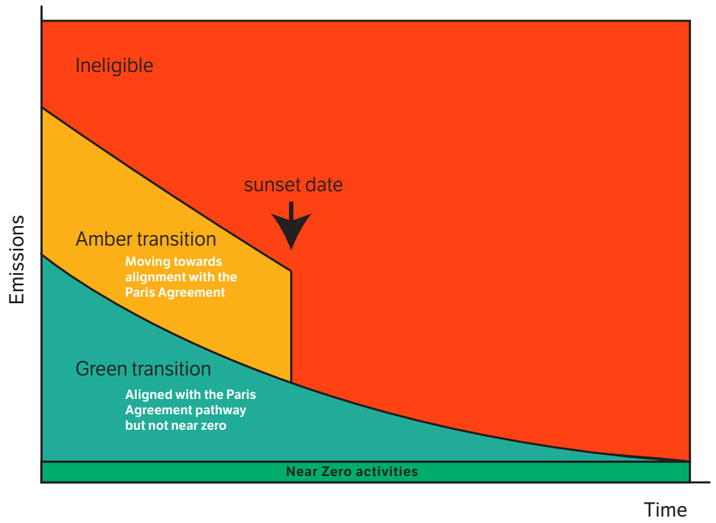


Figure 3: Graphical illustration of sunset date for Amber thresholds

[15]GFIT was convened from Nov 2019 to Apr 2023. In its place, a new Singapore Sustainable Finance Association (SSFA) will be set up.

Technical Screening Criteria

The following section provides technical screening criteria for the following sectors:

1 ENERGY
2 TRANSPORT
3 REAL ESTATE/CONSTRUCTION
4 INDUSTRY
5 FORESTRY
6 CARBON CAPTURE AND STORAGE
7 INFORMATION AND COMMUNICATIONS TECHNOLOGY
8 WASTE
9 WATER
10 AGRICULTURE

1 — Energy

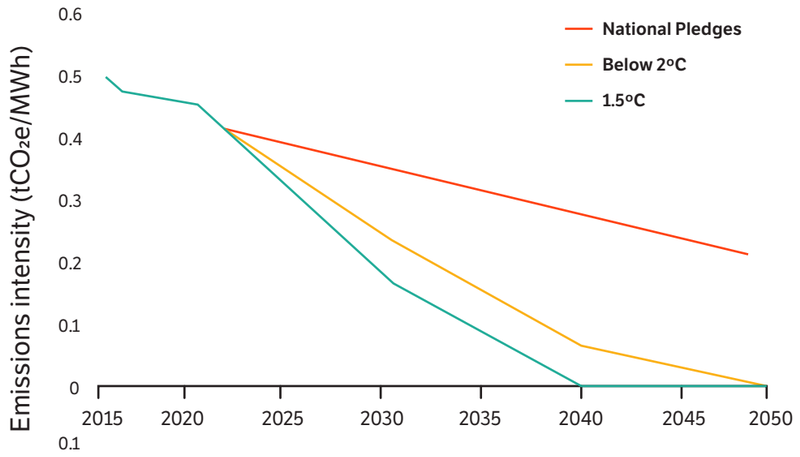


Figure 4: Transition Pathway Initiative pathways for electricity utilities[16]

Context

Global

Globally, decarbonisation of electricity generation is critical to meeting the Paris Agreement and to enabling the decarbonisation of other sectors. Further, the low-carbon alternatives are both economically and technologically viable in most jurisdictions, meaning that the decarbonisation of electricity generation will be required to be quicker than hard to abate sectors where the low-carbon pathways are less clear.

The Transition Pathway Initiative (TPI) pathway for electricity generation shows a 1.5°C pathway decarbonising by 2040.

Singapore

Singapore has committed to meet a net zero target by 2050 and has enhanced its NDC to reduce emissions to around 60MtCO₂e in 2030 after peaking emissions earlier. Power generation accounts for ~40% of Singapore's total carbon emissions today[17] and decarbonisation of the sector is critical to meet climate pledges.

The big challenge that Singapore faces in electricity generation is its geography. As a small and highly urbanised city-state with low wind speeds and relatively flat land, the ability to access renewable or alternative clean energy at scale is limited.

To decarbonise electricity generation, Singapore will continue to enhance the efficiency and reliability of electricity generation from natural gas, while developing and ramping up supply of alternative low-carbon energy sources including[18]:

(i) Solar deployment
(ii) Regional power grids to bring in low-carbon electricity by 2035, and
(iii) Low-carbon alternatives such as hydrogen, geothermal and other technologies such as carbon capture and storage.

Singapore is taking steps to maximise the available spaces for solar deployment, by tapping on locations such as rooftops, buildings, reservoirs, offshore sea space/islets etc. However, based on a study by the Solar Energy Research Institute of Singapore, Singapore only has a solar potential of approximately 8GWp[19] technical potential. Singapore aims to achieve the solar target of at least 2GWp by 2030 (which will constitute around 3% of the country's total protected electricity demand in 2030). To complement solar deployment efforts, Singapore has also announced

[16] https://www.transitionpathwayinitiative.org/publications/2022-tpi-publishes-consolidated-report-containing-decarbonisation-pathways-for-all-high-emitting-sectors.pdf?type=Publication
[17] https://www.ema.gov.sg/our-energy-story
[19] Based on the updated "Solar PV Roadmap for Singapore" by Solar Energy Research Institute of Singapore

plans to import up to 4GW of low-carbon electricity by 2035 (which is expected to make up around 30% of the total projected supply in 2035), and is actively studying other low-carbon alternatives such as hydrogen, geothermal and CCUS to further decarbonise the sector in the longer term.

Understanding hydrogen as a lever to decarbonisation electricity generation for Singapore

Given the geographical constraints for Singapore, a major decarbonisation lever for Singapore is to use hydrogen or its derivatives as a fuel to replace natural gas in power plants (e.g. Combined Cycle Gas Turbine (CCGT)). We note that this is what is credibly envisaged today although there may be alterative solutions that emerge in the future.

Enabling this requires either the replacement of existing power plants with new technology that allows the input of hydrogen or its derivatives into the fuel mix (either wholly or partially such as through blending with natural gas) or, in some cases, retrofitting of existing power plants to allow blending of hydrogen into the fuel mix.

Whilst replacing and upgrading turbines at power plants is a necessary measure to decarbonise, it does not itself facilitate emissions reduction. For emissions reductions that to be realised, low-carbon hydrogen needs to be blended at increasing levels over time. As more low-carbon hydrogen is fed into the system, emissions decrease.

Challenges of hydrogen

a. The use of low-carbon hydrogen for electricity generation is not universally recommended.

Low-carbon hydrogen made using an electrolysis process requires renewable energy. Clearly, it makes little sense from an efficiency perspective to use renewable energy to create hydrogen and then to create electricity again from that hydrogen. Furthermore, given the limited availability of low-carbon hydrogen, its use will be to be prioritised for applications where there are no alternatives. As a result, electricity generation from hydrogen is not recommended unless geographic constraints mean there are no other available options.

b. Hydrogen leakage

There remain some concerns around hydrogen leakage which will need to be assessed as more evidence becomes available. Hydrogen is an indirect GHG and while there is not yet scientific consensus on its global warming potential, leakages are likely to be problematic and will need to be monitored and mitigated. There is limited data and research on this at this point in time, but this will need to be reviewed and further criteria added as it becomes available.

c. Hydrogen 'ready' does not mean low-carbon

As noted, improving infrastructure to allow for hydrogen does not reduce emissions until hydrogen is fed in. This will rely on a range of factors including availability of low-carbon hydrogen at scale.

Given these challenges, GFIT considered how to facilitate finance for the enabling infrastructure (hydrogen-ready turbines) without locking in technology into the future that never feeds in hydrogen. This was a challenge around a decade ago with the concept of CCS-ready coal plants which were actively supported at a point in time but were widely regarded as a failure given that the CCS never eventuated.

To achieve this balance, GFIT put forward two types of criteria:

- **Activity criteria** classifies investments at the activity-level based on their emissions intensity, e.g. the emissions intensity of a solar farm or a fossil gas generation facility. Activity criteria are applicable to a facility or whole activity and could be applied to classifying Green/Amber revenues.

- **Measure criteria** classifies any investments that are made to decarbonise an existing facility (e.g. a retrofit or a replacement of technology) or to equip a new facility to be hydrogen ready. Measures criteria are usually applicable for CapEx investments and are associated with debt finance (Green bonds). Any investment that meets these criteria can issue a labelled bond (Amber) for that investment irrespective of whether the investment(s) leads the whole activity to meet the activity threshold above. User guidance is provided in Appendix I.

These criteria are discussed in detail below.

TSC overview and methodology

This section provides an overview of the criteria and the methodology undertaken to develop them for the sector as a whole. Detailed activity-specific criteria are at the end of the chapter.

Criteria for whole activities: Modelling of 1.5°C

TPI Global modelling for the electricity sector presented above shows how the average grid intensity needs to reduce to reach net zero across different scenarios. Applying a 1.5°C scenario from TPI pathways in Figure 5 above shows that the grid average needs to reach ~150gCO_2e/kWh[20] by 2030. Achieving this will require major changes to electricity production, including the use of renewable technologies, adoption of CCS and the reconfiguring and retrofitting of existing fossil fuel facilities to increase renewable uptake.

For new projects, this means that the green threshold is at 100gCO_2e/kWh to bring the grid average down rapidly. This threshold drops to 50gCO_2e/kWh to 2050. This figure is indicative at this point and will likely revise to 0g but is maintained at 50g based on current average emissions associated with renewable energy (see Table 1) and to ensure that this does not act as any kind of barrier to investment in renewable energy. These will likely be revised down in the future as technology evolves and emissions associated with the supply chain also decarbonise.

This is the upper bound for the amber threshold (as below), which is relevant for existing infrastructure only and is based on the average emissions intensity that the grid must achieve to be consistent with 1.5°C as below. This means that existing projects should always be improved to be better than the average of where the grid should be to be considered in transition.

New projects may only utilise criteria for Amber (measures) – this does not apply at the plant or facility level but to particular technology. These are eligible up to the sunset date with all funds (in the case of a bond) being disbursed before then.

Existing infrastructure may be retrofitted in line with the Amber measures criteria defined below to qualify for transition finance. These are designed to facilitate reductions in emissions using 2 levers that, at the time of writing, understood to be feasible for the Singapore context:

- Blending of low-carbon gas e.g. hydrogen (as per above)
- Carbon capture and storage

Both of these levers are technologically feasible but face some hurdles to reach scale and viability. Following 2030, the assumption is that these key technologies are available and have been implemented.

The GFIT notes that this approach is not universally recommended in most jurisdictions where fossil fuel electricity generation will need to be phased out entirely to meet climate targets.

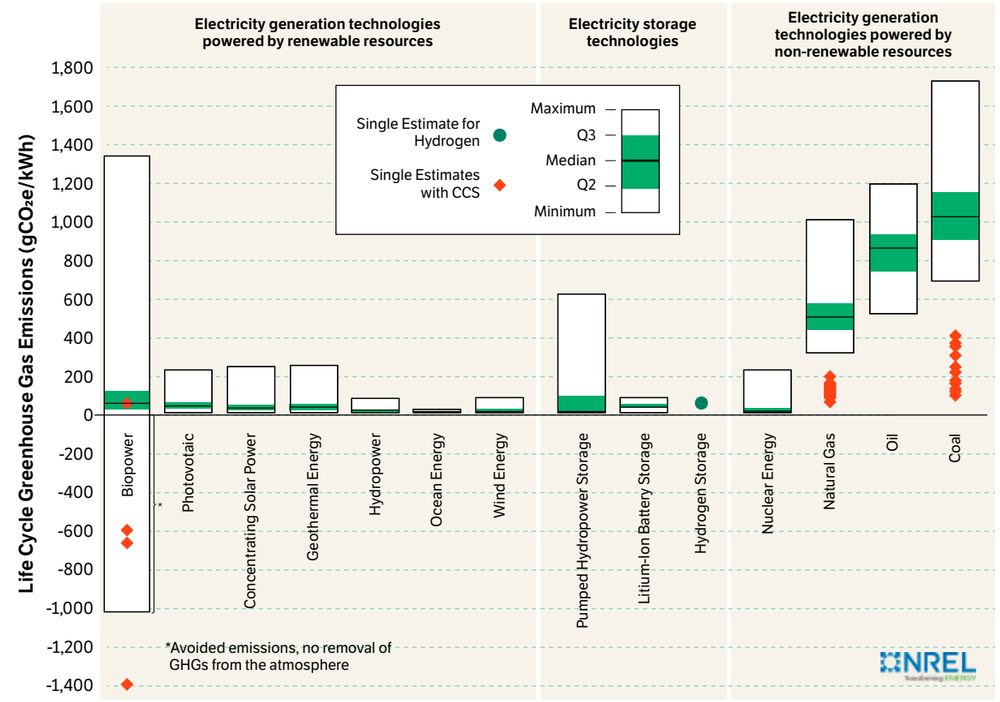
Choice of metrics

To be consistent with other global taxonomies including the EU Taxonomy, the primary metric for measuring emissions for electricity generation is **gCO_2e/kWh**. The Green thresholds are based on lifecycle assessment (LCA) in line with EU Taxonomy.

Ultimately, lifecycle emissions are essential to account for GHG emissions throughout the value chain of electricity production processes (e.g., electricity generation from natural gas can have significantly large emissions due to methane leakage during extraction, transportation, and distribution in addition to combustion). National Renewable Energy Laboratory (NREL) data on the following page shows the huge range of emissions.

Hence a lifecycle-based threshold is useful to check GHG emissions across the entire supply chain and not just during combustion.

[20]Based on direct emissions https://www.transitionpathwayinitiative.org/publications/2021-carbon-performance-assessment-of-electricity-utilities-note-on-methodology.pdf?type=Publication



Estimates	**276(+4)**	**46**	**36**	**35**	**149**	**10**	**186**	**16**	**29**	**1**	**99**	**80(+11)**	**24**	**164(+11)**
References	**57(+2)**	**17**	**10**	**15**	**22**	**5**	**69**	**4**	**3**	**1**	**27**	**47(+11)**	**10**	**53(+9)**

Figure 5: Lifecycle emissions range for types of electricity generation[21]

While LCA is utilised in EU Taxonomy, generally direct emissions are used for energy utility pathways (e.g. TPI, International Energy Agency (IEA)) with the assumption that upstream emissions will be allocated in other pathways.

For this reason, direct emissions are used for amber activity criteria. This also makes them more usable in the short term as understanding of LCA methodologies improves. While the GFIT recognises that there is some risk in using direct emissions, this is seen to be low given that the thresholds are not applicable to electricity generation from fossil fuels and only to transmission and distribution (T&D) or renewable energy.

Upper thresholds

Table 1 shows the proposed emissions intensity thresholds from 2023 to 2035. Note that future thresholds beyond 2035 are indicative but may be subject to change based on new technologies or changing science.

For amber thresholds, this is based on the TPI energy modelling above where the 2030 threshold for 2°C scenario is at 220gCO_2e/kWh for grid average. The rationale for the 220gCO_2e/kWh in the short term would be to import electricity that has significantly low enough average emissions than the current grid as to act as a lever for significant emissions reduction to decarbonize the grid average in the short. Having a higher threshold would not serve a purpose as would not be significantly different from electricity that can already be produced in Singapore.

The proposal is to allow direct emissions to be utilised in the short term to allow users the chance to understand and measure lifecycle emissions methodologies. Following this, lifecycle emissions should be used to ensure that fugitive emissions are not high enough to mean that there is no climate value to the importation of electricity as a decarbonisation lever.

[21]National Renewable Energy Laboratory, 2021, https://www.nrel.gov/docs/fy21osti/80580.pdf

Table 1 — Criteria for activities: Thresholds for electricity generation activities (gCO_2e/kWh)

	2023–2030 (gCO_2e/kWh)	2031–2035 (gCO_2e/kWh)	2036–2040*	2041–2050*	Justification
Green (lifecycle emissions)	**≤100**	**≤100**	**≤90**	**≤50**	**EU threshold applied**
Amber (direct emissions)	≤220	≤150	N.A.	N.A.	Based on TPI 2°C scenario where threshold is taken from intersection of line at end point year and rounded to nearest 10 (e.g. 2023–2028 uses 2028 intersection)
Ineligible activities	>220 Exclusions: All solid fossil fuels (coal, petcoke, lignite etc)	>150 Exclusions: All solid fossil fuels	>90	>50	

*Thresholds beyond 2035 are indicative but may be subject to change based on new technologies or evolving scientific views.

Criteria for measures: use of proceeds investments

In addition to the criteria for eligible revenue and whole activities, as described above, certain measures are included here as eligible for use of proceeds investments typically debt financing via bond/loan format.

Table 2.1 — Criteria for Amber measures: use of proceeds eligible investments

	2022–2035*
Green measures	Not applicable
Amber measures	Meet one of the following criteria: • Retrofit of existing power plants to allow hydrogen or its derivatives (e.g. ammonia) that meet the CCGT technological readiness thresholds and criteria in Table 2.2, or • New power plants (e.g. CCGTs or fuel cells) that can allow hydrogen or its derivatives (e.g. ammonia) that meet the CCGT technological readiness thresholds and criteria in Table 2.2, or • Retrofit of existing plants with CCS that is designed at the outset to allow the facility to meet the green criteria by 2035 at the latest, or • New power plants that capture at least 50% of emissions and and are designed to meet green activity criteria by a 2035 at the latest, or • Retrofit of existing transmission and distribution networks that allow ≥50vol% low-carbon gases, or • New transmission and distribution networks that allow ≥50vol% low-carbon gases, or • Retrofit of existing storage systems that allow ≥50vol% low-carbon gases, or • New storage systems that allow ≥50vol% low-carbon gases; or • Other investments directly supporting or facilitating hydrogen uptake in the plant are eligible if the measures result in the new plant to allow ≥50vol% hydrogen or its derivatives, (e.g. purchase, operation, and maintenance measures). And, all measures must meet the following criteria: • The power cannot be generated from renewable energy sources, based on a comparative assessment with the most cost-effective and technically feasible renewable alternative for the same capacity identified; the result of this comparative assessment is published and is subject to a stakeholder consultation Amber measures can be new and qualifying measures do not need to meet the amber activity thresholds in Table 1
Ineligible activities	N.A.

*Criteria have an initial sunset date of 2035 after which point they will not be applicable. The criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology.

Note: Renewable and low-carbon gases include non-fossil gaseous fuels, such as biomethane and biogas, as well as hydrogen and its derivatives.

Table 2.2 — Criteria for Amber measures: Specific thresholds for CCGT capability to allow for hydrogen or its derivatives

Timeline	2023–2028 (vol%)	2029–2032 (vol%)	2033–2035 (vol%)
Amber measures: CCGT technological readiness for hydrogen or its derivatives	30	50	100*
	New plants need to meet the thresholds set out in the amber measures table. For e.g., CCGTs that secures financing from 2029 need to be 50% hydrogen-ready at the onset. *However, the proposed threshold of 100% vol from 2033 is intended to be read as forward guidance for countries like Singapore which are alternative energy disadvantaged. Singapore's ability to tap on low-carbon hydrogen to decarbonise will depend on the availability and security of low-carbon hydrogen supply chain in the future given that we are alternative energy disadvantaged and would not have excess renewable energy to produce low-carbon hydrogen domestically. Furthermore, as 100% hydrogen-ready CCGTs (utility scale) are still being developed and it is uncertain whether such CCGTs can also run on natural gas for baseload generation to meet Singapore's energy demand before hydrogen supply is available and as a backup fuel option in case of hydrogen supply disruption. Hence it may not be feasible for companies to deploy 100% hydrogen-ready CCGTs before hydrogen supply is ready in Singapore. For 2033-2035, the deployment of new 50-100% hydrogen-ready CCGT would be provided as a forward guidance by EMA, based on when we expect utility-scale units to be available with acceptable reliability, efficiency, and baseload compatibility with natural gas. For CCGTs that had secured financing before the thresholds were ratcheted up in 2029 and 2033, the plants will have to demonstrate that they have an entity level target to retrofit and be 100% ready no later by 2035 if not earlier. The 2035 timeline to complete retrofitting is not applicable to countries like Singapore which are alternative energy disadvantaged. Singapore recognises the importance for companies to commit to retrofit the CCGT to be 100% hydrogen-ready to meet Singapore's net-zero commitment. Given the constraints mentioned above, the timeline to retrofit to 100% hydrogen-ready for Singapore CCGTs will be based on EMA's forward guidance, e.g. through Singapore's Emission Standards, when EMA requires CCGTs to be retrofitted to 100% hydrogen-ready with baseload compatibility with natural gas.		

As technology evolves quickly, Singapore will continuously monitor and study the hydrogen-readiness and technology viability of utility-scale generation units and will review the trajectory to encourage the adoption of cleaner technologies when they are technically viable. This is to ensure that Singapore is on track to achieving our net zero by 2050 ambition.

Activity technical screening criteria

1.1. Electricity generation using solar PV and CSP (including electricity, heat, cool)

Sector	Energy	
Activity	**Energy from solar PV and CSP (including electricity, heat, cool)**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	This class includes the generation of bulk electric power, transmission from generating facilities to distribution centers and distribution to end users. This class includes: • operation of generation facilities that produce electric energy, including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable • operation of transmission systems that convey the electricity from the generation facility to the distribution system • operation of distribution systems (i.e. consisting of lines, poles, meters, and wiring) that convey electric power received from the generation facility or the transmission system to the final consumer • sale of electricity to the user • activities of electric power brokers or agents that arrange the sale of electricity via power distribution systems operated by others operation of electricity and transmission capacity exchanges for electric power	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	All energy generation activities from solar PV and solar CSP are directly eligible	EU Taxonomy
Amber	N.A.	
Ineligible activities	Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.2. Electricity generation from wind power

Sector	Energy	
Activity	**Wind power generation**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• All energy generation activities from solar PV and solar CSP are directly eligible	EU Taxonomy
Amber	• N.A.	
Ineligible activities	• Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.3. Electricity generation from hydropower

Sector	Energy	
Activity	**Hydropower generation**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	All pumped storage systems for hydropower plants that comply with either of the criteria are eligible. • Power density greater than 5W/m^2 or • Emission intensity measured during the lifecycle of the power plant is less than 100gCO_2e/kWh	EU Taxonomy
Amber	• Existing facilities meeting amber threshold as defined in Table 1	
Ineligible activities	• Facilities that do not meet green or amber criteria • Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.4. Electricity generation from geothermal energy

Sector	Energy	
Activity	**Geothermal energy generation (including electricity, heat, cool)**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• Emission intensity measured during the lifecycle of the power plant is less than 100gCO_2e/kWh	EU Taxonomy
Amber	• Existing facilities meeting amber threshold as defined in Table 1	
Ineligible activities	• Facilities that do not meet Green or Amber criteria • Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.5. Electricity generation from bioenergy power

Sector	Energy	
Activity	**Bioenergy power generation (including electricity, heat, cool)**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	Bioenergy power generation that complies with all of the criteria is eligible • Emission intensity measured during the lifecycle of the power plant is less than 100gCO_2e/kWh, and • Bioenergy produced from waste (e.g., agriculture, municipal sources) are eligible, or • Feedstock used for production of bioenergy should comply with one of the following standards: ○ Forest Stewardship Council (FSC) ○ Biomass Biofuels voluntary scheme (2BSvs) ○ Bonsucro (Better Sugarcane Initiative) ○ Roundtable of Sustainable Biomaterials (RSB) ○ Round Table on Responsible Soy (RTRS) ○ International Sustainability and Carbon Certification (ISCC and/or ISCC plus)	EU Taxonomy
Amber	All existing bioenergy power generation facilities that comply with all/or any or the criteria is eligible • Lifecycle emissions intensity meets amber criteria as defined in Table 1, and • Bioenergy produced from waste (e.g., agriculture, municipal sources) are eligible, or • Feedstock used for production of bioenergy should comply with one of the following standards: ○ Forest Stewardship Council (FSC) ○ Biomass Biofuels voluntary scheme (2BSvs) ○ Bonsucro (Better Sugarcane Initiative) ○ Roundtable of Sustainable Biomaterials (RSB) ○ Round Table on Responsible Soy (RTRS) ○ International Sustainability and Carbon Certification (ISCC and/or ISCC plus)	
Ineligible activities	• Facilities that do not meet Green or Amber criteria • Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.6. Electricity generation from ocean energy

Sector	Energy	
Activity	**Electricity generation from ocean energy**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• All electricity generation activities from ocean energy are directly eligible	EU Taxonomy
Amber	• N.A.	
Ineligible activities	• Facilities that do not meet Green or Amber criteria • Power plants dedicated to support fossil fuel infrastructure (e.g., operations of fossil fuel activities) are ineligible	

1.7. Transmission and distribution of electricity

Sector	Energy	
Activity	**Transmission and distribution of electricity**	
ISIC Code	3510 Electric power generation, transmission and distribution	
ISIC Description	As above	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • Transmission and distribution infrastructure dedicated to a direct connection or an expansion of connection between power plants with energy intensities less than 100gCO_2e/kWh (lifecycle emissions) are directly eligible, or • Transmission and distribution infrastructure dedicated to a inter-country/region direct or grid connection to access existing or new power plants with energy intensities less than 100gCO_2e/kWh (lifecycle emissions) are directly eligible, or • Transmission and distribution infrastructure that is on a decarbonisation trajectory where at least 67% of the newly connected generation capacity in the system is below the generation threshold value of 100gCO_2e/kWh measured on a Product Carbon Footprint (PCF) basis, over a rolling five-year period; or the average system grid emissions factor is below the threshold value of 100gCO_2e/kWh measured on a PCF basis, over a rolling five-year average period. All enabling ICT systems and smart management systems and those required for procurement of electricity that meet the green thresholds are eligible. Methodology note: The energy intensity computation of the infrastructure must be carried out for the electricity grid network under consideration. For interconnected grids, the computation must be carried out for the whole network.	EU Taxonomy
Amber	The activity complies with one of the following criteria: • Transmission and distribution infrastructure dedicated to a inter-country/region direct or grid connection to access existing or new power plants that is less than amber threshold defined in Table 1 • Power purchase agreements of electricity meeting amber thresholds defined in Table 1 • Sunset date: 2035 All enabling ICT systems and smart management systems and those required for procurement of electricity that meets the amber criteria are eligible. Methodology note: The energy intensity computation of the infrastructure can be assessed on a project portfolio basis. For interconnected grids, the computation must be carried out for the whole network.	TPI electricity generation thresholds 2°C
Ineligible activities	• Transmission and distribution infrastructure dedicated to connecting fossil fuel plants to the grid Transmission and distribution infrastructure dedicated to a inter-country/region direct or grid connection to access existing or new power plants that is greater than amber thresholds defined in Table 1.	

1.8. Transmission and distribution of renewable and low-carbon gases

Sector	Energy	
Activity	**Transmission and distribution of renewable and low-carbon gases, including but not limited to low-carbon hydrogen and its derivatives such as ammonia**	
ISIC Code	3520: Manufacture of gas; distribution of gaseous fuels through mains 4930: Transport via pipeline	
ISIC Description	Scope considerations for Singapore Taxonomy: Activities are covered by 2 separate ISIC codes (description below). Only distribution of natural synthetic gas is in scope for this Taxonomy either via pipeline or through mains. Manufacture is out of scope. Pipeline transport of other commodities (water, slurry) is out of scope. 3520: This class includes the manufacture of gas and the distribution of natural or synthetic gas to the consumer through a system of mains. Gas marketers or brokers, which arrange the sale of natural gas over distribution systems operated by others, are included. The separate operation of gas pipelines, typically done over long distances, connecting producers with distributors of gas, or between urban centers, is excluded from this class and classified with other pipeline transport activities. 4910: This class includes: transport of gases, liquids, water, slurry, and other commodities via pipelines. This class also includes: operation of pump stations	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • Transmission and distribution networks of low-carbon gases • Retrofit of natural gas distribution lines to allow 100% hydrogen and/or its derivatives and/or other low-carbon gases The activity includes leak detection and repair of existing gas pipelines and other network elements to reduce methane leakage.	EU Taxonomy
Amber	The activity/measure complies with one of the following criteria: • Transmission and distribution networks transporting at least 50vol% of low-carbon gases or • Retrofit of natural gas distribution lines to allow > 50vol% of low-carbon gases	
Ineligible activities	• Transmission and distribution infrastructure that do not meet the Green or Amber criteria • Transmission and distribution of fossil gas is excluded	

1.9. Storage of electricity

Sector	Energy	
Activity	**Storage of electricity**	
ISIC Code	N.A. (not listed as activity in ISIC)	
ISIC Description	From EU Taxonomy: Construction and operation of facilities that store electricity and return it at a later time in the form of electricity. The activity includes pumped hydropower storage.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity is the construction and operation of electricity storage including: • mechanical energy storage systems, or • thermal energy storage systems, or • pumped hydropower storage, or • electrochemical storage systems, or Where the activity includes chemical energy storage, the medium of storage, complies with the criteria for manufacturing of the corresponding product specified in this document. The energy intensity computation of the infrastructure can be assessed on a project portfolio basis.	EU Taxonomy
Amber	N.A.	
Ineligible activities	N.A.	

1.10. Storage of hydrogen or its derivatives

Sector	Energy	
Activity	**Storage of hydrogen or its derivatives**	
ISIC Code	N.A.	
ISIC Description	N.A.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • construction of hydrogen storage facilities; • conversion of existing underground gas storage facilities into storage facilities dedicated to hydrogen-storage; • operation of hydrogen storage facilities that meet the green criteria and scope in the hydrogen production activity outlined in 4.4.	EU Taxonomy
Amber	All operation of storage systems for hydrogen which cradle to gate emissions meet the Taxonomy criteria for "manufacturing of hydrogen" activity (see 4.4), and of which the scope of lifecycle-emissions includes conversion and transport of hydrogen carriers are eligible as amber until the criteria determining the thresholds for conversion and transport of hydrogen carriers become available and introduced in the taxonomy. Once available, hydrogen storage systems could be considered green if green thresholds are met under 'manufacturing of hydrogen' activity, as well as future activities on 'hydrogen conversion' and 'transportation of hydrogen carriers'. It is recommended that the inclusion of thresholds for conversion and transport of hydrogen carriers should happen before 2030.	
Ineligible activities	N.A.	

[22]Gaseous fuels originating from renewable (non-fossil) and sustainable feedstocks such as waste or other sources that meet relevant taxonomy thresholds.
[23]Note: Hydrogen is understood to be explosive if blended at levels higher than 10% and therefore may not relevant here as part of the low-carbon gas mix. This may change with new engineering developments/technologies. T&D infrastructure capable of transporting 100% H_2 are eligible.

1.11. Electricity generation from hydrogen or its derivatives (e.g. ammonia)

Sector	Energy
Activity	**Electricity generation from hydrogen or its derivatives (e.g. ammonia)**
ISIC Code	3510: Electric power generation, transmission, and distribution
ISIC Description	As above
Objective	Climate change mitigation

Traffic Light	Criteria	Reference
Green	The activity complies with all of the following criteria: • Emission intensity measured during the lifecycle of the power plant is less than 100gCO_2e/kWh[24]; and • the power cannot be generated from renewable energy sources, based on a comparative assessment with the most cost-effective and technically feasible renewable alternative for the same capacity identified; the result of this comparative assessment is published and is subject to a stakeholder consultation[25].	EU Taxonomy
Amber (activity)	• New or retrofit of existing facilities to meet Amber threshold	Utilise TPI electricity generation thresholds 2°C
Amber (measure)	Eligible CapEx measures can meet any one of these • Retrofit of existing power generation facilities (e.g. CCGT, fuel cells) to allow hydrogen or its derivatives that meet the CCGT technological readiness thresholds and criteria in Table 2.2, or • New power plants (e.g. CCGT, fuel cells) that can allow ≥50vol% hydrogen , or • Other CapEx investments directly supporting or facilitating hydrogen uptake in the plant are eligible if the measures result in the new plant to allow hydrogen or its derivatives that meet the CCGT technological readiness thresholds and criteria in Table 2.2 And, all measures must meet the following criteria: • the power cannot be generated from renewable energy sources, based on a comparative assessment with the most cost-effective and technically feasible renewable alternative for the same capacity identified; the result of this comparative assessment is published and is subject to a stakeholder consultation Note: Amber measures can be new and qualifying measures do not need to meet the Amber activity criteria in Table 1.	Singapore -specific approach
Ineligible activities	N.A.	

[24]Note: Generation of electricity from hydrogen is an inefficient process because the process involves using renewable energy to first produce hydrogen which is later reconverted to electricity. The reconversion process could be avoided by directly using the renewable energy produced. In Singapore, however, this is permitted due to the following conditions: i) On-site renewable energy production capacity is not sufficient to meet the demand, ii) There is no sufficient availability of renewable energy for purchase to meet the demand.
[25]Further guidance on comparative assessments will follow.

1.12. Electricity generation from fossil gaseous fuels

Sector	Energy
Activity	**Electricity generation from fossil gaseous fuels**
ISIC Code	3510: Electric power generation, transmission and distribution
ISIC Description	As above
Objective	Climate change mitigation

Traffic Light	Criteria	Reference
Green	The activity meets the following criteria: • Lifecycle GHG emissions from the generation of electricity using fossil gaseous fuels are lower than 100gCO_2e/kWh. • Lifecycle GHG emissions are calculated based on project-specific data, using ISO 14067:2018 or ISO 14064-1:2018. • Quantified lifecycle GHG emissions are verified by an independent third party. • CCS is eligible as a lever for the activity to meet the green thresholds as defined in Table 1.	EU Complimentary Delegated Act
Amber (activity)	• New or retrofit of existing facilities to meet Amber threshold	Utilise TPI electricity generation thresholds 2°C
Amber (measure)	Eligible CapEx measures can meet any one of the following: • Retrofit of existing power plants to allow hydrogen or its derivatives that meet the CCGT technological readiness thresholds and criteria in Table 2.2, or • New power plants that can allow hydrogen or its derivatives the CCGT technological readiness thresholds and criteria in Table 2.2, or • Other investments directly supporting or facilitating hydrogen uptake in the plant are eligible if the measures result in the new plant to allow for share (by volume) of hydrogen or its derivatives to reach or exceed thresholds described in Table 2.1 (e.g. purchase, operation, and maintenance measures), or • Retrofit of existing plants with CCS that is designed at the outset to allow the facility to meet the green criteria by 2035 at the latest. Or • New power plants that capture at least 50% of emissions and are designed to meet Green criteria by 2035 at the latest. And, all measures must meet the following criteria: • The power cannot be generated from renewable energy sources, based on a comparative assessment with the most cost-effective and technically feasible renewable alternative for the same capacity identified; the result of this comparative assessment is published and is subject to a stakeholder consultation. Note: Amber measures can be new	Singapore-specific approach
Ineligible activities	N.A.	

1.13. District heating and cooling systems

Sector	Energy	
Activity	**District heating and cooling systems**	
ISIC Code	3530 Steam and air conditioning supply	
ISIC Description	Construction, refurbishment and operation of pipelines and associated infrastructure for distribution of heating and cooling, ending at the sub-station or heat exchanger	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	All activities related to district heating and cooling are eligible	EU Taxonomy
Amber (activity)	N.A. (Activity already meets Green criteria)	
Amber (measure)	N.A.	
Ineligible activities	N.A.	

1.14. Production of heat or cool from waste heat

Sector	Energy	
Activity	**District heating and cooling systems**	
ISIC Code	3530 Steam and air conditioning supply	
ISIC Description	This class includes: • production, collection and distribution of steam and hot water for heating, power and other purposes • production and distribution of cooled air • production and distribution of chilled water for cooling purposes • production of ice, including ice for food and non-food (e.g. cooling) purposes	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	All activities related to the production of heat or cool from waste heat are eligible	EU Taxonomy
Amber (activity)	N.A. (Activity already meets Green criteria)	
Ineligible activities	N.A.	

1.15. Decommissioning of fossil-fuel power plants

Addressed in separate Appendix P.

2 — Transport

Context

Technical screening criteria for activities within the Transport sector primarily rely on the EU Taxonomy and the Climate Bonds Initiative Taxonomy. However, many of the interim flexibilities offered by these taxonomies for some economic activities within the transport sector (e.g., until the end of 2025, low and zero emission light-duty vehicles that do not exceed the threshold of 50gCO_2/km can be regarded as taxonomy aligned) have not been adopted in this Taxonomy, as their very limited period of applicability (e.g., up to 2025) limits their relevance for this Taxonomy.

The process of designing technical screening criteria also considered the key transport-related initiatives and targets announced by the Singapore Government, in support of its enhanced Nationally Determined Contribution, Long Term Low-Emissions Development Strategy, and the Singapore Green Plan[26].

For shipping technical screening criteria for green category have been put forward based on Climate Bonds Initiative Criteria developed for the sector. The metrics used by CBI include Energy Efficiency Operational Index and The Annual Efficiency Ratio as defined by IMO. For Amber we refer to the emission reduction ambition levels devised by IMO. While it is not significant for Singapore itself, inland water transport has been included, given the objective of the Taxonomy to cater to the needs of the international financial institutions operating in Singapore.

Given the characteristics of the Transport sector and inherently limited opportunities to improve existing assets with regards to energy efficiency measures and/or reduction of GHG emissions, the decarbonisation of the transport sector predominantly relies on the fast roll-out of zero-emission solutions and phase out of emissions-intensive technologies. Hence, selected activities within the transport sector do not have an Amber category, especially activities for which zero-emission alternatives exist. Thus, the Amber category is only available for heavy-duty vehicles, sea and coastal water transport, land water transport, and air transport.

Sunset date at 2030 applies for amber category for sea and coastal transport for activities aligned with IMO pathways. Amber criteria for inland water transport will have to be revised, for the taxonomy to offer guidance on thresholds beyond 2025. Amber criteria for heavy-duty vehicles will have to be revised by 2030 the latest. Similarly, the sunset date stated under amber measures for air transport applies only to the stated criteria for Sustainable Aviation Fuels (SAF) and not SAF as a measure. Appropriate thresholds for SAF will be considered in subsequent editions to reflect latest developments, recognizing that SAF is a key decarbonisation lever for the international aviation sector that will feature till 2050 and beyond and ICAO is still in the midst of developing an overall decarbonisation pathway for international aviation.

Only existing projects are eligible in the Amber categories. The exception is for new projects in sea and coastal, and inland water transport Amber (measures) that have to demonstrate their ability to retrofitted to be Green-eligible before the sunset date, or can be switched to renewables – for e.g., dual-fuel vessels that can switch to renewables. New projects under Air Transport, Amber (measures) such as Sustainable Aviation Fuel are also allowed.

[26] https://www.greenplan.gov.sg/files/resources/cos-sgp-factsheet.pdf
[27] https://www.climatebonds.net/standard/shipping

TSC overview and methodology

Category	Main criteria	Additional metrics
Green	**Land transport:** Zero tailpipe emissions **Sea and coastal water transport:** aligned and well-below 2°C pathway determined by Climate Bonds Initiative. Once credible, science-based, and 1.5°C-aligned pathway developed by IMO becomes available, it will be reviewed for inclusion in the Singapore Taxonomy. **Air transport :** Zero tailpipe emissions aircraft Once credible, science-based, and 1.5°C-aligned pathway developed by ICAO becomes available, it will be reviewed for inclusion in the GFIT Taxonomy.	• Percentage improvements; • gCO_2/t-km; • Energy Efficiency Operational Index and The Annual Efficiency Ratio as defined by IMO
Amber (activity)	**Road freight transport:** outperforming best-on-the market approach – the EU approach **Sea and coastal water transport:** aligned with IMO Strategy on Reduction of GHGs[28]	• Percentage improvement for selected activities
Amber (measure)	**Sea and coastal water transport:** Dual-fuel vessels that can be switched to operate on renewables and these, which design allows for modernisation to operate on renewables **Inland water transport:** Dual-fuel vessels that can be switched to operate on renewables and vessels that do not exceed certain emissions threshold **Air transport :** Sustainable Aviation Fuels	
Ineligible activities	Exceeding Green or Amber criteria	

[28]https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/annex/2023%20IMO%20Strategy%20on%20Reduction%20of%20GHG%20Emissions%20from%20Ships.pdf

Activity technical screening criteria

2.1. Transport via railways

Sector	Transport	
Activity	**Transport via railways**	
ISIC Code	491	
ISIC Description	This group includes rail transportation of passengers and/or freight using railroad rolling stock on mainline networks, usually spread over an extensive geographic area. Freight rail transport over short-line freight railroads is included here.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • The trains and passenger coaches/wagons have zero direct (tailpipe) CO_2 emissions; or • The trains and passenger coaches/wagons have zero direct (tailpipe) CO_2 emission when operated on a track with necessary infrastructure and use a conventional engine where such infrastructure is not available (bimode). And • The trains and wagons are not dedicated to fossil fuel transport.	EU Taxonomy criteria. Adopted from the EU Taxonomy, there are no substantial differences between the proposed criteria and the EU Taxonomy for Green category
Amber	• N.A. Electric railway already meets Green criteria.	
Ineligible activities	• Activities that do not meet Green or Amber criteria.	

2.2. Other passenger land transport

Sector	Transport	
Activity	**Other passenger land transport**	
ISIC Code	4922	
ISIC Description	This class includes scheduled long-distance bus services; charters, excursions and other occasional coach services; passenger cars; passenger motorcycles; taxi operation, and airport ground handling vehicles and equipment (for passenger and freight transport). This class also includes other renting of private cars with driver; operation of school buses and buses for transport of employees.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• Direct (tailpipe) CO_2 emissions of the vehicle are zero.	Adapted from the EU Taxonomy for zero-emission vehicles. Low-emissions light-duty vehicle threshold set by the EU Taxonomy not applied here given limited period of applicability (2025), and targets set by SG Green Plan for clean vehicles.
Amber	•N.A. (Technology sufficiently advanced for new vehicles to comply with green criteria. Not applicable for existing vehicles given the difficulty in retrofitting existing vehicles.)	
Ineligible activities	• Activities that do not meet Green or Amber criteria.	

2.3. Urban and suburban passenger land transport

Sector	Transport	
Activity	**Urban and suburban passenger land transport**	
ISIC Code	4921	
ISIC Description	This class includes: land transport of passengers by urban or suburban transport systems. This may include different modes of land transport, such as by motorbus, tramway, streetcar, trolley bus, underground and elevated railways etc. The transport is carried out on scheduled routes normally following a fixed time schedule, entailing the picking up and setting down of passengers at normally fixed stops. This class also includes town-to-airport or town-to-station lines; operation of funicular railways, aerial cableways etc. if part of urban or suburban transit systems.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	For scheduled passenger road transport, the activity complies with the following criteria: • The activity provides urban or suburban passenger transport, and its direct tailpipe CO_2 emissions are zero. For scheduled passenger urban suburban rail transport, the activity complies with one of the following criteria: • The trains and passenger coaches have zero direct tailpipe CO_2 emissions; the trains and passenger coaches have zero direct tailpipe CO_2 emission when operated on a track with necessary infrastructure, and use a conventional engine where such infrastructure is not available (bimode), or • Direct tailpipe CO_2 emissions of the vehicle are zero.	Adapted from the EU Taxonomy for zero-emission vehicles Other requirements set by the EU Taxonomy for M2 and M3 vehicles of EURO VI standard not applied given the limited period of applicability (2025), and targets set by SG Green Plan for clean buses EURO VI is already mandatory for newly registered light and heavy duty vehicles such requirement would not introduce new value.
Amber	• N.A. for existing vehicles given difficulty of retrofit. In line with this, only zero tailpipe are eligible.	
Ineligible activities	• Activities that do not meet Green or Amber criteria	

2.4. Freight transport by road

Sector	Transport	
Activity	**Freight transport by road**	
ISIC Code	4923	
ISIC Description	This class includes all freight transport operations by road; logging haulage; stock haulage; refrigerated haulage; heavy haulage; bulk haulage, including haulage in tanker trucks; haulage of automobiles; transport of waste and waste materials, without collection or disposal. This class also includes furniture removal; renting of trucks with driver; freight transport by man or animal-drawn vehicles.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• Direct tailpipe CO_2 emissions of the vehicle are zero; and • Vehicles are not dedicated to fossil fuel transport.	Adapted from the EU Taxonomy – green category entails zero-emission vehicles.
Amber	• Amber category is available only for vehicles dedicated to freight transport having a maximum mass exceeding 3.5t[29] and thresholds are to be revised by 2030 the latest: • A heavy-duty vehicle has specific CO_2 emissions of less than half of the reference CO_2 emissions of all vehicles in the vehicle sub-group to which the vehicle belongs – i.e. has better emissions than 50th percentile of vehicles in the same class, and • Vehicles are not dedicated to fossil fuel transport.	Amber utilises EU provisions around low-emissions heavy-duty vehicles with EU Taxonomy criteria split between green and amber depending on the emission levels.
Ineligible activities	• Activities that do not meet Green or Amber criteria.	

[29]This is noted as the limit because there are limited technological options available for zero tail pipe emissions for vehicles in this category.

2.5. Low-carbon transport infrastructure

Sector	Transport	
Activity	**Transport infrastructure**	
ISIC Code	N.A.	
ISIC Description	N.A.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**

Green	The objective of the infrastructure (and the associated ancillary activities necessary for construction and operation) that is constructed and operated is dedicated to supporting the development of one or more of the following modes of transport and is listed in the associated category and meets the associated criteria, if available:
	
	Personal mobility or cycle logistics
	
	• Pavements, bike lanes and pedestrian zones, parking provisions for active mobility modes, electrical charging and hydrogen refueling installations for personal mobility devices.
	
	Rail transport (infrastructure is within the scope of at least one of the bullet points listed)
	
	• For electrified trackside infrastructure and associated subsystems: infrastructure, installations and related facilities, energy, on-board control-command and signaling, and trackside control-command and signaling subsystems.
	• For new and existing trackside infrastructure and associated subsystems where there is a plan for electrification as regards line tracks, and, to the extent necessary for electric train operations, as regards sidings, or where the infrastructure will be fit for use by zero tailpipe CO_2 emission trains within 10 years from the beginning of the activity: infrastructure, energy, on-board control-command and signaling, and trackside control-command and signaling subsystems.
	• The infrastructure and installations that principally facilitate transshipping freight between the modes: terminal infrastructure and superstructures for loading, unloading and transshipment of goods.
	• Infrastructure, installations and related facilities that principally facilitate the transfer of passengers from rail to rail or from other modes to rail.
	
	Road transport (infrastructure is within the scope of at least one of the bullet points listed)
	
	• Electric Vehicle (EV) charging solutions (e.g. EV charging points, swap stations, cabinets etc.) which could include, but is not limited to:
	  ○ electricity grid connection upgrades necessary to support the deployment and operation of infrastructure for charging an EV;
	  ○ all other solutions related to optimising and/or providing the necessary electrical capacity to support the deployment and operation of EV charging solutions;
	
	• Hydrogen fueling stations;
	• Electric road systems (ERS)
	• The infrastructure and installations that principally facilitate transshipping freight between the modes: terminal infrastructure and superstructures for loading, unloading and transshipment of goods.
	• The infrastructure, installations, and related facilities that principally facilitate urban and suburban public passenger transport, including associated signaling systems for metro, tram and rail systems.
		EU Taxonomy

Traffic Light	Criteria	Reference
Green	Water transport (infrastructure is within the scope of at least one of the bullet points listed) • Electricity charging, hydrogen-based refueling. • The infrastructure is dedicated to the provision of shore-side electrical power to vessels at berth. • The infrastructure is dedicated to the performance of the port's own operations with zero direct tailpipe CO_2 emissions. • The infrastructure and installations are dedicated to transshipping freight between the modes: terminal infrastructure and superstructures for loading, unloading and transshipment of goods. Airports and air transport (infrastructure is within the scope of at least one of the bullet points listed) • The infrastructure is dedicated to the provision of fixed electrical ground power and preconditioned air to stationary aircraft, as well as electrical charging and hydrogen refueling for aircraft and ground handling vehicles and equipment at the airport. • The infrastructure is dedicated to support and enable zero-emission aviation including but not limited to: electric charging points, electricity grid upgrades, hydrogen refueling stations, resource circularity, renewable energy, optimise energy and systems efficiency to reduce emissions from airport's own operations. • Air traffic management infrastructure / processes / activities dedicated to enable zero-emission aviation.[30]	Adapted from the EU Taxonomy – Green category entails zero-emission vehicles.
Amber	• N.A. (Enabling infrastructure supports green criteria)	
Ineligible activities	• Infrastructure dedicated to the transport or storage of fossil fuels. • Infrastructure used for operation of fossil fuel-based transport (passenger and freight)	

[30]Possible measures include but are not limited to those captured in Appendix M4 of the ICAO's Report on the Feasibility of a Long-term Aspirational Goal. These measures are also in line with ICAO's Global Air Navigation Plan (GANP) and the Aviation System Block Upgrades (ASBUs).

2.6. Sea and coastal water transport

Sector	Transport
Activity	**Sea and coastal water transport**
ISIC Code	501
ISIC Description	This class includes transport of passengers or freight overseas and coastal waters, whether scheduled or not; operation of excursion, cruise or sightseeing boats; operation of ferries, water taxis etc.; operation of harbour crafts; transport of freight overseas and coastal waters, whether scheduled or not; transport by towing or pushing of barges, oil rigs etc. This class also includes rental of pleasure boats with crew for sea and coastal water transport.
Objective	Climate change mitigation

Traffic Light	Criteria	Reference
Green	The activity complies with one of the following criteria: • Vessel has zero direct tailpipe CO_2 emissions; with an emphasis on tank-to-wake emissions and taking into account the IMO's guidelines on lifecycle analysis of fuels; or • Vessel derives 100% of the energy used onboard from fuels or other energy carriers which achieve at least 80% greenhouse gas emission savings compared to their fossil fuel equivalent on a Tank-To-Wake basis; or • Vessel has to comply with emission intensity thresholds (Table 3) set by CBI criteria[31] throughout its economic life. And Vessels are not dedicated to the transport of fossil fuels. And If vessels are using biofuels these must: • Meet the Taxonomy Green criteria for biofuels indicated in the Energy sector and • Be recognised by the IMO as relevant and eligible fuels/energy carriers used for propulsion and operation of ships taking into account the IMO's Guidelines on the Lifecycle GHG Intensity of Marine Fuels (LCA Guidelines)" The fleet type and size category median values in EEOI[32] and AER[33] for each decade starting from 2020 to 2050. Table 3 — Emissions intensity thresholds for shipping	CBI Criteria EU Taxonomy. The approach, uses the same metrics as the EU Taxonomy which are also used by IMO, however it goes beyond what is offered by EU by providing the long-term decarbonisation pathway. Vessels are not dedicated to fossil fuel transport. Once credible, science-based, and 1.5°C-aligned pathway developed by IMO becomes available, it will be reviewed for inclusion in the Taxonomy.

Type	Size	2020 EEOI/AER	2030 EEOI/AER	2040 EEOI/AER	2050
Bulk carrier	0-9999 DWT	35.1 / 24.6	23.4 / 16.4	11.7 / 8.2	0
Bulk carrier	10000-34999 DWT	12.2 / 6.6	8.1 / 4.4	4.1 / 2.2	0
Bulk carrier	35000-59999 DWT	9.2 / 4.6	6.2 / 3.1	3.1 / 1.5	0
Bulk carrier	60000-99999 DWT	8.4 / 3.6	5.6 / 2.4	2.8 / 1.2	0
Bulk carrier	100000-199999 DWT	4.6 / 2.4	3.1 / 1.6	1.5 / 0.8	0
Bulk carrier	200000-+ DWT	4.1 / 2.3	2.7 / 1.5	1.4 / 0.8	0
Chemical tanker	0-4999 DWT	40.3 / 35.4	26.8 / 23.6	13.4 / 11.8	0
Chemical tanker	5000-9999 DWT	26.6 / 19	17.7 / 12.7	8.9 / 6.3	0
Chemical tanker	10000-19999 DWT	18.7 / 11.9	12.5 / 7.9	6.2 / 4	0
Chemical tanker	20000-+ DWT	12.3 / 6.5	8.2 / 4.3	4.1 / 2.2	0
Container	0-999 TEU	27.3 / 16.9	18.2 / 11.3	9.1 / 5.6	0

[31]https://www.climatebonds.net/standard/shipping
[32]Energy Efficiency Operational Index (EEOI): EEOI represents the CO_2 emitted per tonne-nautical mile for a voyage or specific time period. It can either be calculated from fuel consumption measurements and information on cargo carried and distance travelled or estimated using satellite tracking data and fleet technical specifications. EEOI therefore accounts for the real operating conditions of the vessel and their impact on fuel consumption (e.g., speed, weather, draught).
If the vessel operates 100% of the time on voyages that include the EU, then it must report using EEOI. Vessels which are not operating 100% of the time on voyages that include the EU can opt to report EEOI but are required to verify this data independently.
[33]The Annual Efficiency Ratio (AER) measures carbon emissions associated with transport work, but it uses a ship's size (deadweight) as a proxy for cargo carried and assumes that the ship is fully loaded on all journeys.

<table>
<tr><th>Traffic Light</th><th>Criteria</th><th>Reference</th></tr>
<tr><td>Green</td><td>
<table>
<tr><td>Container</td><td>1000-1999 TEU</td><td>24.9 / 14.8</td><td>16.6 / 9.9</td><td>8.3 / 4.9</td><td>0</td></tr>
<tr><td>Container</td><td>2000-2999 TEU</td><td>19.5 / 10</td><td>13 / 6.7</td><td>6.5 / 3.3</td><td>0</td></tr>
<tr><td>Container</td><td>3000-4999 TEU</td><td>16.8 / 8.3</td><td>11.2 / 5.5</td><td>5.6 / 2.8</td><td>0</td></tr>
<tr><td>Container</td><td>5000-7999 TEU</td><td>16.2 / 7.8</td><td>10.8 / 5.2</td><td>5.4 / 2.6</td><td>0</td></tr>
<tr><td>Container</td><td>8000-11999 TEU</td><td>14.1 / 6.7</td><td>9.4 / 4.5</td><td>4.7 / 2.2</td><td>0</td></tr>
<tr><td>Container</td><td>12000-14500 TEU</td><td>10.4 / 4.6</td><td>6.9 / 3.1</td><td>3.5 / 1.5</td><td>0</td></tr>
<tr><td>Container</td><td>14500-+ TEU</td><td>10.4 / 4.6</td><td>6.9 / 3.1</td><td>3.5 / 1.5</td><td>0</td></tr>
<tr><td>General cargo</td><td>0-4999 DWT</td><td>30.2 / 24.2</td><td>20.1 / 16.1</td><td>10.1 / 8.1</td><td>0</td></tr>
<tr><td>General cargo</td><td>5000-9999 DWT</td><td>27.2 / 16.7</td><td>18.2 / 11.1</td><td>9.1 / 5.6</td><td>0</td></tr>
<tr><td>General cargo</td><td>10000-+ DWT</td><td>24.2 / 13.1</td><td>16.2 / 8.8</td><td>8.1 / 4.4</td><td>0</td></tr>
<tr><td>Other liquid tanker</td><td>0-+ DWT</td><td>106.6/ 97.6</td><td>71.1 / 65.1</td><td>35.5 / 32.5</td><td>0</td></tr>
<tr><td>Ferry-pax only*</td><td>0-1999 GT</td><td>1272135.8</td><td>848090.5</td><td>424045.3</td><td>0</td></tr>
<tr><td>Ferry-pax only*</td><td>2000-+ GT</td><td>1740606.6</td><td>1160404.4</td><td>580202.2</td><td>0</td></tr>
<tr><td>Cruise*</td><td>0-1999 GT</td><td>2044403.4</td><td>1362935.6</td><td>681467.8</td><td>0</td></tr>
<tr><td>Cruise*</td><td>2000-9999 GT</td><td>1286641.3</td><td>857760.8</td><td>428880.4</td><td>0</td></tr>
<tr><td>Cruise*</td><td>10000-59999 GT</td><td>1495064.7</td><td>996709.8</td><td>498354.9</td><td>0</td></tr>
<tr><td>Cruise*</td><td>60000-99999 GT</td><td>1738613.6</td><td>1159075.7</td><td>579537.9</td><td>0</td></tr>
<tr><td>Cruise*</td><td>100000-+ GT</td><td>1337274.9</td><td>891516.6</td><td>445758.3</td><td>0</td></tr>
<tr><td>Ferry-RoPax*</td><td>0-1999 GT</td><td>822123.9</td><td>548082.6</td><td>274041.3</td><td>0</td></tr>
<tr><td>Ferry-RoPax*</td><td>2000-+ GT</td><td>1137003.8</td><td>758002.5</td><td>379001.3</td><td>0</td></tr>
<tr><td>Refrigerated bulk</td><td>0-1999 DWT</td><td>72.8 / 48.7</td><td>48.5 / 32.5</td><td>24.3 / 16.2</td><td>0</td></tr>
<tr><td>Ro-Ro</td><td>0-4999 GT</td><td>258.2 / 212.4</td><td>172.1 / 141.6</td><td>86.1 / 70.8</td><td>0</td></tr>
<tr><td>Ro-Ro</td><td>5000-+ GT</td><td>63.9 / 45.9</td><td>42.6 / 30.6</td><td>21.3 / 15.3</td><td>0</td></tr>
<tr><td>Vehicle</td><td>0-3999 Vehicles</td><td>124.7 / 46</td><td>83.2 / 30.7</td><td>41.6 / 15.3</td><td>0</td></tr>
<tr><td>Vehicle</td><td>4000-+ Vehicles</td><td>58.1 / 13.8</td><td>38.7 / 9.2</td><td>19.4 / 4.6</td><td>0</td></tr>
</table>
*For Ferry-pax only, Cruise, and Ferry RoPax, the denominator is GT*nm instead of tnm.

DWT – Dead Weight Tonnes (the weight of the cargo)
TEU – Twenty-foot Equivalent Unit
GT – Gross tonnage</td><td>CBI Criteria EU Taxonomy. The approach, uses the same metrics as the EU Taxonomy which are also used by IMO, however it goes beyond what is offered by EU by providing the long-term decarbonisation pathway. Vessels are not dedicated to fossil fuel transport. Once credible, science-based, and 1.5ºC-aligned pathway developed by IMO becomes available, it will be reviewed for inclusion in the Taxonomy.</td></tr>
<tr><td>Amber</td><td>The activity complies with one of the following criteria:

• Vessels achieve the levels of ambition set by the 2023 IMO Strategy on Reduction of GHG emissions from Ships[34]; or</td><td>For Amber, the Taxonomy refers to the IMO's level of ambition, to recognise efforts undertaken by the sector. It is important to emphasise that IMOs pathway is not yet 1.5ºC- aligned, however commonly used by the sector and soon to be reviewed by IMO.

*Note: 2050 figures are included here for completeness. Sunset date of 2030 has been applied to amber in line with amber across the Taxonomy. We expect that a credible 1.5ºC pathway will be released by IMO in advance of this date which would serve to replace these figures.</td></tr>
<tr><td>Amber</td><td>• For vessels that do not meet the emission intensity thresholds identified in Table 3 in green category at the outset, a Managed Reduction Plan is required that outlines the retrofit technologies or a fuel switch option that the vessel will be able to take in order to remain compliant with the trajectory and explains how these plans are cost-effective. The Plan should include as a minimum the following details:

◦ The time period (e.g. range of years) at which a significant fuel switch is expected to be necessary
◦ Any modifications required to fuel storage systems onboard (including any additional space required and how this modified cargo carrying capacity)
◦ Any modifications required to fuel handling systems (including bunkering systems)
◦ Any modifications required to machinery
◦ The estimated total additional cost (including both estimated operating costs and capital costs)

And
• Vessels are not dedicated to fossil fuel transport.

And
If vessels are using biofuels these must:

• Meet the Taxonomy Green criteria for biofuels indicated in the Energy sector and
• Be recognised by the IMO as relevant and eligible fuels/energy carriers used for propulsion and operation of ships taking into account the IMO's Guidelines on the Lifecycle GHG Intensity of Marine Fuels (LCA Guidelines)"

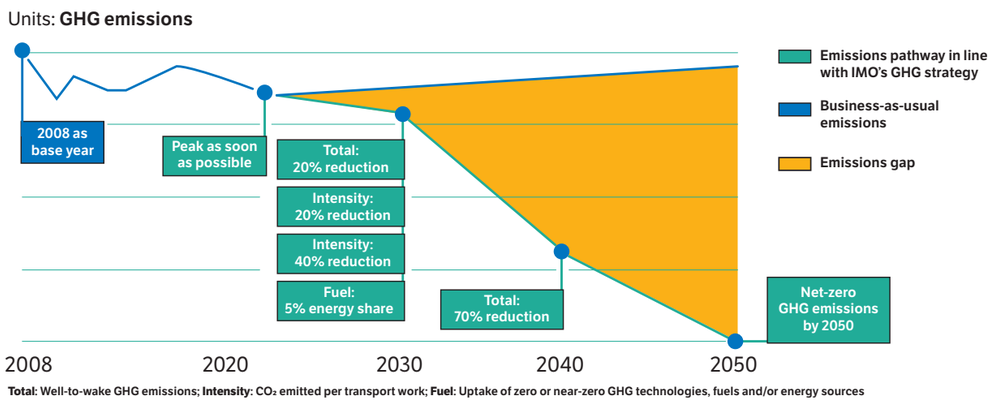
The activity will be sunset in 2030.</td><td></td></tr>
<tr><td>Amber (measures)</td><td>• Dual-fuel vessels that can be switched to renewables, that derive at least 25% of their energy from zero direct tailpipe CO_2 emission fuels or plug-in power for their normal operation at sea and in ports (threshold to be revised by 2025), of which owner has a transition plan aligned with 1.5ºC. Or
• Vessels, which design at the outset allows for their modernisation/adaptation to use 100% renewables/ meet the Green criteria by 2030, and of which owner has a transition plan aligned with 1.5ºC.</td><td></td></tr>
<tr><td>Ineligible activities</td><td>• Activities that do not meet Green or Amber criteria.</td><td></td></tr>
</table>

A full assessment of the 2023 IMO Strategy for usability, Paris-alignment etc. will be conducted and its relevance to the green category will be updated in future iterations.

[34]Levels of ambition directing the 2023 IMO GHG strategy are as follows:
1. Carbon intensity of the ship to decline through further improvement of energy efficiency for new ships;
2. To reduce CO_2 emissions per transport work, as an average across international shipping, by at least 40% by 2030, compared to 2008;
3. Uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to represent at least 5%, striving for 10%, of the energy used by international shipping by 2030; and
4. To peak GHG emissions from international shipping as soon as possible and to reach net zero by or around, i.e. close to, 2050

Further, the Strategy includes indicative checkpoints to reach net-zero GHG emissions from international shipping:
1. To reduce the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030, compared to 2008; and
To reduce the total annual GHG emissions from international shipping by at least 70%, striving for 80%, by 2040, compared to 2008.

Figure 6: The Global Shipping fleet's absolute CO_2 targets and trajectories (Source: DNV)



Total: Well-to-wake GHG emissions; **Intensity**: CO_2 emitted per transport work; **Fuel**: Uptake of zero or near-zero GHG technologies, fuels and/or energy sources

2.7. Inland water transport

Sector	Transport
Activity	**Inland water transport**
ISIC Code	502
ISIC Description	This class includes transport of passenger or freight via rivers, canals, lakes and other inland waterways, including inside harbours and ports. This class also includes rental of pleasure boats with crew for inland water transport.
Objective	Climate change mitigation

Traffic Light	Criteria	Reference
Green	• Vessels have zero direct ztailpipe CO_2 emissions.	EU Taxonomy
Amber	For passenger inland water transport, the activity complies with the following criteria • Until 31 December 2025, dual fuel vessels derive at least 50% of their energy from zero direct tailpipe CO_2 emission fuels or plug-in power for their normal operation, and • Vessels are not dedicated to fossil fuel transport, and And If vessels are using biofuels these must: • Meet the Taxonomy green criteria for biofuels indicated in the Energy sector and • be recognised by the IMO as relevant and eligible fuels/energy carriers used for propulsion and operation of ships taking into account the IMO's Guidelines on the Lifecycle GHG Intensity of Marine Fuels (LCA Guidelines)" For freight inland water transport, the activity complies with the following criteria • Until 2025 direct tailpipe emissions do not exceed 28.3gCO_2/t-km; and • Vessels are not dedicated to fossil fuel	EU Taxonomy provisions from the EU Taxonomy have been split between Green (zero-emission) and Amber (time-bound)
Ineligible activities	• Activities that do not meet Green or Amber criteria	

2.8. Air transport

Sector	Transport
Activity	**Freight and Passenger air transport**
ISIC Code	5110 & 5120
ISIC Description	5110: Passenger air transport This class includes transport of passengers by air over regular routes and on regular schedules; charter flights for passengers; and scenic and sightseeing flights. This class also includes renting of air-transport equipment with operator for the purpose of passenger transportation; and general aviation activities, such as: transport of passengers by aero clubs for instruction or pleasure. 5120: Freight air transport This class includes transport freight by air over regular routes and on regular schedules; non-scheduled transport of freight by air; launching of satellites and space vehicles; and space transport. This class also includes renting air-transport equipment with operator for the purpose of freight transportation. This class also includes the vehicles and equipment that support ground activities in airports.
Objective	Climate change mitigation

Traffic Light	Criteria	Reference
Green	Once credible, science-based, and 1.5°C-aligned pathway developed by ICAO becomes available, it will be reviewed for inclusion in the Taxonomy. Pending this development The activity complies with one of the following criteria: • Performed using zero exhaust CO_2 emission aircraft such as those powered by electricity or hydrogen meeting Taxonomy criteria (green) And • Aircrafts are not dedicated to fossil fuel transport.	Not available in any of the currently existing Taxonomies.
Amber	The follow measures are eligible for CapEx financing: • Purchase/ use of SAF are eligible if it used in the processes (see below)[35], and • Investments in the manufacturing, infrastructure and supply chain for the development of the SAF industry and activities that promote the production and adoption of SAF can be classified as Amber measures. • In addition, manufacturing, infrastructure and supply chain for the development of the SAF industry can be classified as amber measures only if they relate to SAF which meet the feedstock criteria. SAF feedstock • must meet the Singapore Taxonomy Green criteria for biofuels indicated in the relevant section of this Taxonomy, and • the SAF feedstock must be recognised by ICAO as eligible under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and / or certified under the European Union Renewable Energy Directive[36] (EU RED). Sunset date for stated criteria[37]: 2030. Requirements for amber measures will need to be revised at the latest by 2030 to reflect the most recent developments in the SAF technologies and their potential impact on the decarbonisation of the aviation. In addition, the criteria will be revised before 2030 when the development of credible, science-based, and 1.5°C-aligned pathway for the SAF blending (e.g. by ICAO) is available.	EU Taxonomy provisions from the EU Taxonomy have been split between Green (zero-emission) and Amber (time-bound)
Ineligible activities	• Activities that do not meet Green or Amber criteria	

[35]For the avoidance of doubt, for blended fuels only the proportionate SAF % can qualify as an amber measure
[36]Recognising that the availability of SAF is currently limited, the inclusion of EU RED certification is to provide flexibility for producers and users in certifying their SAF, especially during this nascent stage where the building up of SAF supply and production is underway.
[37]The sunset date stated under amber measures for air transport applies only to the stated criteria for SAF and not SAF as a measure. Appropriate thresholds for SAF will be considered in subsequent editions to reflect latest developments, recognizing that SAF is a key decarbonisation lever for the international aviation sector that will feature till 2050 and beyond and ICAO is still in the midst of developing an overall decarbonisation pathway for international aviation.

3 — Real Estate/Construction

Context

Metrics for measuring buildings vary around the world and a key challenge for setting buildings criteria and thresholds in taxonomies is to maintain a balance between usability and interoperability. While this is a challenge throughout the Taxonomy, in the buildings sector it is particularly acute given that most regions or countries already have a local buildings code or standard that is already being used locally (although to different degrees around the world). To maintain usability, local standards need to be used to whatever extent possible while also recognising that some of them may be insufficient on their own.

Comparing buildings standards, codes and labels around the world is a huge challenge, not least because buildings labels are scoring methodologies which measure a range of different metrics. Some of these metrics are climate related (energy efficiency, emissions etc) while others are not directly (water consumption, recycling infrastructure etc.). As a result, a building with a high score may receive this for largely non-energy related reasons which would not be aligned with the objective (climate mitigation) in this Taxonomy.

The extent to which non-energy related points can be awarded varies significantly depending on the scheme.

TSC overview and methodology

In the EU, the main metric is Primary Energy Demand (PED). The Taxonomy aims to set defined emissions intensity thresholds in line with Singapore's transition pathway.

Singapore's Green Mark Certification is used in this Taxonomy as a key starting point it is a rigorous and ambitious green building rating system to evaluate a buildings environmental impact and performance with climate mitigation credentials that are broadly aligned with EU approach. It is seen as a highly ambitious scheme internationally and intends to align with the United Nations (UN) Sustainable Development Goals (SDGs), including SDG13 on climate action. It is also used as a benchmark for existing requirements and/or schemes; for example, it being used by GreenGov.SG for all new public sector buildings and existing public sector buildings under retrofit as a key enabler for the public sector to meet government sustainability targets.

Category	Main Technical screening criteria	Additional metrics
Green	• Prevailing Green Mark certification[38] (all levels) • Buildings meeting CBI certification • Other eligible international certification: Edge, NABERS, Australian Green Star – see Table 4 and Table 5	
Amber	• No Amber category for new buildings • For renovation, 30% reduction in emissions or energy consumption (based on energy usage, Primary Energy Demand or GHG emissions) up to 2030 (sunset date) based on Singapore's required emissions intensity transition.	• Sunset date of 2030
Ineligible activities	• Buildings dedicated to fossil fuel use (consistent with treatment of fossil fuels in energy; however, this would not apply to indirect activities e.g., a green building will be eligible even if rented by a fossil company).	

[38]The most updated version of Green Mark as of this current Taxonomy iteration is Green Mark 2021.

International certification schemes

To identify international proxies for eligibility, the Taxonomy has made use of the Climate Bonds Initiative research and criteria. This is kept up to date on the website. Some of the regional and international proxies are summarised here for easy viewing. Note that this is not comprehensive, and users are recommended to view the Climate Bonds website for up-to-date information[39].

Table 4 — Residential buildings proxies

Country/ region	Standard/ label/ code	Requirements
Australia	Green Star Homes	Certified by the GBCA and comply with Renewable Energy Pathway A or B and do not include a swimming pool.
China	Evaluation Standard for Green Building	Evaluation Standard for Green Building rating of 3 Star
India	IGBC Green Homes	Buildings certified under the IGBC Green Homes® Rating system v3.0.
International	LEED	Meet all of the following criteria: • LEED Gold OR Platinum and • 30% improvement above the levels in ASHRAE 90.1 and • Only able to be used where a local proxy has not been established • If for a debt instrument: Date of LEED certification must be within 5 years before bond issuance
International	EDGE	• EDGE certified • Only able to be used in developing countries. • If for a bond: 10-year limit on bond tenor
International	Living Building Challenge Certified	Living Building Challenge Certified

Table 5 — Commercial buildings proxies

Country/ region	Standard/ label/ code	Requirements
Australia	Australian Proxy for Green Star Buildings	Certified by the GBCA under the Green Star Buildings scheme and comply with the Climate Positive Path. Buildings certified with 6 Star automatically comply. 5 Star rated buildings registered after 2023 will also comply. More information[40]
India	IGBC Net Zero Building rating system	Buildings that achieve a Net Zero Rating under the IGBC Net Zero Building rating system. Buildings in construction and recently completed buildings must provide additional pre-issuance document.
International / USA	LEED	Meet all the following criteria: • LEED Gold OR Platinum and • 30% improvement above the levels in ASHRAE 90.1. • Only able to be used where a local proxy has not been established • If debt instrument : 6-year limit on tenor. • If debt instrument : Date of LEED certification must be within 5 years before bond issuance.
International	EDGE	• EDGE Certified • Only eligible in developing countries
International	Living Building Challenge Certified	• **Living Building Challenge Certified** (all tiers)

[39]https://www.climatebonds.net/standard/buildings/commercial/calculator ; https://www.climatebonds.net/standard/buildings/residential/calculator
[40]https://www.climatebonds.net/files/files/standards/Buildings/Proxies/AUS%20-%20Green%20Star%20Buildings%20proxy%20v1.pdf

Activity technical screening criteria

3.1. Construction of new buildings

Sector	Real Estate	
Activity	**Construction of new buildings**	
ISIC code	F4100	
ISIC description	This class includes: a. Building of complete constructions or parts thereof; civil engineering.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• Prevailing Green Mark Certification, or • Office buildings (or portfolio) in Singapore meeting CBI certification criteria[41] • Eligible international certifications – refer to Tables 4 and 5 under the "International certification schemes" section above'. Certificate validity: 5-year maximum limit if the certification does not impose a limit, or has one that is longer than 5 years.	Green Mark is the Singapore buildings standard Key elements of EU Taxonomy criteria
Amber	• N.A. (New buildings need to meet Green criteria)	
Ineligible activities	• Buildings are dedicated to extraction, storage, manufacturing, transport of fossil fuels. For the avoidance of doubt, the above does not include buildings providing office space to fossil companies for administrative or trading activities.	

3.2. Installation, maintenance, repair of equipment

Sector	Real Estate	
Activity	**Installation, maintenance, repair of equipment**	
ISIC code	F4321 / 4322 / 4329	
ISIC description	This class includes: 2. Building installation	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • Installation of renewable energy equipment, renewable energy charging stations and regulation devices or • Installation of equipment within the two highest energy efficiency classes for equipment, as determined by relevant international labelling scheme or Singapore regulation	EU Taxonomy Local/ international labelling scheme rather than EU regulation.
Amber	• N.A. (Technology sufficiently developed to meet Green criteria)	
Ineligible activities	• Buildings are dedicated to extraction, storage, manufacturing, transport of fossil fuels. For the avoidance of doubt, the above does not include buildings providing office space to fossil companies for administrative or trading activities.	

[41]https://www.climatebonds.net/standard/buildings/commercial/calculator#calculator

3.3. Renovation of existing buildings

Sector	Real Estate	
Activity	**Renovation of existing buildings**	
ISIC code	F4100 / F4330	
ISIC description	This class includes: 3. Building completion	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	• The renovations enable to reach the prevailing Green Mark Certification or • Aligns with relevant Climate Bonds Buildings Criteria	Green Mark Singapore Key elements of EU Taxonomy criteria
Amber	• Min 30% reduction in emissions or energy consumption if not meeting Certification standard above (based on energy usage, Primary Energy Demand or GHG emissions) up to 2030 (sunset date)	EU Taxonomy Climate Bonds Taxonomy
Ineligible activities	• Buildings are dedicated to extraction, storage, manufacturing, transport of fossil fuels. For the avoidance of doubt, the above does not include buildings providing office space to fossil companies for administrative or trading activities.	

3.4. Acquisition or ownership of buildings

Sector	Real Estate	
Activity	**Acquisition or ownership of buildings**	
ISIC code	L6810	
ISIC description	This class includes: Real estate activities with own or leased property	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with one of the following criteria: • Prevailing Green Mark Certification, or • The building is within the top 15% of the national or regional building stock expressed as operational Primary Energy Demand (PED) or GHG emissions or energy consumption and demonstrated by evidence which at least compares the performance of the relevant asset to the performance of the national or regional stock and at least distinguishes between residential and non-residential buildings. **The Singapore's Annual Building Energy Benchmarking Report (BEBR) can be a reference source to determine top 15% national stock.**	Green Mark Singapore Key elements of EU Taxonomy criteria
Amber	• The building is within the top 25% of the national or regional building stock expressed as operational Primary Energy Demand (PED) or GHG emissions or energy consumption and demonstrated by evidence. The sunset date for this activity is 2030. **The Singapore's Annual Building Energy Benchmarking Report (BEBR) can be a reference source to determine top 25% national stock.**	
Ineligible activities	• Buildings are dedicated to extraction, storage, manufacturing, transport of fossil fuels. For the avoidance of doubt, the above does not include buildings providing office space to fossil companies for administrative or trading activities.	

4 — Industry

Context

According to IPCC AR6 report, in 2019, about 24% of anthropogenic GHG emissions came from the high-emitting industry sectors[42]. Once indirect emissions from energy use are considered that share increases to 34%. Over the last decade emissions from the industry (and transport) sector increased most rapidly.

Industrial sectors are recognised as amongst the hardest to abate. The high levels of energy required cannot always be met using electrification. Existing fossil fuel sources may be difficult to replace, and the future replacement technologies are at varying stages of commercial development.

Most products from the industrials sectors will be required in a lowcarbon future – steel and aluminium for wind turbines, cement for low-carbon infrastructure etc. Therefore, most activities will not be completely phased out (like coal) but will need to be significantly decarbonised (green steel, green cement etc.). This distinction is important recognising how sector criteria are being developed to enable a successful global transition to net zero.

The IPCC AR6 report highlights that the enormous challenge in achieving a net-zero objective in the coming decade. However, decarbonisation is not impossible, owing to ongoing technological developments, and broad adoption of mitigation, adaptation, and resilience measures across value chains.

The primary levers for decarbonisation include, among others:

- Electrification,
- Non-fossil-based inputs,
- Use of various low-carbon fuels (e.g. hydrogen) for heat applications,
- Use of CCS/CCUS as appropriate with ambitious efficiency targets (e.g. ≥70% in steel).

Importantly, industry faces a dual challenge – on one hand, reducing its own emissions and on the other hand manufacturing the technological solutions that will play an enabling role in the emissions reduction in other areas of whole economy. Thus, it is necessary to steer financial flows both[43]:

- to the activities that have the **highest share in the GHG emissions**, (referred to as hard to abate activities)
  - e.g. manufacturing of iron and steel, of basic chemicals, cement, aluminium and hydrogen[44]
- to the activities that have the **highest share in the GHG emissions**, (referred to as hard-to-abate activities)
  - e.g. manufacturing of renewable energy technologies, low-carbon technologies for transport, energy efficiency equipment for buildings, and production and use of hydrogen etc.

TSC overview and methodology[45]

GREEN
High GHG-emitting sectors

Technical screening criteria – emission thresholds for sectors that are characterised by high GHG emissions (basic chemicals, steel, cement, hydrogen, aluminium) as have been developed based on the 1.5ºC science-based decarbonisation pathways – an approach adapted from Climate Bonds Initiative's criteria.

[42] https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Full_Report.pdf
[43] While manufacture of biofuels has also been identified as a key area for green growth, it is not scoped in this current Taxonomy due to a lack of credible references. Instead, it'll be included in future Taxonomy.
[44] While manufacture of biofuels has also been identified as a key area for green growth, it is not scoped in this current Taxonomy due to a lack of credible references. Instead, it'll be included in future Taxonomy iterations when there is clearer global guidance.
[45] Given the broad scope covered by the manufacturing sectors please refer to detailed sectoral criteria, given that there might be some deviations from the outlined approach and methodology

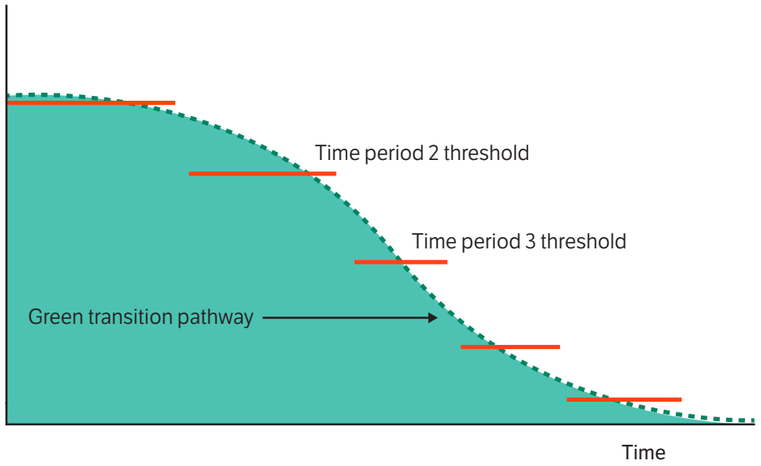


Figure 7: Theoretical example of creation of how thresholds are put forward based on transition

EU Taxonomy thresholds have been used as a starting point for a pathway and the sectoral decarbonisation pathway has been transposed to this starting point to reach net zero by 2050 at the activity level. As far as possible, the thresholds have been projected into the future so that the user can see how the thresholds will change over time as they ratchet down towards 2050 (see Figure 7). This is an extension of the EU approach where the EU criteria are put forward for the current period with the understanding that these will be revised downwards every 5 years (to be confirmed). The approach is intended to provide greater certainty for users to see how activities need to decarbonise to remain green although it is noted that thresholds, particularly those further in the future, are based on today's understanding of the future and what is possible, what may change as new technologies become available etc.

Wherever possible, science-based transition pathways have been adopted from other initiatives, which approach pathway development process with a high degree of scrutiny from academia and industry experts such as these developed by the IEA or the Science-Based Targets Initiative (SBTi).

Basic information about decarbonisation pathways used is provided in the table below – more details can be found in J.

Manufacturing of low and zero carbon products and technologies

Enabling sectors are those focused on manufacturing of net-zero aligned products and technologies. These sectors have TSC that are more qualitative and less dynamic – not associated directly with decarbonisation pathway, often introducing the links to criteria established for the associated economic activities. The Green thresholds adopted for these activities have been, in most cases, are from the EU Taxonomy.

Table 7 — Decarbonisation pathways based on which Taxonomy criteria have been developed

Basic chemicals	Teske et al. (2022); ICF and Fraunhofer ISI study for the EC (2021)
Cement	Science-Based Targets Initiative
Iron and Steel	IEA Net-Zero Emissions (IEA NZE)
Hydrogen	MIT Energy Initiative's SESAME platform
Aluminum	International Aluminum Institute based on IEA
Please refer to Table 17 in Appendix J for details	

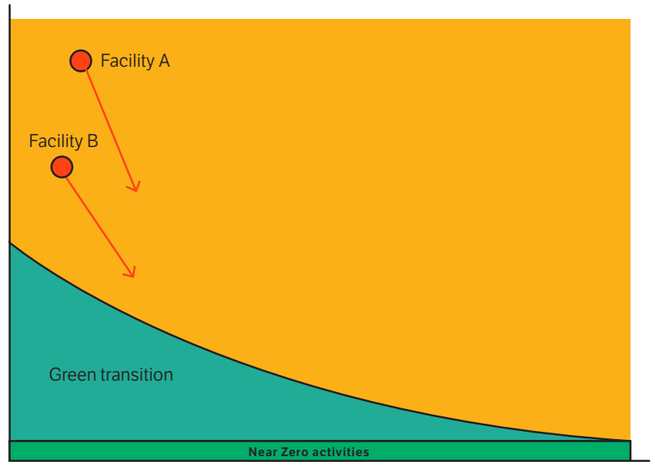


Figure 8: Amber category for industry sectors

Amber and Ineligible activities

Approach to setting TSC for high emitting sectors

Given the scale of the challenge associated with the decarbonisation of the selected industry sectors and lack of technologically and economically feasible low-carbon alternatives, these sectors have been defined as inherently "in transition".

This means that while in other sectors, it makes sense to create a line between ineligible and Amber performance, for most industry sectors, this line is problematic for a few reasons:

1) The data is not available to create a line with any credibility or science basis meaning that the line between ineligible and Amber would be arbitrary;

2) For many activities, performance at the activity level (or, in the case of industry, a plant or facility) will vary significantly but the aim is for all facilities to move to a Green transition pathway within a time period. The starting point is therefore not important compared to the movement towards green over time.

This means that while in other sectors, it makes sense to create a line between ineligible and Amber performance, for most industry sectors, this line is problematic for a few reasons:

1) Transition plans: Rely on plans put in place at the company level towards net zero

2) Measures based approach: Put forward eligible technologies or Green transition 'measures'

Therefore, it has been proposed not to focus on selected activities deemed as harmful/ineligible, but on criteria that would positively reinforce decarbonisation efforts through the establishment of Green category for facilities that meet certain thresholds and Amber category for measures that support emissions reduction, rather than specific economic activities alone.

However, to promote "movement towards green" also of these facilities that do not yet meet the Green criteria, and to ensure that investments in measures are not just an "one-off" initiative, but rather part of strategic planning

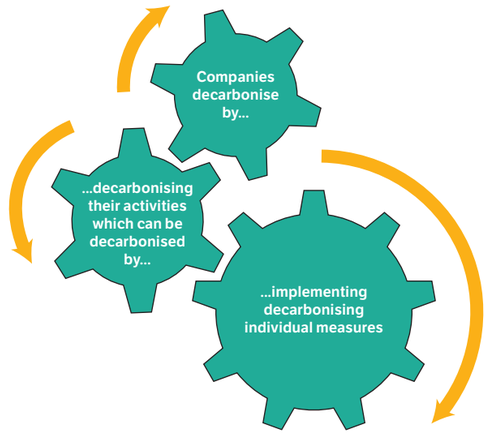


Figure 9: Theory of change behind measures-based approach

focused on alignment of the activity with the decarbonisation pathway, for the measures-based approach, the requirement of the 1.5ºC-aligned transition plan has been introduced. We recommend for the transition plans to be prepared in line with Transition Finance Principles outlined by the IPSF.[46] [47] While today the requirement is for the entities to develop 1.5ºC-aligned transition plan, likely, with future revisions of the Taxonomy, further provisions regarding the contents and level of ambition might be introduced.

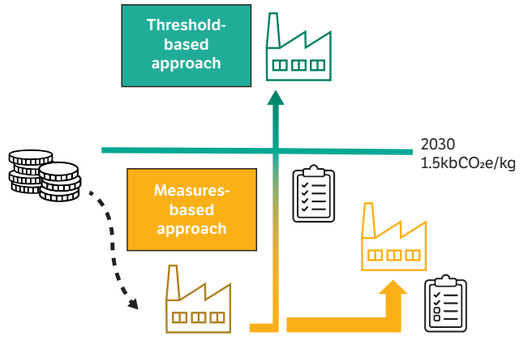


Figure 10: Measures-based approach for Amber category for selected sectors

APPROACH TO SETTING TSC FOR MANUFACTURING OF LOW-CARBON PRODUCTS AND TECHNOLOGIES

In most cases, there is no Amber category but new activities, and thus manufacturing of associated new products and technologies, have to meet thresholds set for Green category. Activities that do not meet Green TSC are classified as Ineligible activities.

Table 8 — Usability implications of measures-based approach to Amber category

Type of activities	Activities	Green (facility)	Amber (measures)	Ineligible activities
High emitting activities	Manufacture of basic chemicals	X	X	X
	Manufacture of cement	X	X	X
	Manufacture of aluminum	X		
	Manufacture of hydrogen	X	X	X
Enabling activities	Manufacture of plastics in primary form	X		X
	Manufacture of batteries	X		X
	Manufacture of renewable energy technologies	X		X
	Manufacture of equipment for the production and use of hydrogen	X		X
	Manufacture of low-carbon technologies for transport	X		X
	Manufacture of energy efficiency equipment for buildings	X		X
	Manufacture of other low-carbon technologies	X		X

[46] https://finance.ec.europa.eu/system/files/2022-11/221109-international-platform-sustainable-report-transition-finance_en.pdf
[47] While the requirement for the entity to have a 1.5ºC-aligned transition plan has been introduced just for the investments in measures that are classified as Amber transition plans are regarded as best practice and development of the 1.5ºC, science-based transition plan is encouraged for all entities.

Impact on usability of measures-based approach – promoting transition of hard-to-abate sectors

The Amber category that applies to investment measures cannot, however, be used to assess revenues. It can only be used for the purpose of defining the alignment of CapEx. Such an approach has a major upside in that by acknowledging individual decarbonisation efforts rather than solely end-effects, it could help fast-track emissions reduction from hard to abate sectors. To further leverage that effect, TSC require that measures are implemented by 2035, limiting the timeframe for enabling meaningful, but nevertheless insufficient, from the net-zero perspective, improvements. This short-term period aims to offer an opportunity to reward positive climate impacts, while low and zero-emission technologies remain under-developed and expensive.

Table 9 — Usability implications of measures-based approach to Amber category

	Criteria for Amber measures	Criteria for Amber facilities	Criteria for Green activity
Taxonomy end-use: CapEx	Specific measures (each of them might have additional measure-specific criteria)	CapEx is eligible if a given activity currently meets the Amber criteria, and the measure will help to achieve Green criteria (so assume need to assess transition plan/ CapEx plan)	CapEx is eligible if a given activity currently meets the Green criteria, and the measure will help to keep below the future Green criteria (so assume need to assess transition plan/ CapEx plan)
Taxonomy end-use: Revenue	N.A.	Revenue is eligible if activity meets the Amber criteria	Revenue is eligible if activity meets Green criteria

Interoperability with Climate Bonds Initiative and EU Taxonomies – rationale for selection of pathways designed by Climate Bonds Initiative

In most cases, for enabling activities, TSC have been adapted from the EU Taxonomy. However, given that EU thresholds are highly EU-specific, and that they lack forward-looking emissions reduction pathways, CBI criteria have been used for the development of TSCs for highly emissive sectors.

Uptake of global decarbonisation pathways (e.g. IEA's) by CBI criteria helps to ensure their universal application and thorough engagement of technical and industry experts in the criteria development process enhances their usability by stakeholders.

However, to increase interoperability between taxonomies, EU thresholds have been used as a starting point for ratcheting ambition up to net zero. Such approach encourages also pro-active approach given that EU thresholds have been based on achievements of best performers. Additionally, CBI criteria offer increased stringency due to the presence of cross-cutting requirements focused on e.g. feedstock or energy-used.

User guide for measures and activity

The Taxonomy proposes different criteria for CapEx (Amber measures) and for revenue (Amber activities). These are potentially eligible for Amber category within sustainable finance (noting that some international investors may choose not to invest in Amber) for a labelled bond.

However, revenues generated from the activity will not be eligible as Amber activities under any disclosure guidelines/requirements until they meet the Amber thresholds.

Activity technical screening criteria

4.1. Manufacture of basic chemicals

Sector	Industry
Activity	**Manufacture of basic chemicals**
ISIC code	2011
ISIC description	This class includes the manufacture of chemicals using basic processes, such as thermal cracking and distillation. The output of these processes are usually separate chemical elements or separate chemically defined compounds.
Objective	Climate change mitigation
Reference	**Green:** Adapted from Climate Bonds' Criteria for Basic Chemicals sectors. Pathway followed and relevant references for projection of the thresholds has been described in detail the Basic Chemicals Criteria Background Paper. Wherever applicable, the EU Taxonomy thresholds have been used as a starting point for the decarbonisation pathway. **Amber:** Adapted from Climate Bonds' Criteria for Cement sector. Detailed methodology can be found in the CBI's Basic Chemicals Criteria Background Paper.

Further information on methodology used can be found at the Climate Bonds Initiative's website: https://www.climatebonds.net/standard/basic-chemicals in the Criteria Document and Background Paper

Traffic Light	Criteria
Green	Facility must comply with the following headline requirements • Activities need to meet specific carbon or energy intensity thresholds defined in Table 10, and • At least 50% of annual production by volume is on the list of basic chemicals in scope, and And if Facilities are using fossil gas, hydrogen, CO_2 or biomass as feedstock they are eligible only if they meet the following criteria: • **Fossil gas**: Only eligible for existing facilities prior to 2030. • **Hydrogen** meets the Taxonomy criteria (Green category) for hydrogen production. • **Biomass** complies with the criteria applicable for biomass sourcing set out in the Taxonomy Bio-energy criteria (Green category). • **CO_2** used satisfies the criteria described in Table 10 (e.g. CO_2 from ammonia production should not be used for urea production) And if Facilities are using fossil gas, hydrogen, biomass, or heat supplied from alternative sources as a fuel source they are eligible only if they meet the following criteria: • **Fossil gas**: Only eligible for existing facilities prior to 2030. • **Hydrogen**: The hydrogen used meets the Taxonomy criteria for hydrogen production (Green category). • **Biomass**: The bio-energy complies with the Taxonomy Bio-energy criteria (Green category). Only secondary organic streams are eligible. • **Facilities using heat supplied from alternative sources**, such as geothermal, solar thermal, and waste heat recovery: The heat source must comply with the Taxonomy most up to date criteria for each source of energy (Green category).

Amber

Table 10 — Basic chemical-specific carbon and energy intensity thresholds

Type	Criteria			
	2022–2029	**2030–2039**	**2040–2049**	**2050 and beyond**
Ammonia	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category) or ammonia is recovered from wastewater. CO_2 from ammonia production should not be used for urea production.	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category) or ammonia recovered from wastewater. CO_2 from ammonia production should not be used for urea production.	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category) or ammonia recovered from wastewater. CO_2 from ammonia production should not be used for urea production.	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category) or ammonia recovered from wastewater. CO_2 from ammonia production should not be used for urea production.
Nitric acid	0.038tCO_2e/t nitric acid	0.021tCO_2e/t nitric acid	0.011tCO_2e/t nitric acid	0.007tCO_2e/t nitric acid
Chlorine	2.45MWh electricity/t chlorine or carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	1.85MWh electricity/t chlorine or carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	Carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	Carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)
Carbon black	1.141tCO_2e/t carbon black	0.63tCO_2e/t carbon black	0.34tCO_2e/t carbon black	0.20tCO_2e/t carbon black
Disodium carbonate/ soda ash	0.789tCO_2e/t disodium carbonate/ soda ash or carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	0.44tCO_2e/t disodium carbonate/ soda ash or carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	0.23tCO_2e/t disodium carbonate/ soda ash and carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)	0.14tCO_2e/t disodium carbonate/ soda ash and carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (Green category)
High value chemicals (ethylene, propylene, butadiene)	0.51tCO_2e/t high value chemical	0.28tCO_2e/t high value chemical	0.15tCO_2e/t high value chemical	0.09tCO_2e/t high value chemical
Aromatics BTX (benzene, xylene and toluene)	0.0072tCO_2e/t aromatics BTX[48]	0.0040tCO_2e/t aromatics BTX[48]	0.0021tCO_2e/t aromatics BTX[48]	0.0012tCO_2e/t aromatics BTX[48]

[48]BTX measured as complex weighted throughput. Refer to: https://www.concawe.eu/publication/report-no-912/

	Production of methanol	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category)	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category)	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category)	Uses hydrogen, as feedstock, that meets the Taxonomy criteria for hydrogen production (Green category)

The following emissions should be accounted for when comparing to the thresholds in Table 10.

- Nitric acid, and soda ash: Scope 1 emissions which include all direct emissions from the production processes: emissions generated during the chemical reactions, emissions from fuel combustion on-site.
- Carbon black, HVC and aromatics: Scope 1 as defined above, plus Scope 2 emissions which includes indirect emissions from the energy imported from off-site.
- Methanol and ammonia: GHG emissions are for the lifecycle emissions of hydrogen used as feedstock.
- Chlorine: The benchmark is for the electricity intensity of the process. No GHG accounting is required for chlorine. Following 2040, electricity must be from renewable sources.

Amber (measures)

Amber category is applicable until 2035 – all eligible decarbonisation measures must be implemented prior to 2035

Criteria:
- Eligible measures are listed in Appendix K together with the associated criteria

Criteria are applicable within production facility where:
- At least 50% of annual production is on the list of basic chemicals in scope
- Company has a transition plan aligned with 1.5ºC.

Ineligible activities

Facilities or measures in which:
- The energy source is coal or coal derivatives or dedicated crops, primary organic streams, and wood and/or
- The feedstock is coal or coal derivatives.

4.2. Manufacture of cement

Sector	Industry
Activity	**Manufacture of cement**
ISIC code	2394
ISIC description	
Objective	Climate change mitigation
Reference	**Green:** Pathway based on a starting point (in 2020) of the EU Taxonomy thresholds for cement. Sectoral decarbonisation pathway from Science-Based Targets Initiative has been applied to this starting point to reach net zero by 2050. Pathway followed and relevant references for projection of the thresholds has been described in detail in section 4.3.1. of the CBI's Cement Criteria Background Paper **Amber:** The proposed approach is adapted from Climate Bonds' Criteria for Cement sector. Detailed methodology can be found in the CBI's Cement Criteria Background Paper

Further information on methodology used can be found at the Climate Bonds Initiative's website: https://www.climatebonds.net/standard/cement in the Criteria Document and Background Paper

Traffic Light | **Criteria**

Green

Facility must comply with the following headline requirements:

- Activities need to meet specific emissions intensity thresholds defined in Table 11, More detailed calculations and methodology can be found in Appendix A.

And if
facilities are using biomass, hydrogen', or waste as a fuel source they are eligible only if they meet the following criteria:

- **Hydrogen**: The hydrogen used meets the Taxonomy criteria (Green category) for hydrogenproduction.
- **Biomass**: The biomass used complies with the criteria applicable for biomass sourcing set out in the Taxonomy Bio-energy criteria (Green category).
- **Waste-Derived Fuels, including Municipal Solid Waste (MSW)** must meet Taxonomy criteria (Green category) and

  1) All waste of recycling potential must be removed prior to burning in line with the waste hierarchy and

  2) Municipal solid waste will not be eligible as a fuel type after 2035

And if
the plant uses Carbon Capture and Storage (CCS) equipment on site, it must comply with Taxonomy criteria for CCS Storage (Green category)

Table 11 — Selected threshold values forming the emissions pathway for cement production facilities (tCO_2/t cementitious product)

Cement class	2025	2030	2040	2050
32.5	0.341	0.298	0.222	0.073
42.5	0.416	0.363	0.271	0.089
52.5	0.470	0.410	0.306	0.101

More detailed information, thresholds for other years and methodology (incl. scope of emissions used in meeting the pathway) can be found in Appendix L.

Amber (measures)

Eligible decarbonisation measures or retrofitting activities (capital investments) must be implemented prior to 2035

And
Constitute one or more of the following measures:

- Installation, upgrade and operation of precalciners

Traffic Light	Criteria
Amber (measures)	• Installation, upgrade, and operation of heat recovery systems • Installation, upgrade, and operation of digitised control equipment or infrastructure. This may include: ○ Sensors and measurement tools (including software to allow real-time and close control of processes to improve efficiency) ○ Communication and control (including advanced software and control rooms, and automation of plant processes) • Installation, upgrade, and operation of testing equipment. For example: ○ Automated XRD systems • Electrification of heat (for example, electrified kiln processes) • Installation, upgrade, retrofit and operation of measures which achieve emissions savings equivalent to the emissions decrease for facilities over the life-span of the debt instrument • Installation, upgrade, and operation of carbon capture and storage equipment that is aligned with Taxonomy criteria (Green category) • Infrastructure, revamps or modifications of equipment needed for the production of cement using hydrogen as a fuel, that is aligned with Taxonomy criteria for hydrogen (Green category) And Measures are applicable within production facility where company has a transition plan aligned with 1.5ºC.
Ineligible activities	Facilities or measures in which: • The energy source is coal or coal derivatives or dedicated crops, primary organic streams, and wood

4.3. Manufacture of basic iron and steel

Context and methodology notes

Most new steel plants built today will still be online in 2050. There are already low-carbon steel production technologies available, and it is expected that more will become commercially ready before and beyond 2030.

Since steel production facilities can operate for many years, new facilities should already be built with CO_2 emissions mitigation technologies in place or avoiding CO_2 generation entirely by limiting the use of fossil fuels. The technical challenges are such that this is very important at the design stage – if a plant is not designed to have, for example, CCS implemented, it is very difficult to retrofit later.

To acknowledge and promote the decarbonisation efforts, (new and existing) facilities that do not meet criteria designed for Green category at the outset but have been designed to and envisage full alignment over time and by 2030 latest, can be classified as Amber.

At the same time, current technologies for refurbishment cannot bring long-existing Blast Furnace-Basic Oxygen Furnace (BF-BOF) plants in line with a 1.5ºC pathway. These are old technologies and retrofit opportunities are limited. Such plants will need to be phased out in the long term. However, in many cases, short term emissions can be reduced to the levels required in 2030 – these should be maximised. When looking at existing facilities, the criteria below aim to avoid investments that would lock-in heavy emitting technologies, without overlooking those producers that will make credible efforts to reduce their current emissions.

Literature review shows that around 71% of steel's global coal-based capacity will require reinvestment by 2030. Steel producers can either invest in 'relining' (extension of a life-span of the investment) or switch to alternative technologies. Relining is discouraged within these criteria as it risks locking-in assets that are not compatible with a low-carbon future. Consequently, we have limited the age of eligible blast furnaces

for 'measures' aimed at increasing energy efficiency (subject to meeting the criteria) to only those that started operation from 2007.

The principle behind this is to allow "newer" facilities that are still not going for relining (because they have not reached the relining age yet), to lower their emissions and reach the emissions intensity targets before 2030 by implementing a bundle of mitigation measures. These investments in emissions reduction in "newer" facilities can only take place until 2030, which is before the asset reaches the relining age. After 2030, these facilities need to decarbonise more aggressively. Whereas older facilities, that should in any case, get a significant investment in relining, cannot qualify unless the investment will entail a major retrofit to reduce emissions by more than 50%. What this suggests is that, in line with what a number of decarbonisation roadmaps state, blast furnaces that don't retrofit to significantly mitigate carbon emissions with e.g. CCS by 2030, will most likely become stranded assets.

Given the above features of steel, the criteria have been designed to achieve and encourage deep emissions reductions at the facility level in the short to medium term while also encouraging all short-term measures to maximise emissions reductions in the interim. The decision tree below demonstrates how this works in practice where the facility is eligible for Green if it meets Green criteria. If it does not yet meet these criteria, there is an option for that facility (through design and planning) use the Amber category to raise finance. If, however, it does not meet the Amber facility criteria, it may still raise finance for specific interim measures that will reduce the carbon footprint in the short term.

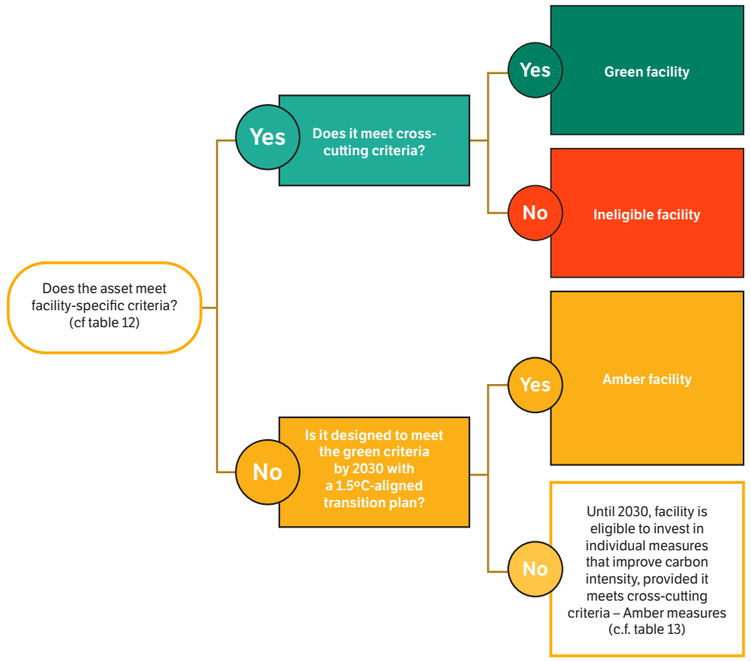


Figure 11: Eligible categories for iron and steel production – a high level overview

Sector	Industry
Activity	**Manufacture of basic iron and steel**
ISIC code	2410
ISIC description	This class includes operations of conversion by reduction of iron ore in blast furnaces and oxygen converters or of ferrous waste and scrap in electric arc furnaces or by direct reduction of iron ore without fusion to obtain crude steel which is smelted and refined in a ladle furnace and then poured and solidified in a continuous caster in order to produce semi-finished flat or long products, which are used, after reheating, in rolling, drawing and extruding operations to manufacture finished products such as plate, sheet, strip, bars, rods, wire, tubes, pipes and hollow profiles.
Objective	Climate change mitigation
Reference	**Green:** The proposed approach is adapted from Climate Bonds' Criteria for Steel sector. Pathway followed and relevant references for projection of the thresholds has been described in detail in section 3.4.1. of the CBI's Steel Criteria Background Paper **Amber:** The proposed approach is adapted from Climate Bonds' Criteria for Steel sector. Detailed methodology can be found in the CBI's Steel Criteria Background Paper.

Further information on methodology used can be found at the Climate Bonds Initiative's website: https://www.climatebonds.net/standard/Steel in the Criteria Document and Background Paper

Traffic Light: Green

Criteria

Facilities must comply with:

• the facility specific mitigation criteria in Table 12 and

• comply with applicable cross-cutting criteria listed in Table 21 Appendix M and

• Facilities using hydrogen as a fuel or reductive agent, are eligible only if hydrogen complies with Taxonomy criteria for hydrogen (Green category)

Table 12 — Eligible iron and steel production facilities

Eligible Assets	Facility specific mitigation criteria
BF-BOF (Blast Furnace – Basic Oxygen Furnace)	• Has to have Carbon Capture Utilisation and Storage (CCUS) meeting Taxonomy criteria for transport and storage (Green) ; And • CCUS should capture at least 70% of all emissions
Smelting reduction	• Has to have Carbon Capture Utilisation and Storage (CCUS) meeting Taxonomy criteria for transport and storage (Green) ; And • CCUS should capture at least 70% of all emissions
Direct Reduced Iron (DRI)	• if fossil gas based: a) Has to have Carbon Capture Utilisation and Storage (CCUS) meeting Taxonomy criteria for transport and storage (Green) ; And b) CCUS should capture at least 70% of all emissions • if 100% hydrogen-based: hydrogen meets carbon intensity thresholds and specific Taxonomy criteria for hydrogen (Green category)
DRI – EAF	• if fossil gas based: a) Has to have Carbon Capture Utilisation and Storage (CCUS) meeting Taxonomy criteria for transport and storage (Green) ; And b) CCUS should capture at least 70% of all emissions • if 100% hydrogen-based: hydrogen meets carbon intensity thresholds and specific Taxonomy criteria for hydrogen (Green category)

Traffic Light	Criteria
Green	Electric Arc Furnace (EAF): • Needs to use 70% of scrap as total annual inputs; OR • The combined scrap and (100%) Hydrogen based DRI meeting Taxonomy criteria for DRI (Green category) should add to at least 70% of the EAF total annual inputs Scope of emissions used in meeting the pathway is described in Appendix J .
Amber	Eligible assets that are listed in Table 12 and that are not meeting the criteria identified in the table can be classified as Amber only if: • The facility has been designed to and is implementing all necessary actions to meet criteria for Green category by 2030 at the latest • The facility from the onset of its operations is using CCUS, that operates to capture at least 20% of emissions And • Facility has a transition plan aligned with 1.5°C.
Amber (measures)	Facilities must comply with: • be implemented prior to 2030 and • enable the eligible assets to meet criteria identified in Table 13 and • comply with applicable cross-cutting criteria listed in Appendix M

Table 13 — Criteria for capital investments in decarbonisation measures for steel facilities

Eligible Assets	Facility specific mitigation criteria
BF	No relining; and The emissions intensity of the facility should be below 1.8tCO_2/t steel by 2030; and Decarbonisation measures should decrease emissions (tCO_2/t steel) between 2022 and 2030 by: • by 15% if emissions < 2tCO_2/t steel and if the production line with BF became operational in 2007 or later; or • by 20% if emissions >2tCO_2/t steel and if the production line with BF became operational in 2007 or later; or • at least 50% if the production line with BF became operational prior to 2007.
Production line with a DRI or Smelting reduction	Implement decarbonisation measures to decrease emissions (tCO_2/t steel) between 2022 and 2030 by: a) If fossil-gas based: 20%; or b) If coal-based: 40%.
Electric Arc Furnace (EAF)	Implement decarbonisation measures that: • enable the facility to increase the scrap total annual input; or • enable the facility to increase the share of renewable energy used by the facility

Scope of emissions used in meeting the pathway is described in Appendix J.

Ineligible activities	Facilities not complying with cross-cutting criteria (see Appendix M), incl. facilities using: • coal for on-site electricity generation. • dedicated crops, primary organic streams, and wood when using biomass as a reducing agent and/or for energy generation • CCUS for production of products that release the CO_2 immediately when these are used (such as in urea, carbonated beverages, or fuels), or for enhanced oil recovery, and the production of other forms of fossil energy sources.

4.4. Manufacture of hydrogen

Additional notes:

1. Thresholds for Green criteria for Manufacturing of hydrogen assess and pertain only to the cradle-to-site emissions.

2. Lifecycle GHG assessment for hydrogen production includes cradle-to-gate emissions, and transportation emissions to the site where a product will be used, unless it is instead converted into a carrier form before transportation. It means that the GHG accounting includes scope 1, 2 and partial scope 3 emissions. System boundaries are shown in Figure 12 below.[49]

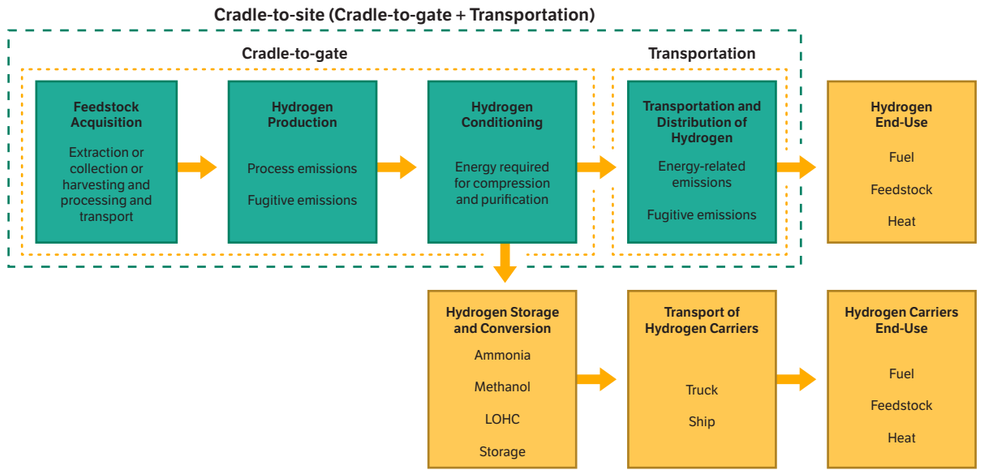


Figure 12: Systems Boundaries for GHG Accounting

3. If hydrogen is converted to ammonia or other carriers before transportation, that conversion is out of scope and therefore for this criteria is only up to the point before it is converted is relevant and should meet the proposed threshold. The conversion, transportation, and storage following are not currently in scope due to a lack of global guidance, although additional research is going into developing criteria for those parts of the process separately.

Sector	**Industry**
Activity	**Manufacture of hydrogen**
ISIC code	
ISIC description	
Objective	Climate change mitigation

[49]In cases, where ammonia is used as a hydrogen carrier - fugitive emissions have not been yet taken into account

Reference with international best practice / taxonomies / methodologies	**Green:** The proposed approach is adapted from Climate Bonds' Criteria for hydrogen sector. Pathway followed and relevant references for projection of the thresholds has been described in detail in section 4.3.2. of the CBI's Hydrogen Criteria Background Paper. EU Taxonomy criteria have been adapted as a starting point for the decarbonisation pathway. **Amber**: The proposed approach is adapted from Climate Bonds' Criteria for hydrogen sector. Detailed methodology can be found in the CBI's Hydrogen Criteria Background Paper

Further information on methodology used can be found at the Climate Bonds Initiative's website: https://www.climatebonds.net/standard/hydrogen-production in the Criteria Document and Background Paper

Traffic Light	**Criteria**
Green	Facility must comply with the following requirements: • Hydrogen production must meet specific carbon intensity thresholds (Table 14). • To demonstrate compliance with any of the emissions intensity thresholds set in Table 14, issuers are required to carry out a life cycle assessment (see Appendix N). • Facilities must meet the requirements listed in Table 22 in Appendix N depending on the feedstock and : a. The feedstock is not coal or coal derivatives. b. Biomass from primary sources is not eligible as a feedstock. Wood and other dedicated crops are not eligible (only waste biomass sources are eligible). • Facilities must meet the requirements listed in Table 22 in Appendix N for different electricity sources. • Facilities using CCS or CCU must meet the criteria in Table 22 in Appendix N. Facilities that meet the specific intensity thresholds presented in Table 22 in Appendix N, do not have to meet the following requirements associated with CCS/CCU listed in Table 22 in Appendix N: The minimum capture ra¬¬te from process and energy emission streams should be 90% or emissions reduction at the facility level have to be at least of 50%. Note: Use of fossil gas as a feedstock by facilities following 2030 is not recommended but given substantial uncertainty regarding availability of low-carbon green hydrogen, it is not a criterion at this stage. This will be re-evaluated in future iterations.
Amber (eligible decarbonisation measures)	Amber category is applicable until 2035 – all eligible decarbonisation measures must be implemented prior to 2035. **Criteria**: Eligible measures are listed in Appendix N (Table 21) together with the associated criteria. Criteria are applicable within production facility where company has a transition plan aligned with 1.5ºC.
Ineligible activities	**Facilities or measures for which:** • The energy source is oil, coal or coal derivatives and/or • The feedstock is coal or coal derivatives and/or • The energy source is biomass from primary sources and/or • The use of wood and other dedicated crops is enabled.

Table 14 — Hydrogen carbon intensity thresholds (see Appendix J for references and further details)

Asset Type	**Criteria**			
	2022 ($kgCO_2e/kgH_2$*)	2030 ($kgCO_2e/kgH_2$*)	2040 ($kgCO_2e/kgH_2$*)	2050 ($kgCO_2e/kgH_2$*)
Production of hydrogen	3	1.5	0.6	0

*To demonstrate compliance with any of the emissions intensity thresholds set in Table 14, the lifecycle assessment in line with the methodological notes provided in the Appendix J.

4.5. Manufacture of aluminium

Sector	Industry
Activity	**Manufacture of aluminium**
ISIC code	2420
ISIC description	
Objective	Climate Change Mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Pathway based on a starting point (in 2020) of the EU Taxonomy thresholds for aluminium. 1.5ºC-aligned sectoral decarbonisation pathway of the of the International Aluminium Institute (IAI) has been applied to this starting point focusing on the emissions scope by the EU Taxonomy. Pathway followed and relevant references for projection of the thresholds has been described in detail in IAI model

Traffic Light	Criteria
Green	The activity complies with one of the following criteria: **Primary aluminium** where the economic activity complies with two of the following criteria until 2025 and with all of the following criteria after 2025: • the GHG emissions do not exceed CO_2e emissions intensity thresholds presented in Table 15. • the average carbon intensity for the indirect GHG emissions does not exceed Green criteria set in the Taxonomy for Green category. • the electricity consumption for the manufacturing process does not exceed 14.86MWh/t Al. or **Secondary aluminium** – all eligible.
	Table 15 — Aluminium carbon intensity thresholds

Asset Type	CO_2e emissions intensity (CO_2e per tonne of aluminum manufactured)				
	2018	2030	2035	2040	2050
Production of Primary Aluminium through electrolysis	1.484	1.185	0.826	0.520	0.311

Amber (eligible decarbonisation measures)	Amber category is applicable until 2035 – all eligible decarbonisation measures must be implemented prior to 2035. **Criteria**: Decarbonisation measures that enable the facility to increase share of renewable energy used by the facility. Criteria are applicable within production facility where company has a transition plan aligned with 1.5ºC.
Ineligible activities	N.A.

4.6. Manufacture of plastics in primary form

Sector	Industry
Activity	**Manufacture of plastics in primary form**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU and South African Taxonomies

Traffic Light	Criteria
Green	The activity complies with one of the following criteria: • the plastic in primary form that is fully manufactured by mechanical recycling of plastic waste is directly eligible, without any further requirements incl. these focused on GHG emissions accounting; • where mechanical recycling is not technically feasible or economically viable, the plastic in primary form is fully manufactured by chemical recycling of plastic waste and the lifecycle GHG emissions of the manufactured plastic, excluding any calculated credits from the production of fuels, are lower than the lifecycle GHG emissions of the equivalent plastic in primary form manufactured from fossil fuel feedstock. Lifecycle GHG emissions are calculated using ISO 14067:2018 or ISO 14064-1:2018. Quantified lifecycle GHG emissions are verified by an independent third party. • derived wholly or partially from renewable feedstock and its lifecycle GHG emissions are lower than the lifecycle GHG emissions of the equivalent plastics in primary form manufactured from fossil fuel feedstock. Lifecycle GHG emissions are calculated using ISO 14067:2018 or ISO 14064-1:2018. Quantified lifecycle GHG emissions are verified by an independent third party. And Food or feed crops are not used as bio-based feedstock for the manufacture of plastic in primary form. And At least 90% of the produced plastic must not knowingly be used for single use consumer products.
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category

4.7. Manufacture of batteries

Sector	Industry
Activity	**Manufacture of batteries**
ISIC code	
ISIC description	Manufacture of rechargeable batteries, battery packs and accumulators for transport, stationary, on-grid, and off-grid energy storage, and other industrial applications. Manufacture of respective components (battery active materials, battery cells, casings, and electronic components). And Recycling of end-of-life batteries. And Where economic activity enables repurposing of batteries into facilities that store electricity, the technical screening criteria outline in the Taxonomy for energy storage apply.
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU Taxonomy taking into account emerging level of regulatory ambition in the EU regarding the recycled materials content
Traffic Light	**Criteria**
Green	The activity complies with one of the following criteria: • The economic activity manufactures and repurposes rechargeable batteries, battery packs and accumulators (and their respective components), including from secondary raw materials, that result in substantial GHG emission reductions in transport, stationary, on grid and off-grid energy storage and other industrial applications. • Recycling of end-of-life batteries.
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category.

4.8. Manufacture of renewable energy technologies

Sector	Industry
Activity	**Manufacture of renewable energy technologies**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU Taxonomy
Traffic Light	**Criteria**
Green	The economic activity manufactures renewable energy technologies meeting the criteria set out in the Taxonomy (Green category).
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category

4.9. Manufacture of equipment for the production of hydrogen through electrolysis

Sector	Industry
Activity	**Manufacture of equipment for the production and use of hydrogen**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU Taxonomy
Traffic Light	**Criteria**
Green	The economic activity manufactures equipment to produce hydrogen through electrolysis
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category.

4.10. Manufacture of low-carbon technologies for transport

Sector	Industry
Activity	**Manufacture of low-carbon technologies for transport**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU Taxonomy
Traffic Light	**Criteria**
Green	The economic activity manufactures low-carbon transport vehicles and their respective key components, fleets and vessels meeting the criteria set out in the Taxonomy (Green category). Manufacturing of measures that can be classified as Amber for water and air transport (as per section 2.6–2.8 of the Taxonomy) is eligible as Green only until 2030.
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category

4.11. Manufacture of energy efficiency equipment for buildings

Sector	Industry
Activity	**Manufacture of energy efficiency equipment for buildings**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach adapted from the EU Taxonomy to account for potential geographical differences
Traffic Light	**Criteria**
Green	The economic activity manufactures one or more of the following products and their key components:[50] a) household appliances falling into the highest two classes of energy efficiency in accordance with local market standards b) light sources rated in the highest two classes of energy efficiency in accordance with local market standards c) space heating and domestic hot water systems rated in the highest two classes of energy efficiency in accordance with local market standards d) cooling and ventilation systems rated in the highest two classes of energy efficiency in accordance with local market standards e) presence and daylight controls for lighting systems; f) heat pumps g) façade and roofing elements with a solar shading or solar control function, including those that support the growing of vegetation; h) energy-efficient building automation and control systems for residential and non-residential buildings; i) zoned thermostats and devices for the smart monitoring of the main electricity loads or heat loads for buildings, and sensoring equipment; j) products for heat metering and thermostatic controls for individual homes connected to district heating systems, for individual flats connected to central heating systems serving a whole building, and for central heating systems; k) district heating exchangers and substations compliant with the district heating/cooling distribution activity set out in the Taxonomy (green category); l) products for smart monitoring and regulating of heating system, and sensoring equipment.
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category

[50]The list of products and their components is likely to be revised in time

4.12. Manufacture of other low-carbon technologies for household sector

Sector	Industry
Activity	**Manufacture of other low-carbon technologies**
ISIC code	
ISIC description	
Objective	Climate change mitigation
Reference with international best practice / taxonomies / methodologies	**Green:** Approach aligned with the energy rating system introduced by the National Environment Agency of Singapore for regulated goods[51]
Traffic Light	**Criteria**
Green	For the household sector: Manufacturing of regulated goods that meet the highest performance level for a given good in energy rating system introduced by the National Environment Agency of Singapore or internationally available equivalent.
Amber	N.A.
Ineligible activities	Activities that do not meet the criteria outlined in the Green category

[51]https://www.nea.gov.sg/our-services/climate-change-energy-efficiency/energy-efficiency/household-sector

5 — Forestry

Context

The forestry sector has immense potential to provide environmental services that are extremely important in the fight against climate change. Forestry can also play an important role in the local economy through sustainable and regenerative systems. Forests can not only sequester and mitigate emissions of GHG, but they also play an important role in keeping biodiversity assets intact.

Afforestation, reforestation, and forest management to maximise carbon sequestration are recognised as key strategies for climate change mitigation in line with a 1.5°C pathway through removing CO_2 from the atmosphere and slowing global warming. However, the actual mitigation effect of forestry activities is influenced by many factors, such as location, scale and management effectiveness.

Climate change mitigation in the forestry sector is also strongly linked to avoiding deforestation and land-use change. Peat fires are also a major contributor to GHG emissions in Indonesia (40% of the total in 2005 and, in 2015, rivalling daily emissions in the U.S.) and could add an estimated 1 billion tons to the country's carbon footprint. The total carbon content of forests has been estimated at 861Gt of carbon for 2011, which is more than the amount of carbon in the entire atmosphere. According to the IPCC in its Sixth Assessment Report, reducing and/or preventing deforestation is the mitigation option with the largest and most immediate carbon stock impact in the short term.

TSC overview and methodology

Due to the diversity embedded in the forestry sector, the approach to identifying green agricultural practices and activities does not consider quantitative metrics and/or criteria.

Instead, it classifies activities and sub-activities according to the "traffic light" methodology where green are activities that are encouraged, amber are activities that should either be phased out or changed over time, while the rest are considered ineligible activities. This approach is similar to the one used for the construction of the Colombian Taxonomy.

Categorisation of activities

For the forestry sector, it is possible to group activities in three big groups, defined by the objectives and outputs of each operation in the sector.

The activities here have been mapped and grouped as follows:

- **Sustainable forest management** – a system that ensures that forests supply goods and services meet both present-day and future needs and contribute to the sustainable development of communities;
- **Forestry plantation** – type of managed forest in which the trees are planted (as opposed to naturally regenerated), of the same age and generally of the same species, and are intended to maximise the production of wood fibre;
- **Conservation, restoration and maintenance** – actions needed to protect and assure that environmental services are provided by natural/pristine forests.

How to use these criteria

The criteria have been designed to be applicable to granular green activities as well as to the wider level. For example, some of the criteria are suitable for green use of proceeds instruments, such as green bonds, where a bond is raised for a specific project or asset (e.g. nurseries) while others (e.g. the proxy certification standards) are applicable at the forestry project level and could be used as part of corporate disclosure to classify green revenues. Note that for an activity to be effectively considered as green, it should be in line with the relevant related guidelines in one or more of the listed credible certification schemes (e.g. Forest Stewardship Council – FSC and Programme for the Endorsement of Forest Certification – PEFC).

Activity technical screening criteria

5.1. Sustainable forest management

Sector	Forestry	
Activity	**Sustainable forest management**	
ISIC Code	A 0200	
ISIC Description	Forestry	
Objective	Identify Green, Amber, and Ineligible assets, projects and related activities related to sustainable forest management.	
Traffic Light	**Criteria**	**Alignment with international best practice/ taxonomies/ methodologies**
Green	• Land acquisition/refinancing if sustainable forest management practices are being carried out or being implemented as certified by credible international schemes (see list aside); or • Equipment and costs incurred by the activities – pre and post extraction, including primary processing that is either powered by renewable energy or appear amongst the most energy efficient in the country – as certified by local energy efficiency standards; or • Conservation, restoration and maintenance; or • Nurseries[52] – required for the adoption of Integrated Farm Management (IFM[53]) practices – organic and biofertilisers/ biocontrol – and that seeds and seedlings are sourced in sustainably managed areas; or • Adoption and maintenance of monitoring technology that enables the tracking of the forest extracts and its conservation status.	Aligned to CBI Taxonomy; Colombian Taxonomy applies a similar approach; Credible green certification schemes for sustainable forest management: • Forest Stewardship Council (FSC); • Programme for the Endorsement of Forest Certification (PEFC);
Amber	• Land acquisition with the purpose of adopting sustainable forest management practices as defined and certified by credible national schemes (see list aside); or • Extraction of timber products that would be used as biomass or feedstock for heat generation and biofuels (Phase out by 2030).	Amber certification schemes: • National certifications in ASEAN (to be considered AMBER until national schemes are assessed).
Ineligible activities	• Exploitation of timber and non-timber products from any species that would lead to or further its threatened conservation status.	

[52]Nurseries are defined any facility designated to produce tree seedlings grown under favourable conditions until they are ready for planting.
[53]Integrated Farm Management (IFM) is a site specific farm business approach that uses the best of modern technology and traditional methods (as defined by IFMA)

5.2. Forestry plantation

Sector	Forestry	
Activity	**Forestry plantation**	
ISIC Code	A 0200	
ISIC Description	Forestry	
Objective	Identify green, amber, and ineligible assets, projects and related activities related to forestry plantation.	
Traffic Light	**Criteria**	**Alignment with international best practice / reference from other taxonomies or methodologies**
Green	• Equipment and costs incurred by the activities (equipment must be powered by renewable energy or appear amongst the most energy efficient in the country – as certified by local energy efficiency standards); or • Use of organic and biofertilisers; or • Use of physical and biocontrol of pathogens, pests and weeds; • Conservation, restoration and maintenance; • Nurseries – required the adoption of IFM practices – organic and biofertilisers/biocontrol – and that seeds and seedlings are sourced in sustainably managed areas; • Adoption and maintenance of monitoring technology that enables the tracking of the forest extracts.	Aligned to CBI Taxonomy; Colombian Taxonomy applies a similar approach; Credible certification schemes: • Forest Stewardship Council (FSC); • Programme for the Endorsement of Forest Certification (PEFC); • National certifications in ASEAN (to be considered Amber until national schemes are properly assessed).
Amber	• Plantation of forests with the goal of extracting timber products that would be used as biomass or feedstock for heat generation and biofuels (Phase out by 2030); • Nutrient management plan based solely on chemical fertilisers (Phase out by 2030 and shift to IFM); • Phytosanitary management plan based solely on chemicals (Phase out by 2030 and shift to IFM).	• Aligned to CBI Taxonomy; • EU Taxonomy does not include agriculture; • Colombian Taxonomy applies a similar approach;
Ineligible activities	• Use of chemicals listed in the Stockholm Convention 1a or 1b in the WHO classification of pesticides by hazard or not in compliance with the Rotterdam Convention; • Operations on land that has been converted from high carbon stock (HCS[55]) after Jan 1, 2010.	• Aligned to CBI Taxonomy; • EU Taxonomy does not include agriculture; • Colombian Taxonomy applies a similar approach

[54]Biocontrol comprises using living organisms or natural substances to prevent or reduce damage caused by harmful organisms (animal pests, weeds and pathogens).
[55]High carbon stock (HCS) land assessment was developed for the purpose of avoiding land use change due to oil palm conversion that resulted in net carbon losses. As a result, any land use with more than the average C stock per hectare of oil palm, i.e., more than 35tC/ha, is considered high carbon stock. Forest classification types can be used as a proxy for the classification. For example, in Indonesia, lands classified as "Mostly young re-growth forest, but with occasional patches of older forest within the stratum," or above in terms of biomass are considered HCS land.

5.3. Conservation, restoration, and maintenance of natural/pristine forests

Sector	Forestry	
Activity	**Conservation, restoration, and maintenance of natural/pristine forests**	
ISIC Code	A 0200	
ISIC Description	Forestry	
Objective	Identify Green, Amber, and Ineligible assets, projects and related activities related to conservation, restoration, and maintenance of forests extracts.	
Traffic Light	**Criteria**	**Alignment with international best practice / reference from other taxonomies or methodologies**
Green	• Land acquisition with the purpose of conservation, restoration and maintenance; • Equipment and costs incurred by the activities (equipment must be powered by renewable energy or appear amongst the most energy efficient in the country – as certified by local energy efficiency standards); • Use of organic and biofertilisers (only relevant for restoration/ replanting of natural forest); • Use of physical and biocontrol[56] of pathogens, pests and weeds; • Nurseries[57] – required the adoption of Integrated Farm Management (IFM – find definition below[58]) practices – organic and biofertilisers/ biocontrol – and that seeds and seedlings are sourced from native species in sustainably managed areas; • Adoption and maintenance of monitoring technology that enables the tracking of the forest extracts and its conservation status.	Aligned to CBI Taxonomy; Colombian Taxonomy applies a similar approach;
Amber	• N.A.	
Ineligible activities	• N.A.	

[56]It is expected the all types of biological management required by the forestry project are guided by credible technical assistance.
[57]Any facility designated to produce tree seedlings grown under favourable conditions until they are ready for planting.
[58]Integrated Farm Management (IFM) is a site specific farm business approach that uses the best of modern technology and traditional methods (as defined by IFMA)

6 — Carbon Capture and Storage

Context

Carbon capture and storage/sequestration (CCS) is the process of capturing carbon dioxide (CO_2) before it enters the atmosphere, transporting it and storing it in underground geological formations. CCS includes a range of different process and technology options to capture and store CO_2. According to IEA, CCS is an important decarbonisation lever for hard-to-abate sectors and will contribute to achieving global climate goals.

Singapore is studying emerging low-carbon technologies such as Carbon Capture Utilisation and Storage (CCUS) This includes the study "Carbon Capture, Storage, and Utilisation: Decarbonisation Pathways for Singapore's Energy and Chemicals Sectors"[59] which was commissioned by the government and concluded in June 2021.

Singapore does not have any known suitable reservoirs for the permanent storage of CO_2 in its subsurface, but analysis of the geological storage potential in neighbouring countries indicates an estimated regional storage potential of 84.8 Giga tons[60] (Singapore's annual emissions are approximately 0.5Gigatons[61]. Currently, Singapore is targeting at least 2 million tons of carbon capture by 2030 and more than 6 million tons/year by 2050, as it transforms its Jurong Island downstream oil hub into an energy and chemicals park.

As a relatively mature technology, CCS is gaining traction as a decarbonisation lever in recent decades. However, scientists have exercised caution in promoting the role of CCS across the economy. While it is broadly agreed that CCS will play a role, there remain economic viability constraints, uncertainty around the long term nature of storage and limits to storage reservoirs and capacity (in the short-to medium term).

There is no universally adopted classification of CCS activities and no ISIC codes for them, but based on the examples of other taxonomies (Climate Bonds, EU and South Africa) activities can be classified the following way:

- **Point-source capture of CO_2** is the process of capturing CO_2 from a large emissions source – e.g. an industrial facility. Most CCS projects utilise point source capture given the higher concentrations of CO_2 make the capture process more efficient. Point-source capture is listed here for completeness of the process but it cannot be viewed as a standalone activity because it is never carried out separately from a certain industrial or power generation activity. Its main goal is to decrease the emissions of the activity it is linked to. Point-source capture is not a separate activity in other taxonomies and is mostly mentioned in this Taxonomy as a part of industrial activities criteria.

- **Transportation of captured CO_2** can be done by various means, including pipelines, ships, railroad cisterns or trucks.

- **Permanent sequestration of captured CO_2** includes injecting of CO_2, removed by point- or direct air capture of CO_2 within an underground geological formation, whereby the fraction of carbon dioxide stored through mineral carbonation that is retained after 1000 years is virtually certain to be 100%. As a consequence, the need for monitoring the disposal sites will be limited in the case of mineral carbonation (IPCC Special Report).

- **Research, development and innovation for CCS-related technologies**. Research activities that are related to CCS are included in the Taxonomy to underline the importance of the development of this field.

[59] https://file.go.gov.sg/carbon-capture-utilisation-and-storage-decarbonisation-pathway-for-singapore-energy-and-chemical-sectors-pdf.pdf
[60] Ibid.
[61] 1 Gigaton = 1,000,000,000 Tonnes

Utilisation of CO_2

Captured CO_2 may either be transported and stored or used on-site by industrial processes that require a source of carbon. Huge quantities of CO_2 are currently used each year, mainly in in the fertiliser industry and for enhanced oil recovery while new utilisation pathways in the production of CO_2-based synthetic fuels, chemicals and building aggregates are gaining momentum.

Utilisation is not included in this first version of the Taxonomy for a number of reasons including the nascent stage of the technologies, as well as the fact that the use of CO_2 does not always result in emissions reductions and are therefore not compatible with a low-carbon future. There also remains a lack of guidance in this area to leverage for this phase of work.

For these reasons, the precautionary principle was applied, and utilisation is not eligible within this Taxonomy. This may well change in the future as clearer guidelines become available.

TSC overview and methodology

Metrics used:

- Point-source capture of CO_2: compatibility of the targeted industrial or power generation activity with the corresponding green criteria elsewhere in taxonomy.
- Captured CO_2 transportation: rate of leakages. Proper construction properties of the vessel and leakage detection system can prevent captured CO_2 from leaking back into the atmosphere.
- Permanent sequestration of captured CO_2: Proper arrangement of the geological formation for CO_2 storage, the establishment of reliable surveillance systems and prevention of leakage are key metrics in assessing the efficiency of sequestration.
- Research, development, and innovation for CCS-related technologies: Research and development activities have a metric of technology readiness level (TRL) which employs a scale from 1 to 10 to indicate how far the technology stands from being utilised commercially

Activity technical screening criteria

6.1. Point-source capture of CO_2

Sector	**Carbon capture and storage**	
Activity	**Point-source capture of CO_2**	
ISIC Code	No code	
ISIC Description	The capture of CO_2 from a point source in an industrial or power generation facility	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference**
Green	The activity complies with all of the following criteria: • Point-source capture of CO_2 is eligible only as a complementary activity for the activities in the Taxonomy (for example, in the Industry section), and • Point-source capture of CO_2 is eligible as green if it makes the target activity compatible with the green criteria for a specific activity. Applicability of this option to each individual sector can be found in a specific activity article (relevant for sections related to the production of cement, iron and steel, hydrogen, basic chemicals). For reference to CCS in other parts of the Taxonomy, see: • 1.12 Electricity generation from fossil gaseous fuels • 4.2 Manufacture of cement • 4.3 Manufacture of basic iron and steel • 4.4 Manufacture of hydrogen	Not present in any other taxonomy. Added for clarity as cross-reference article as per request of the consultation group
Amber	The activity complies with all of the following criteria: • Point-source capture of CO_2 is eligible only as a supplementary activity for the activities in the present taxonomy (for example, in the Industry section), and • Point-source capture of CO_2 is eligible as amber if it makes the target activity compatible with the amber criteria for a specific activity. Applicability of this option to each individual sector can be found in a specific activity article (relevant for sections related to the production of cement, iron and steel, hydrogen, basic chemicals, as well as energy generation from gas).	
Ineligible activities	• N.A.	

6.2. Transportation of captured CO_2

Sector	Carbon capture and storage	
Activity	**Transportation of captured CO_2**	
ISIC Code	No code	
ISIC Description	Captured CO_2 transportation via pipelines, ships, railroad cisterns or trucks.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference with international best practices/reference / methodologies**
Green	The activity complies with all of the following criteria: • The CO_2 transported[62],from the installation where it is captured to the injection point leads to: ○ If transported by sea: CO_2 leakages[63], less than 3% of the mass of CO_2 transported regardless of the distance, and less than 2% after 2035, or ○ If transported via pipeline: CO_2 leakages, less than 0.5% of the mass of CO_2 transported. • The CO_2 is delivered to a permanent CO_2 storage site that meets the criteria for underground geological storage of CO_2 set out in Section 6.3. • Appropriate leak detection systems are applied and a monitoring plan is in place, with the report verified by an independent third party • The activity may include the installation of assets that increase flexibility and improve the management of an existing network.	Adopted from the EU Taxonomy
Amber	The activity complies with all of the following criteria: • Retrofitting of the existing CO_2 transportation systems in order to bring down the leakage rate from the current rate to the rate specified in the Green category is eligible as Amber • The starting leakage rate may not be above 10% of the mass of CO_2 transported regardless of the mode of transportation • The CO_2 is delivered to a permanent CO_2 storage site that meets the criteria for underground geological storage of CO_2 set out in Section 6.3. • Appropriate leak detection systems are applied and a monitoring plan is in place, with the report verified by an independent third party • The activity may include the installation of assets that increase flexibility and improve the management of an existing network. • Sunset date for this activity is designated as 2030	Based on the Climate Bonds research as per request of consultations group
Ineligible activities	• Transportation or retrofitting of transportation systems that do not comply with relevant Green and Amber criteria are designated as Ineligible.	

6.3. Permanent sequestration of captured CO_2

Sector	Carbon capture and storage	
Activity	**Permanent sequestration of captured CO_2**	
ISIC Code	No code	
ISIC Description	Permanent storage of captured CO_2 in appropriate underground geological formations. This activity does not include nature based sequestration activities.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference with international best practices/reference / methodologies**
Green	• Operation of a permanent CO_2 storage facility is eligible if the facility complies with requirements and recommendations of ISO 27914:2017 for geological storage of CO_2.	Adopted from the EU Taxonomy
Amber	• N.A.[64]	
Ineligible activities	• Construction of new facilities that fail to comply with ISO 27914:2017 is designated as ineligible.	

6.4. Research, development, and innovation for CCS-related technologies, including direct air capture

Sector	Carbon capture and storage	
Activity	**Research, development, and innovation for CCS-related technologies**	
ISIC Code	No code	
ISIC Description	The research applied research and experimental development of solutions, processes, technologies, and business models and other products dedicated to carbon capture, transportation and storage	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference with international best practices/reference / methodologies**
Green	The activity complies with one of the following criteria: • The activity researches, develops or provides innovation for technologies, products or other solutions that are dedicated to carbon capture, transportation and storage, • The implementation of the technologies, products or other solutions being researched for carbon capture, transportation and storage has the potential to result in overall net GHG emissions reductions once commercialised Or • Either one of the following criteria is met: ○ Where the researched, developed or innovated technology, product or other solution is at Technology Readiness Level (TRL) 1 to 7, lifecycle GHG emissions are evaluated in simplified form by the entity carrying out the research. The entity demonstrates one of the following, where applicable: (a) a patent not older than 10 years associated with the technology, product or other solution, where information on its potential has been provided; or (b) a permit obtained from a competent authority for operating the demonstration site associated with the innovative technology, product or other solution for the duration of the demonstration project, where information on its potential has been provided, Or ○ Where the researched, developed or innovated technology, product or other solution is at TRL 8 or higher, lifecycle GHG emissions are calculated using ISO 14067:2018 or ISO 14064-1:2018 and are verified by an independent third party.	Adapted from the EU Taxonomy, but expanded in scope (EU Taxonomy only contains research for DAC technology, not for the whole spectrum of CCS)
Amber	• N.A. (R&D activities that do not meet Green criteria are not eligible for finance.)	
Ineligible activities	• N.A.	

[62]Transportation of CO_2 may be carried out through pipeline or by seagoing vessel from the point of capture to the point of injection into storage or utilisation facility.
[63]Leakages are defined as fugitive losses due to equipment leaks, accidents, sabotage and exploitation issues.
[64]Note: No Amber criteria are available for storage of CO_2 as the criteria are binary – either it meets the ISO standard or it does not, If it does not, it is presumed not to be investible and therefore red.

7 — Information and Communications Technology

Context

ICT is one of the key enabling sectors in the ASEAN, EU, SA, Indonesian and other taxonomies. Although not usually high-emitting itself (there is almost no Scope 1 emission, only Scope 2 and 3 emission), this sector is important for digital transformation and the improvement of efficiency of activities in emissions-intensive sectors. Today roughly over 2% of all emissions in the world can be attributed to ICT sector, but this figure will grow in the future as demand increases. Even as emissions from the sectors rise, a report by the Global e-Sustainability Initiative estimates that IT solutions can help cut nearly 10 times more CO_2 than they emit[65].

Under the ISIC code, Section J, ICT includes publishing activities, telecommunications and data processing and hosting activities. Most ICT activities have limited climate impact and they are not generally included in major taxonomies. For the Singapore Taxonomy, the GFIT selected data centres as the most important activities within the ICT sector for emission reductions within the Singapore Taxonomy.

Data centres are an important part of the Singaporean as well as regional economy. As of 2021, Singapore had more than 70 operational data centres which amounts to 60% of all data centres in Southeast Asia. Together they consume almost 7% of the country's total energy requirements. This number is expected to hit 12%[66] by 2030.

In simple terms, data centre activities can be divided into two parts: the hardware and software.

The hardware component covers construction, as well as storage, manipulation, management, movement, control, display, switching, interchange, transmission, or processing of data through data centres.

The software component consists of two main activities:

- **Development of software and solutions that help tackle emission in other sectors** (development or use of ICT solutions that are aimed at collecting, transmitting, storing data and at its modelling and use where those activities are predominantly aimed at the provision of data and analytics enabling GHG emission reductions).

- **Development of software modification and solutions that lower the emission of this or other software** (for example, by optimising its architecture).

TSC overview and methodology

Singapore context

Singapore has, in the last decade, become a major hub for data centres within the ASEAN region. In the country itself they account for 7%[67] of total energy requirements. As data centres are intensive users of resources like land, water and energy, the Government informed the industry of a temporary pause in the growth of DCs in 2019 and embarked on a review. The pause was lifted in 2022 with the launch of pilot Data Centre – Call for Application (DC-CFA) exercise that invited innovative proposals from the industry.

The Government has recently announced that it will award 80MW of new capacity to four data centre operators selected through the pilot DC-CFA exercise, where the selected data center operators proposed sustainability measures such as achieving PUE of 1.3 or lower, as well as a Platinum rating under the Green Mark Scheme for New Data Centres.

[65]Global e-Sustainability Initiative & Accenture Strategy (2015) ICT Solutions for 21st Century Challenges.. https://smarter2030.gesi.org/downloads/Full_report.pdf
[66]https://news.nus.edu.sg/nus-and-ntu-launch-first-of-its-kind-tropical-data-centre-testbed/
[67]https://techwireasia.com/2022/04/singapore-data-centres/

Metrics for data centres

There are several aspects that affect emissions profile of a data centre:

Power Usage Effectiveness (PUE). Energy efficiency of data centres is usually measured in PUE ratio. It is determined by dividing the total amount of power entering a data centre by the power used to run the IT equipment within it. PUE is expressed as a ratio, with overall efficiency improving as the quotient decreases toward 1.0.

The BCA-IMDA Green Mark scheme for new data centres stipulates a PUE of 1.35 (at full capacity) for the "Platinum" rating. This is chosen as the PUE requirement for the green criteria and is stringent enough for the current level of development of the sector in the Southeast Asia region. It is feasible that some data centres in Singapore itself could comply with a PUE of 1.2, but the regional scope of the Taxonomy makes 1.35 a more realistic short-term target. It provides alignment with the government-instated target and also establishes an ambitious threshold that is slightly more rigorous than the one proposed by the Climate Neutral Data Centre Pact, which unites the world's biggest data centre owners and operators (their target is PUE 1.4 by 2025 for countries in tropical climate and 1.3 for temperate and cold climates).

For Amber criteria, the current target PUE of 1.49 (at full capacity) is determined by referencing PUE requirements for the "Gold" rating under the latest version of BCA-IMDA Green Mark scheme for existing data centres. After 2025, the target PUE of 1.42 (at full capacity) is proposed based on "Gold^{PLUS}" rating under the same scheme. This allows the Taxonomy to keep up with the technological advancements.

Energy sourcing. Replacement of fossil fuels generation with renewables generations can help further reduce scope 2 emissions, especially once marginal efficiency gains become more expensive to improve.

Refrigerant Global warming potential (GWP). Refrigerants that are used within data centres are liquids or a gas with a very low boiling point. Refrigerants, such as hydrofluorocarbons, and fire suppressants are powerful greenhouse gases with global warming potential (GWP) hundreds to thousands of times more potent per unit than carbon dioxide. Their effect on climate is measured in GWP units where lower GWP refrigerants can reduce the emissions of a data centre. The GWP of refrigerants applies the same criteria across Green and Amber due to low cost of complying with it and huge negative effect in case if it is relaxed.

Water usage efficiency. Singapore's non-domestic sector uses about 55% of its current water supply and this is projected to increase to 70% of its future water demand by 2060. Water Usage Effectiveness (WUE) indicator is computed using the data centre's annual water consumption (in cubic meters) divided by the annual operating IT equipment load (in MWh). As of 2021, the median WUE for data centres in Singapore was 2.4[68] while the lowest was 2.0 and the highest was around 4.8.

Architecture, design, and maintenance efficiency. Sustainable construction materials, proper organization of space within the data centre, efficient lighting and air cooling can reduce the consumption of energy, refrigerants, and fire suppressants thus improving the emissions profile of the facility.

All these criteria will be addressed by creating thresholds for the activities of the sector.

Metrics for software

Software is not, in itself, the source of material emissions, but it can drastically improve the emission profile of other activities ("greening by IT") – i.e. it is an enabling activity. Thus, the only metrics that can be applied is the metrics of efficiency with which the emission management software fulfills its mission.

Recent developments in the IT sector also launched a movement for "greening of IT" itself in order to improve energy efficiency of the IT solutions, maximise their use, minimise their carbon footprint and meet compliance requirements. Development of such software is a nascent field. These solutions make lesser impact on Taxonomy's objectives but is also important. Thus, it is added as Amber criteria-compliant activity without any additional thresholds.

Interoperability with other taxonomies

The Climate Bonds Taxonomy does not yet provide any criteria for ICT sector.

The EU Taxonomy provides criteria both for data centres and software, and in overwhelming majority of cases they are compatible with the ones in the draft Singapore Taxonomy. Data centres part refer to a variety of EU laws and regulations ("European Code of Conduct on Data Centre Energy Efficiency", or in CEN-CENELEC document CLC TR50600-99-1 "Data centre facilities and infrastructures - Part 99-1: Recommended practices for energy management"), but also contains a notion that it is possible to apply "alternative best practices from the European Code of Conduct on Data Centre Energy Efficiency or other equivalent sources may be identified as direct replacements if they result in similar energy savings".[69] As the criteria in the proposed Singaporean Taxonomy are more stringent than in the ones provided in the EU documents.

Concerning the software and solutions, the final decision on the compatibility can be made only after the final choice of "substantial contribution" definition is made. The EU Taxonomy solves this issue by stating that "where an alternative solution/technology is already available on the market, the ICT solution demonstrates substantial lifecycle GHG emission savings compared to the best performing alternative solution/technology. Lifecycle GHG emissions and net emissions are calculated using Recommendation 2013/179/EU or, alternatively, using ETSI ES 203 199, ISO 14067:2018 or ISO 14064-2:2019. Quantified lifecycle GHG emission reductions are verified by an independent third party which transparently assesses how the standard criteria, including those for critical review, have been followed when the value was derived[70]".

Activity technical screening criteria

7.1. Data processing, storage, transmission, and management

Sector	**ICT**	
Activity	**Data processing, storage, transmission, and management**	
ISIC code	6311	
ISIC description	Provision of infrastructure for hosting, data processing services and related activities, specialised hosting activities such as web hosting, streaming services, application hosting; application service provisioning; general time-share provision of mainframe facilities to clients; data processing activities such as complete processing of data supplied by clients or generation of specialised reports from data supplied by clients; provision of data entry services.	
Objective	Climate change mitigation	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	The activity complies with all of the following criteria: • For new facilities, PUE threshold should reference the latest version of the BCA-IMDA Green Mark Scheme for New Data Centres[71] – Platinum rating. This number must be updated in 2025 and every 3 years after that. • The GWP of refrigerants used in the data centre cooling system must not exceed 675, or meet applicable national standards/regulations[72], whichever is lower. • If the project includes the construction of a new facility, the facility must be compliant with the relevant Green Building criteria (Section 3.5) from the present Taxonomy	Compatible with the EU Taxonomy in majority of cases. GWP criteria is adapted from the EU Taxonomy. Label and PUE target are adapted from the Singaporean certification schemes.

[68] https://www.pub.gov.sg/Documents/PUB_WaterEfficiencyBenchmark_DataCentre_2021.pdf

[69] 2022 Best Practice Guidelines for the EU Code of Conduct on Data Centre Energy Efficiency (2022). https://e3p.jrc.ec.europa.eu/sites/default/files/documents/publications/jrc128184_jrc128184_jrc128184_2022_best_practice_guidelines-1.pdf

[70] https://eur-lex.europa.eu/resource.html?uri=cellar:d84ec73c-c773-11eb-a925-01aa75ed71a1.0021.02/DOC_2&format=PDF

[71] The most updated scheme as of this current Taxonomy iteration is the BCA-IMDA Green Mark for New Data Centres (2019). For the Platinum rating, PUE thresholds are: 1.50 at 25% IT load; 1.45 at 50% IT load; 1.39 at 75% IT load; 1.35 at 100% IT load.

[72] In Singapore, under the Environmental Protection and Management Act (EPMA), the GWP of refrigerant used in electrically driven water-cooled chillers with cooling capacity of 1,055kW or more that is used for one or more purposes that include producing chilled water for air-conditioning must not exceed the prescribed GWP limit of 15. This includes water-cooled chillers that produce chilled water for the cooling of data server halls/rooms and office spaces in data centres.

	Additionally, either one of the two criteria must be met: • **If the activity in question is located in Singapore**: Data centre must comply with BCA-IMDA Green Mark Scheme for New Data Centres for new Data Centres Platinum Rating criteria. The implementation of those practices is verified by an independent third-party and audited at least every three years. Re-certification has to be obtained every three years, or • **If the activity in question is located outside of Singapore**: WUE of the new data centres should be no more than 2.1 if the project starts before 2025, 2.0 if the project starts after 2025	
Amber (measures)	**The activity complies with all of the following criteria:** • Retrofitting of existing facilities only • For retrofitting that starts before 2025, PUE of the project should reference the latest version of the BCA-IMDA Green Mark Scheme for Existing Data Centres[73] – GOLD rating. If the retrofitting starts between 2025-2030, PUE of the project should reference the latest version of the BCA-IMDA Green Mark Scheme for Existing Data Centres – Gold^{PLUS} rating. • Project retrofitting must lead to aligning the existing Data Centre with a pathway of reaching PUE (at full capacity) green criteria from 2030, and • The GWP of refrigerants used in the data centre cooling system must not exceed 675, or meet applicable national standards/ regulations, whichever is lower. **Additionally, either one of the two criteria must be met:** • If the activity in question is located in Singapore: Data centre must comply with BCA-IMDA Green Mark Scheme for Existing Data Centres Gold plus Rating criteria, with recertification obtained every 3 years, or • If the activity in question is located outside of Singapore: WUE of the retrofitted data centres should be no more than 2.3 at the beginning of the retrofitting and retrofit project must lead to aligning the existing data centre with a pathway of achieving at least 2.0 by 2030.	Amber criteria are developed by Climate Bonds and modified throughout the discussions with the relevant experts during the consultation phase. PUE target are adapted from the Singaporean certification schemes.
Ineligible activities	• Not compatible with either of the criteria	

[73]The most updated scheme as of this current Taxonomy iteration is the BCA-IMDA Green Mark for Existing Data Centres (2019). For the Gold rating, PUE thresholds are: 1.6 at 25% IT load; 1.53 at 50% IT load; 1.45 at 75% IT load; 1.42 at 100% IT load. For the Gold^{PLUS} rating, PUE thresholds are: 1.55 at 25% IT load; 1.49 at 50% IT load; 1.42 at 75% IT load; 1.39 at 100% IT load.

7.2. GHG-related solutions and software

Sector	**ICT**	
Activity	**GHG-related solutions and software**	
ISIC code	6201; 6202	
ISIC description	This class includes the writing, modifying, testing and supporting of software; designing the structure and content of, and/or writing the computer code necessary to create and implement systems software (including updates and patches), software applications (including updates and patches), databases and web pages; customising of software, i.e. modifying and configuring an existing application so that it is functional within the clients' information system environment ; planning and designing computer systems that integrate computer hardware, software and communication technologies; provision of on-site management and operation of clients' computer systems and/or data processing facilities, as well as related support services	
Objective		
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	The activity complies with all of the following criteria: • Data-driven solutions and software for GHG emission reductions are considered to make a substantial contribution to climate change mitigation because of the lifecycle emissions reductions they enable through affecting various emission-related processes • Lifecycle GHG emissions and net emissions are calculated using ISO 14064-2:2019 or similar methodology • Quantified lifecycle GHG emission reductions are verified by an independent third party which transparently assesses how the standard criteria, including those for critical review, have been followed when the value was derived.	Compatible with the EU Taxonomy
Amber	• Solutions and software that contribute substantially to reducing carbon footprint of the IT industry through reengineering IT products and processes to improve their energy efficiency, maximise their use, minimise their carbon footprint and meet compliance requirements.	Adopted based on suggestion from the consultations phase
Ineligible activities	• N.A.	

8 — Waste

Context

The Waste sector, and specifically solid waste management, has the potential to support other sectors of the economy in reducing greenhouse gas emissions through waste prevention, separate hazardous waste collection, waste reuse and recycling.

In Singapore, around 6.94MTs of Municipal Solid Waste (MSW) was generated in 2021, with an overall recycling rate of 55%. Most of the waste is attributed to non-domestic sources (74%), and around 80% of total MSW is treated by Waste-to-Energy (WtE) plants (NEA, 2022). Currently, there are four WtE plants, a transfer station and one offshore landfill. Given Singapore's land constraints, there is limited space inland for additional MSW facilities. Nonetheless, Singapore aims to be a zero-waste nation by strengthening its climate, resource and economic resilience and adopt a circular economy approach to sustainable waste and resource management (NEA, 2022).

To achieve this, Singapore practises source segregation for co-mingled and single fractions. Since 2001, the National Recycling Programme (NRP) has been in place which collects commingled recyclables (paper, plastic, glass and metals) in a blue recycling bin for materials recovery. The Code of Practice on Environmental Health (COPEH), provides guidelines to address environmental health concerns in the design of buildings, and stipulates minimum design criteria on refuse and recyclables collection. In 2019, Singapore passed the Resource Sustainability Act (RSA), which set the foundations for Extended Producer Responsibility (EPR) frameworks to be implemented and address three key waste streams –e-waste, food waste and packaging waste (including plastics). As of 2022, we have put in place EPR for e-waste, and will roll out EPR for other waste streams (e.g. plastics and packaging waste) in phases. These efforts move us closer to achieving a circular economy where materials/ resources are recovered at the upstream while the residual waste is sent for energy recovery.

The Singapore Taxonomy for the Waste sector is developed for Singapore-based Financial Institutions (FIs) to guide business activities in

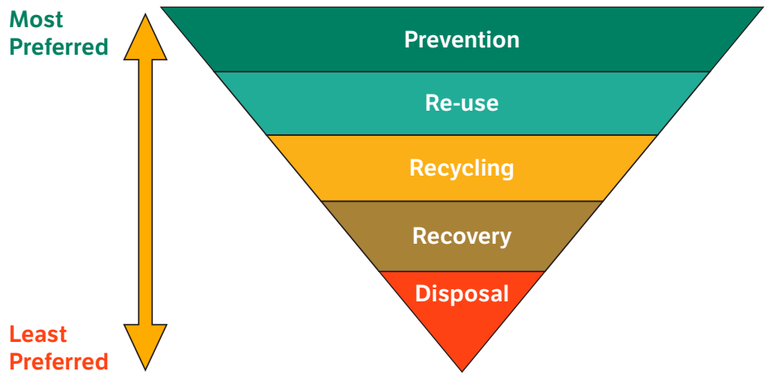


Figure 13: Waste Hierarchy

Singapore and regionally. It includes key activities for the management of post-consumer MSW, etc., which have a substantial contribution to mitigating climate change and moving towards a circular economy. The following economic activities and assets were identified for this sector:

- Collection and transport of non-hazardous waste
- Biowaste treatment: composting of biowaste
- Biowaste treatment: anaerobic digestion
- Waste-to-Energy (WtE)
- Landfill gas capture and utilisation (not directly applicable to Singapore) Material recovery facilities

The waste hierarchy acts as a guide for developing criteria across the sector. The top level of these activities is highly encouraged with limited, or no criteria attached. Moving further down to recovery and disposal, these are the least preferred methods of eliminating waste but allowed in certain circumstances, with more stringent criteria.

WtE activity is focused primarily based on incineration technology and was considered based on the relevance for Singapore. The metrics and thresholds for this activity ensure that recycling is still prioritised over incineration. Other waste-to-energy technologies such as pyrolysis, gasification that can produce alternate and sustainable fuels or chemicals are not covered currently in the Taxonomy as these technologies are still under development. However, such technologies are covered under the R&D activities in the Taxonomy. The activity of landfill gas capture and utilisation was included considering its relevance for ASEAN countries.

We note here that in Singapore's context, waste is first sent for incineration, and the incineration ash is subsequently landfilled together with non-incinerable waste. Landfilling of waste with methane capture has been included here as it provides guidance for such projects at the regional level.

TSC overview and methodology

The criteria for the sector considers the waste management hierarchy to ensure adequate management of the MSW by prioritising recycling over energy recovery or landfilling. Separation at source or at an intermediate facility are promoted to ensure better and efficient recycling. WtE has been included considering the local context, however, the thresholds are strict to ensure that only efficient plants are considered. Additionally, direct disposal of waste at WtE plants without pre-sorting or segregating of recyclables is not considered under Green or Amber categories.

The metrics chosen for activities related to collection and transportation and biological treatment of waste (composting and anaerobic digestion) are qualitative, as the climate mitigation effect is an inherent result of the economic activities. The mitigation of GHG emissions occur by the process of transformation of waste into by-products such as biogas or compost. The collection and transportation of waste to recycling facilities enables recycling and material recovery. However, the metrics include ensuring quality checks on the processes such as methane leakage monitoring, adequate use of by-products, ensuring sorting of waste, among others.

For Material Recovery Facilities, a minimum recovery efficiency was established to ensure that recycling is prioritised. For WtE, quantitative criteria related to energy efficiency and bottom ash recovery are established.

As in EU and Climate Bonds Taxonomy, the corresponding activities in Waste sector are primarily qualitative and incorporates criteria to ensure adequate process efficiencies (e.g., reducing methane leakage in composting plants). The green criteria primarily support segregation of waste at source for effective recovery and recycling. The collection and transportation of non-hazardous waste for energy recovery directly without any material recovery for recycling has been defined as Amber as it is preferred to establish a waste value chain with intermediate sorting and processing to enhance recovery and recycling, as well as lower GHG emissions.

For WtE plants, the net thermal efficiency of the plants is expected to be above 25% and the bottom ash recovery of metal is expected to be at least 75% for Green classification, as this ensures net GHG emissions through enhanced energy recovery. Similarly, the green criteria for Material recovery facilities is expected be above 50%, so as to have significant material recovery that can foster a sustainable waste value chain, with economically feasible and environmentally supportive recycling sector. The 50% efficiency in intermediate sorting also prevents majority of waste entering the landfill and allows for net GHG emission reductions through high quality of waste recycling.
The sunset date for Amber for activities under the Waste sector will be until 2030 unless stated otherwise.

Note: Pre-sorting refers to a process where the input waste has undergone sorting of recyclables at an intermediate facility such as a Material Recovery Facility (MRF) or undergone segregation prior to any waste treatment or disposal. Residual waste refers to non-recyclable fraction of the waste. Segregation refers to separating waste into different fractions such as biowaste, recyclables, etc.

Activity technical screening criteria

8.1. Collection and transport of non-hazardous waste

Sector	Waste	
Activity	**Collection and transport of non-hazardous waste**	
ISIC code	E3811	
ISIC description	Collection of Non-Hazardous Waste	
Objective	Net GHG emission reductions through reuse and high quality recycling of waste, which are enabled by the separate collection and transport of source-segregated non-hazardous waste fractions	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**The activity complies with the following criteria:** • Collection and transportation of non-hazardous waste that is segregated at source or at an intermediate sorting facility that is intended for preparation for reuse or recycling operations, and • Includes waste collection containers, transfer stations, transportation vehicles and other related infrastructure. Criteria for vehicles (if required) are defined under the activities of Transportation sector in Chapter 2	Compatible with EU Taxonomy criteria
Amber	**The activity complies with the following criteria:** • Collection and transportation of non-hazardous waste for energy recovery directly without any material recovery for recycling, and • Includes waste collection equipment and other related infrastructure. • The criteria for vehicles is defined under the activities of Transportation sector.	
Ineligible activities	**The activity complies with the following criteria:** • Collection and transportation of non-hazardous waste directly for disposal to landfills, and • Does not include adequate equipment for collections and transportation.	

8.2. Biowaste treatment: composting of biowaste

Sector	Waste	
Activity	**Biowaste treatment: composting of biowaste**	
ISIC code	E3821	
ISIC description	Treatment and Disposal of Non-Hazardous Waste	
Objective	Net GHG emission reduction through production and use of digestate as fertiliser/soil improver, displacing synthetic fertilisers and increasing carbon sequestration in soils.	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**The activity complies with the following criteria:** • The bio-waste that is composted is source segregated and collected separately, and • Ensure efficient operations to avoid methane leakage (e.g., improper aeration or mixing), and • The compost produced is used as fertiliser or soil improver.	Compatible with EU Taxonomy criteria
Amber	**The activity complies with all of the following criteria:** • Receiving unsegregated waste at site but sorting before composting the organic fraction, and • Ensure efficient operations to avoid methane leakage (e.g., improper aeration or mixing), and • The compost produced is used as fertiliser or soil improver.	
Ineligible activities	**The activity is described by any of the following:** • Waste is neither segregated at source nor pre-sorted, or • Lack of proper aeration system, or • Compost quality is poor and is not suitable for application to soil.	

8.3. Biowaste treatment: anaerobic digestion

Sector	Waste	
Activity	**Biowaste treatment: anaerobic digestion**	
ISIC code	E3821	
ISIC description	Treatment and Disposal of Non-Hazardous Waste	
Objective	Net GHG emission reduction through controlled production and utilization of biogas in various forms and applications, often displacing fossil fuels	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**The activity complies with all of the following criteria:** • The bio-waste that is used for anaerobic digestion is source segregated and collected separately, and • The produced biogas is used directly for the generation of electricity or heat or upgraded to bio-methane for injection in the natural gas grid or used as vehicle fuel or as feedstock in chemical industry, and • The produced digestate – ○ from biowaste (excl. sewage sludge) from single digestion facilities is used as fertiliser or soil improver, either directly or after composting or any other treatment as permitted by the applicable regulations, or ○ from anaerobic digestion of sewage sludge will be further processed and not disposed directly in landfills. Incineration is also fine because it allows energy recovery, and after incineration this gets converted to ash which can be landfilled, or ○ from co-digestion facilities must be processed further to ensure resource recovery and cannot be disposed directly, and • A monitoring and contingency plan is in place in order to minimise methane leakage at the facility, and • Woody waste must be segregated before or after processing and sent to an eligible treatment plant (such as composting or biomass-based energy plants).	Compatible with EU Taxonomy criteria

Amber	**The activity complies with all of the following criteria:** • Waste is not source separated but pre-sorted at facility, and • A monitoring and contingency plan is in place in order to minimise methane leakage at the facility, and • The produced biogas is flared directly without use of energy, and • The produced digestate – ○ from biowaste (excl. sewage sludge) from single digestion facilities is used as fertiliser or soil improver, either directly or after composting or any other treatment as permitted by the applicable regulations, or ○ from anaerobic digestion of sewage sludge will be further processed and not disposed directly in landfills. Incineration is also fine because it allows energy recovery, and after incineration this gets converted to ash which can be landfilled, or ○ from co- digestion facilities must be processed further to ensure resource recovery and cannot be disposed directly, and • The rejects from pre-sorting facility are disposed at Taxonomy-eligible facilities, and • The sunset date for Amber criteria is 2025[74].	
Ineligible activities	**The activity is described by any of the following:** • Waste is not source segregated or pre-sorted, or • No methane detection system installed, or • The produced biogas is flared directly, or • Digestate is not used as fertiliser or soil improver.	

[74]The ultimate aim is to avoid total flaring of biogas without energy recovery. It is allowed in the short term to allow plants to implement equipment to allow energy use. A two-year transition period is considered sufficient for implementing the retrofit.

8.4. Waste to Energy (Incineration)

Sector	Waste	
Activity	**Waste to Energy (Incineration)**	
ISIC code	E3821, E3822	
ISIC description	Treatment and Disposal of Non-Hazardous Waste	
Objective		
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**The activity complies with all of the following criteria:** • Residual or pre-sorted waste only, and • Plant efficiency ≥25%, and • Bottom ash recovery with at least 75% recovery of metal from ash. This activity could take place in an off-site location. • Note: R&D investments related to developing and testing new and emerging technologies are eligible. These include but are not limited to pyrolysis and gasification that can produce alternate and sustainable fuels or chemicals.	Partially aligned to Climate Bonds Taxonomy
Amber	**The activity complies with all of the following criteria:** • Unsegregated waste, but with pre-sorting at an intermediate facility to recover high quality recyclables before processing in the Waste-to-Energy plant, and • Plant efficiency between 10% and 25%, till 2030, and • Partial bottom ash recovery with some recovery of metal from ash (at least 50%).	
Ineligible activities	**The activity is described by any of the following:** • Waste directly used in waste to energy facilities without any pre-sorting, or • Metal recovery in bottom ash is <50%, or • Plant Efficiency less than 10%	

8.5. Landfill gas capture and utilisation

Sector	Waste	
Activity	**Landfill gas capture and utilisation**	
ISIC code	E3821, E3822	
ISIC description	Treatment and Disposal of Non-Hazardous Waste Treatment and Disposal of Hazardous Waste	
Objective	Net GHG emission reduction through the capture and utilization of landfill gas in various forms and applications, often displacing fossil fuels.	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**The activity complies with all of the following criteria:** • The landfill cell where gas capture is implemented is permanently closed and will not receive waste, and • The produced biogas is used directly for the generation of electricity or heat or upgraded to bio-methane for injection in the natural gas grid or used as vehicle fuel or as feedstock in chemical industry, and • A monitoring and contingency plan is in place in order to minimise methane leakage at the facility.	Aligned to EU Taxonomy criteria
Amber	**The activity complies with all of the following criteria:** • The landfill cell where gas capture is implemented is permanently closed and will not receive waste, and • Biogas is flared without use for generation of heat/electricity or biomethane production, and • The sunset date for Amber criteria is 2025.	
Ineligible activities	**The activity is described by any of the following:** • Operational landfill cells that are receiving unprocessed MSW, or • Biogas is not captured or flared without use for generation of heat/electricity or biomethane production.	

8.6. Material recovery facilities

Sector	Waste	
Activity	**Material recovery facilities**	
ISIC code	E3830	
ISIC description	Material Recovery	
Objective	The activity supports separation of recyclable components in the waste stream, thus displacing the use of primary raw materials in production processes.	
Traffic Light	**Criteria**	**Reference with international best practice / reference taxonomies**
Green	**2023–2030** **The activity complies with all of the following criteria:** • The activity results in a recovery efficiency of at least 50%. The sorted waste may then be used as secondary raw materials that are suitable for the substitution of virgin materials in production processes. • All facilities and equipment such as conveyor belts, compactors, pelletisers, air classifiers, magnetic belts, and other infrastructure requird for material recovery are eligible. **2030–2050*** To be provided in future iterations Note: The thresholds are proposed to increase ahead of 2030 to 2035, taking reference from international best practices (currently 80% but may be revised in 2030) and Singapore's national targets (currently targeted at 70% overall recycling rate at the system level by 2030)	The threshold of 50% is compatible with EU Taxonomy criteria
Amber	**The activity complies with all of the following criteria:** • The activity results in a recovery efficiency of at least 40%. The sorted waste stream may then be converted into secondary raw materials that are suitable for the substitution of virgin materials in production processes, and • Allowed till 2030 after which the facilities must meet the Green criteria.	
Ineligible activities	• Recovery efficiency of the Material Recovery Facility is less than 40%.	

9 — Water

Context

The water sector is intrinsically integrated and interrelated with other sectors, and across every Sustainable Development Goal (SDG). Investment in water sector is pivotal to building climate resilience across sectors and strengthening international peace and security. The World Bank estimates that sustained negative growth will occur in some regions due to water related losses in agriculture, health, income and property (World Bank, 2016).

Water and energy use are also highly correlated. Reducing leakages and increasing energy efficiency are also important to meeting climate mitigation goals. This is particularly important in the desalination process which is energy intensive or where water is transported over great distances. For example, in California, the water system uses approximately 20% of the state's electricity and 30% of its natural gas to pump, convey, treat, and heat water[75].

At the same time, poor access to safe drinking water and sanitation can lead to innumerable premature deaths and negatively affect a region's economy. The activities within the water sector for a sustainable finance Taxonomy shall primarily involve processes for efficient design of water collection, treatment, supply and wastewater treatment, with specific focus on increasing energy efficiency and reducing leakage losses.

In Singapore, current water demand is 440 million gallons per day (mgd). This is set to almost double by 2065, with the non-domestic sector being the major source of demand growth, increasing from about half of our total water consumption today to about two-thirds by 2065. The increase in water demand would be met by the installation, upgrading and effective operation of NEWater, desalination plants and distribution network (PUB, 2022). In Singapore, rainwater and used water are collected and conveyed through separate systems, ensuring that our waterways are free of pollution. Rainwater collected in local catchment areas is stored in 17 reservoirs and treated at our local waterworks to produce potable water. It is then distributed through 6,600km of pipeline network to both households and industries.

Used water is collected via 3,600km of public sewers and deep tunnel sewerage systems and is sent to the four water reclamation plants for treatment (PUB, 2022). The treated used water effluent is further purified using advanced membrane technologies and ultra-violet disinfection to produce NEWater at NEWater plants. Singapore also has desalination plants which produces potable water.

Singapore is a compact city state that is highly urbanised and densely populated. Singapore has the third highest population density in the world at 8,377people/km² and is one of the most water stressed countries in the world due to a lack of land to store and capture rainfall. Hence, the operating conditions of water and wastewater treatment infrastructure face unique challenges such as urbanised watershed as well as the lack of space for water infrastructure and deployment of renewable energy sources.

Competing land use compels Singapore to build deeper or multi-storey plants. For example, the Deep Tunnel Sewerage System (DTSS) project allows used water to be conveyed by gravity to centralised water reclamation plants and frees up some 880 hectares of land for higher value land use. However, this necessitates the construction of deeper Influent Pumping Stations (IPS) to pump used water from some 50-60m deep to the treatment processes in the centralised water reclamation plants.

Over the years, PUB has developed NEWater and desalinated seawater as two additional National Taps to enhance Singapore's water resilience. Technological advancement, such as Membrane Bioreactor (MBR) has made wastewater treatment processes more land

[75]https://www.ppic.org/publication/water-and-energy-in-california/

efficient, as there is no longer a need for large secondary sedimentation tanks in the Water Reclamation Plants (WRPs). In addition, MBR produces treated effluent that is of much better quality than that required to meet local discharge standards, and consistent and reliable supply of NEWater. In the context of NEWater production in Singapore, MBR also allows the overall treatment efficiency of water reuse to be improved, as the conventional treatment processes in a WRP and a NEWater Factory are shortened by two processes, saving both land and treatment costs.

The activities in water sector for Singapore have been defined as follows:

- **Plants:** Construction, extension and operation of new water collection and treatment systems
- **Plants:** Renewal of water collection and treatment systems
- **Distribution network:** Construction, extension and operation of new water collection and treatment systems
- **Distribution network:** Renewal of water collection and treatment systems (distribution networks)
- **Plants:** Construction, extension and operation of wastewater collection and treatment
- **Collection network:** Renewal of wastewater collection and treatment
- **Plants:** Desalination systems

The activities align with ISIC — Section E: Water supply, Sewerage, Waste Management and Remediation Activities. The Water collection, treatment and supply related activities align with E3600 and Wastewater sewerage related activities align with E3700.

TSC overview and methodology

The metrics chosen for the water sector consider improvements in efficiencies of systems based on energy efficiency or net energy consumption or through reduction of leakages. The efficiencies are measured based on population equivalent or m^3 of water produced or treated. The metrics for distribution networks are based on leakage indices.

For desalination systems, the metrics are based on net GHG emissions measured per m^3 of potable water produced. Net energy consumption may take into account measures to decrease energy consumption, such as source control (pollutant load inputs), and as appropriate, onsite or offsite renewable energy generation (such as hydraulic, solar and wind energy).

For water collection and treatment systems, the threshold is based on net energy consumption per m^3 of water produced for supply. The renewal of existing collection and treatment systems must meet the green or amber thresholds for the activity. Alternatively, the activity can be considered meeting the amber criteria if it demonstrates at least 20% improvement in energy efficiency over existing systems (measured over a period of 3 years). The net energy reduction can also be achieved using measures to decrease energy consumption, such as source control (pollutant load inputs), and, as appropriate, onsite or offsite renewable energy generation (such as hydraulic, solar and wind energy).

Similarly, for construction of wastewater systems, the criteria are based on energy consumption per population equivalent or m^3 of wastewater treated. For renewal of wastewater systems, the activity must meet the green or amber thresholds for the activity. Alternatively, the activity can be considered meeting the amber criteria if it demonstrates a minimum improvement of at least 20% in terms of net energy consumption compared to the baseline (measured over a period of 3 years). The net energy reduction can also be achieved using measures to decrease energy consumption, such as source control (pollutant load inputs), and, as appropriate, onsite or offsite renewable energy generation (such as hydraulic, solar and wind energy).

For desalination, potable water and wastewater activities, the criteria are based on net energy consumption and the plants can procure renewable energy to reduce the net GHG emissions and energy consumption. The focus, however, must first be on improving the efficiencies to meet the thresholds.

The Green criteria defined for wastewater collection and treatment are based on plant capacity and are detailed in Table 16. These thresholds are drawn from the EU Taxonomy limits. The amber criteria are developed considering data from the wastewater plants in Singapore.

Table 16 — Thresholds defined for wastewater collection and treatment for Green category

Water treatment plant capacity (population equivalent – p.e.)	Net energy consumption of wastewater treatment plant (kWh/p.e. per annum[76])
Less than 10,000	35
Greater than 10,000 and lesser than 100,000	25
Greater than 100,000	20

*The thresholds for distribution networks are based on reducing leakages in the systems for the segment of the network that is renewed.

The threshold for desalination systems is aligned to Climate Bonds and EU criteria, wherein the average carbon intensity of energy used to power the plant must be at or below 100gCO_2e/kWh over the remaining lifetime of the asset. Desalination plants can meet the thresholds through reduction in carbon intensity of energy source and/or through improvements in energy efficiency.

Both new and existing projects are considered in the Amber category. The sunset date for Amber activities under the Water sector will be 2035 unless stated otherwise.

Activity technical screening criteria

9.1. Construction, extension and operation of new water collection and treatment systems (abstraction and treatment systems)

Sector	Water	
Activity	**Construction, extension and operation of new water collection and treatment systems**	
ISIC Code	E3600	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Water collection, treatment, and supply.** Note: The activity excludes energy associated with pumping of potable water from the water treatment plant to the distribution network.	
Objective	Substantial contribution to GHG emissions savings through low specific energy consumption in the water collection, treatment and supply system.	
Traffic Light	**Criteria**	**References**
Green	• The **net average energy consumption for abstraction and treatment** equals to or is lower than **0.5kWh/m³** of water produced for supply. • Net energy consumption may consider measures that decrease energy consumption, such as source control (pollutant load inputs), and, as appropriate, onsite or offsite energy generation (such as hydraulic, solar and wind energy).	EU Taxonomy threshold and European benchmarking
Amber	• The net average energy consumption for abstraction and treatment equals to or is lower than **0.7kWh/m³** produced water supply. • Net energy consumption may take into account measures decreasing energy consumption, such as source control (pollutant load inputs), and, as appropriate, onsite or offsite energy generation (such as hydraulic, solar and wind energy).	
Ineligible activities	• Does not meet Green or Amber criteria	

[76]1 PE is defined as 200L/day or 73m^3/year.

9.2. Renewal of water collection, treatment and supply systems (abstraction and treatment systems)

Sector	Water	
Activity	**Renewal of water collection, treatment and supply systems (abstraction and treatment systems)**	
ISIC Code	E3600	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Water collection, treatment and supply** Note: The activity excludes energy associated with pumping of potable water from the water treatment plant to the distribution network.	
Objective	Substantial contribution to GHG emissions savings through low specific energy consumption in the water collection, treatment and supply system.	
Traffic Light	**Criteria**	**Reference**
Green	• For renewal systems that meet the Green criteria established in Section 9.1	
Amber	**The activity complies with one of the following criteria:** • For renewal systems that meet the Amber criteria established in Section 9.1 • The difference in the **net average energy efficiency of the system must be increased by at least 20%** compared to own baseline performance averaged for previous three years, including abstraction and treatment, measured in kWh per m^3 produced water supply and that established in the Green criteria category for Section 9.1. The efficiency must be achieved after the completion of commissioning and optimisation phase.	The second criteria aligns with the EU Taxonomy criteria
Ineligible activities	• Does not meet Green or Amber criteria	

9.3. Construction, extension and operation of water collection, treatment and supply systems (distribution networks)

Sector	Water	
Activity	**Construction, extension and operation of water collection, treatment and supply systems (distribution networks)**	
ISIC Code	E3600	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Water collection, treatment and supply**	
Objective	Substantial contribution to GHG emissions savings through low specific energy consumption in the water collection, treatment and supply system	
Traffic Light	**Criteria**	**Reference: international best practice/reference/ taxonomies**
Green	• The distribution loss (%) is less than 10% for the segment of the network	
Amber	• The distribution loss (%) is less than 20% for the segment of the network	
Ineligible activities	• Does not meet Green or Amber criteria	

Note: Distribution losses (%) = % Accounted For Water (AFW-real losses) + % Unaccounted for Water (UWF-unaccounted losses) [77].

[77] AFW is based on quantity of known leaks, while UFW = Demand – Sales – AFW.

9.4. Renewal of water collection, treatment and supply systems (distribution networks)

Sector	Water	
Activity	**Renewal of water collection, treatment, and supply systems (distribution networks)**	
ISIC Code	E3600	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Water collection, treatment and supply**	
Objective	Substantial contribution to GHG emissions savings through low specific energy consumption in the water collection, treatment and supply system	
Traffic Light	**Criteria**	**Reference**
Green	• For renewal systems that meet the green criteria established in Section 9.3	
Amber	**The activity complies with one of the following criteria:** • For renewal systems that meet the Amber criteria established in Section 9.3 • For distribution systems, the leakage levels **must be reduced by at least 20% for the segment of the network** compared to own baseline performance averaged for previous three years, and that established in the Green category for Section 9.3. The efficiency must be achieved after the completion of commissioning and optimisation phase.	The second criteria aligns with the EU Taxonomy criteria.
Ineligible activities	• Does not meet Green or Amber criteria	

9.5. Desalination Systems

Sector	Water	
Activity	**Desalination Systems**	
ISIC Code	E3600	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Water collection, treatment, and supply** Note: The activity excludes energy associated with pumping of potable water from the water treatment plant to the distribution network.	
Objective	Substantial contribution to GHG emissions savings through low specific energy consumption in the water collection, treatment and supply system	
Traffic Light	**Criteria**	**Reference**
Green	• The average carbon intensity of energy used to power the plant must be at or below 350gCO_2/m^3 of potable water produced, or • The energy used for the desalination plant must have carbon intensity less than 100gCO_2/kWh over the remaining lifetime of the asset. • The carbon intensity threshold is based on the trajectory established in the energy sector.	EU Taxonomy and Climate Bonds Taxonomy criteria
Amber activities	• The energy consumption of desalination plants must be less than 3.5kWh/m^3 of potable water produced till 2025. Between 2025 and 2030, energy consumption must be less than 3 kWh/m^3; and between 2030 to 2035, energy consumption must be less than 2.5kWh/m^3. • Beyond 2035, the plants must meet the Green criteria.	
Amber measures	The following technologies are eligible as individual measures until 2035. ○ Investments in improving energy efficiency of pumps and motors ○ High pressure speed pumps ○ Variable Frequency drives (VFD) and switchgear ○ High efficiency energy recovery devices (e.g., Isobaric ERDs) ○ Automation and instrumentation systems ○ Investments in Taxonomy-aligned energy generation (e.g., solar, ocean, wind, etc.)	
Ineligible activities	• Does not meet Green or Amber criteria	

* Amber criteria have an initial sunset date of 2035 after which point they will not be applicable. The criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology.

9.6. Construction, extension and operation of wastewater collection and treatment

Sector	Water	
Activity	**Construction, extension and operation of wastewater collection and treatment**	
ISIC Code	E3700	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Sewerage**. Note: The activity excludes energy requirements associated with pumping of sewage via Deep Tunnel Sewerage System (DTSS) to the wastewater treatment plant.	
Objective	Net GHG emission reduction through optimisation of wastewater treatment thus substituting sanitation systems with higher GHG emissions.	
Traffic Light	**Criteria**	**Reference**
Green	• The net energy consumption of the wastewater treatment plant equals to or is **lower than: 35kWh/p.e.** per annum for treatment plant capacity below 10,000p.e.; **25kWh/p.e.** per annum for treatment plant capacity between 10,000 and 100,000p.e.; **20kWh/p.e.** per annum for treatment plant capacity above 100,000p.e. Net energy consumption of the operation of the waste water treatment plant may take into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs), and, as appropriate, onsite or offsite renewable energy generation. • For the construction and extension of a wastewater treatment plant or a waste water treatment plant with a collection system, which are substituting more GHG-intensive treatment systems (such as septic tanks, anaerobic lagoons), an assessment of the direct GHG emissions is performed to establish that the new systems is more efficient.	EU Taxonomy criteria
Amber	• The net energy consumption of the wastewater treatment plant equals to or is **lower than 68kWh/p.e.** per annum, and is applicable for all treatment plant capacities. Net energy consumption of the operation of the wastewater treatment plant may take into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs), and, as appropriate, renewable energy generation. The sunset is 2035, beyond which the plants must meet the Green criteria.	
Ineligible activities	• Does not meet Green or Amber criteria	

9.7. Renewal of wastewater collection and treatment

Sector	Water	
Activity	**Renewal of wastewater collection and treatment**	
ISIC Code	E3700	
ISIC Description	Water supply, Sewerage, Waste Management and Remediation Activities: **Sewerage**	
Objective	Net GHG emission reduction through optimization of wastewater treatment thus substituting sanitation systems with higher GHG emissions.	
Traffic Light	**Criteria**	**Reference**
Green	• For renewal systems that meet the Green criteria established in Section 9.6	
Amber	**The activity complies with one of the following criteria:** • For renewal systems that meet the amber criteria established in Section 9,6, no additional requirements apply or • The difference in the **net average energy consumption of the system must be reduced by at least 20%** compared to own baseline performance averaged for previous three years, including abstraction and treatment, measured in kWh per m^3 produced water supply and that established in the green category for Section 9.6. The net energy consumption is estimated in terms of kWh/p.e.	The second criteria aligns with EU Taxonomy criteria.
Ineligible activities	• Does not meet Green or Amber criteria	

10 — Agriculture

Context

Agriculture accounts for an estimated 34% of all anthropogenic GHG emissions worldwide (Crippa et al., 2021). In 2019, emissions within the farm gate (crop and livestock production, including on-farm energy use) accounted for 7.2GtCO_2 eq. yr–1, while emissions from land-use change accounted for 3.5GtCO_2eq. yr–1. In brief, 65% of all emissions within the agri-food sector are related to primary food production (Tubiello et al., 2022). In addition to the high carbon footprint, traditional agricultural practices are drivers of biodiversity loss and water/soil degradation (Benton et al., 2021; Hunke et al., 2014). At the same time, agriculture is one of the sectors most vulnerable to the impacts of climate change (Tao et al., 2011). Recent extreme events have demonstrated how food production systems can be affected by shifting global climate; heat waves in southern Asia have destroying wheat crops and severe drought in southern Brazil has severely damaged the soybean crop.

Meanwhile, by 2050, it is projected that the global population will increase to 10 billion resulting in a 50% increase in food demand, with global grain demand projected to double. Income growth in low- and middle-income countries are driving changes in diets towards more emissions-intensive animal-based products, much of it grain fed. While the need to increase crop yields is clear, how this will be achieved is less obvious given the likely negative impacts of climate change and the evidence that yields of major crops have been levelling off in large parts of the major producing countries (Ray et al., 2012).

To reduce the impact of food production on the environment, the sector must shift to a more sustainable footing. Generally, 'sustainable' activities are understood as those that are capable of meeting the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland report; 1987). However, a standard narrative on what constitutes sustainable agriculture is yet to emerge due to the complexity of the sector. Production systems are often referred to as "sustainable", but the absence of agreed definitions mean that the risk of incremental changes to business-as-usual and of greenwashing is substantial. The goal of this document is to provide a common understanding on low-carbon agricultural operations for the Singapore context as a guide for the financial sector.

Levers for reducing emissions from the agriculture sector

For the following agriculture criteria, the focus is on reducing the GHG emissions relating to agriculture. There are a number of levers available to reduce emissions from agriculture which we are trying to target through these criteria. These include, but not only:

- Less emission intensive crops and animal production
- Reduced use of chemicals
- Increased use of bio solution
- Use of organic fertilisers
- Use of low-carbon equipment
- Better monitoring of environmental conditions
- Plant breeding dedicated to achieve better yields and resilience

There are, of course, other environmental goals that are important when referring to agriculture — such as reduced leaching of chemicals etc. Where these are aligned with climate goals, they are also tackled here but they are not the focus on this phase of work.

To safeguard Singapore's food security, the Singapore Food Agency (SFA) adopts a multi-pronged approach which includes diversifying food import sources and increasing local production. SFA also takes a risk-based approach to food safety which is guided by science and consistent with international standards. SFA has in place an integrated farm-to-fork food safety system to ensure that food is safe for consumption.

More than 90% of Singapore's food supply is imported, with only about 1% of Singapore's land set aside for agricultural use. Given Singapore's heavy reliance on imports, a key strategy to enhance its food security is import source diversification.

In addition, local farms play an important role in the nation's food security as local production serves as a buffer by reducing dependence on imports during supply disruptions. The local agri-food sector is predominantly made up of farms, producing hen shell eggs, vegetables, and seafood.

However, the agri-food industry in Singapore is nascent where land and resource constraints have prompted farms to adapt technology and innovative ways to 'grow more with less', in a sustainable way. In consultation with the Singapore Food Agency (SFA), context was provided by SFA in terms of its work to anchor high productivity farming players in our local ecosystem. Our farms are harnessing technology and innovation to strive towards productivity, climate-resilience and resource efficiency. These farms are also able to employ climate control technologies, increasing their resilience to climate changes.

SFA is facilitating industry development and growth in capability and capacity through the '30 by 30' vision. Areas of tech and innovation adoption include:

(i) Catalysing adoption of technology/ innovation to elevate productivity levels;
(ii) Growing more with less (to overcome resource costs like energy and manpower);
(iii) Pushing circular economy (to grow in a sustainable manner);
(iv) Closing the system production (to strengthen agri-inputs resilience) and
(v) Climate change adaptation (e.g. coastal protection for Lim Chu Kang).

TSC overview and methodology

Due to the diverse characteristics of agricultural operations, the approach to identifying green agricultural practices and activities does not easily lend itself to quantitative metrics and/ or thresholds.

Instead, it classifies activities and sub-activities according to the "traffic light" methodology where green are activities that are encouraged, amber are activities that should either be phased out or changed over a period of time, while the rest are considered ineligible activities. This approach is similar to the one used for the construction of the Colombian Taxonomy.

Categorisation of activities

The agriculture sector is diverse containing a wide variety of activities and a huge range of crops and animals that can be raised or grown. Despite this diversity, many activities exhibit similar characteristics, making it possible to group them together for simplicity of the Taxonomy.

The activities here have been mapped and grouped using ISIC as a guide as follows:

- **Crops (perennial and non-perennial, ISIC codes A011 and A012):** Palm (oil), coffee, cocoa, tea, rubber trees, nuts, fruits, rice, wheat, soybeans, corn, cassava, sugar cane, sugar beet, tobacco, vegetables.
- **Animal production (ISIC A014):** Bovine cattle and poultry (meat and eggs).

The criteria have been designed to be applicable to granular green activities as well as to the wider level (production unit). For example, some of the criteria are suitable for green use of proceeds finance, such as green bonds, where a bond is raised for a specific project or asset (e.g. machinery) while others (e.g. the proxy certification standards) are applicable at the crop level or famer level and could be used as part of corporate disclosure to classify green revenues.

For a listed activity to be effectively considered as Green, it should be in line with the relevant related guidelines in one or more of the listed credible certification schemes — e.g. if the criteria requires low-carbon soy production then it must meet the requirements of low-carbon soy production under the appropriate schemes. Evidence that these requirements have been met, could either be by certification under the scheme itself or verification of against individual components of the scheme by a third party.

Each bullet on the list represents a credible certification scheme most adapted to certify one or more activities listed on the left column (e.g. sugarcane production — Bonsucro certification scheme). Eligible Green activities should adopt guidelines from one or more of the listed schemes.

Each bullet on the list is eligible on its own unless otherwise stated. The sunset date for Amber activities under the Agriculture sector will be until 2030 unless stated otherwise. New projects/ measures are eligible under the Amber category.

Activity technical screening criteria

10.1. Perennial and non-perennial crops

Sector	Agriculture	
Activity	**Perennial crops (Palm (oil), coffee, cocoa, tea, rubber trees, nuts, fruits); Non-perennial crops (rice, wheat, soybeans, corn, cassava, sugar cane, sugar beet, tobacco, vegetables) includes conventional, protected and hydroponic systems**	
ISIC Code	A 0111, A 0112, A 0113	
ISIC Description	Perennial and non-perennial crops	
Objective	Identify Green, Amber and Ineligible operations dedicated to the production of perennial and non-perennial crops.	
Traffic Light	**Criteria**	**Alignment with international best practice/taxonomies or methodologies**
Green	The activity must meet one of the following criteria: • Agricultural equipment powered by renewable energy; or • Agriculture equipment that appears amongst the most resource efficient in the country e.g. in terms of electricity, water, land, labour efficiency; or • Low-carbon crop management: regenerative agriculture, organic farming, precision agriculture, agroforestry, controlled environments, as certified by eligible schemes (see list aside**us management of protected and hydroponic agriculture facilities (refer to Climate Bonds • Criteria for Protected Agriculture and Water Infrastructure for best practices); or • Use of organic and biofertilisers; or • Use of physical and biocontrol of pathogens, pests and weeds; or • Nurseries related to low-carbon crop management; or • Adoption and maintenance of monitoring and tracking technology (with the goal of enhancing predictability and precision in agricultural operation, and thus being a resilience and adaptation measure); or • Use of superior inputs which enables production with less resources e.g. superior seeds obtained through plant breeding (conventional breeding and genetic engineering with focus on productivity and resilience).	Aligned to Climate Bonds Taxonomy, EU Taxonomy does not include agriculture, Colombian Taxonomy applies a similar approach. **Eligible certification schemes**: • Roundtable of Sustainable Palm Oil (RSPO) • Indonesian Sustainable Palm Oil (ISPO) • Malaysia Sustainable Palm Oil (MSPO) • Palm Oil Innovation Group (POIG) • UTZ Certified and Rainforest Alliance • International Sustainability and Carbon Certification (ISCC) • Singapore Good Agricultural Practice (SG GAP) Certification; • Singapore Clean and Green Certification; • IFOAM Standard • Cocoa Certification — Conservation Alliance • Bonsucro • Global GAP • Roundtable on Responsible Soy (RTSR) • Proterra Foundation • Sustainable Rice Platform (SRP) • Climate-Friendly Rice Certification (AgriCapture) • RSB Standard • Smartcane BMP • Climate Bonds Protected Agriculture (Mexico) and Water Infrastructure Criteria[78]

[78]Note: that there is currently very limited guidance on protected agriculture around the world, criteria may be used as a proxy until additional guidance becomes available.

Amber	The activity must meet one of the following criteria: • Nutrient management plan based solely on chemical fertilisers for soil-based cultivation is eligible if there is a plan to phase out chemical fertilisers over time, and • By 2030, no nutrient management plan based solely on chemical fertilisers for soil-based cultivation will be eligible – and should shift to integrated approach[79] Or • Phytosanitary management plan based solely on chemicals (Phase out by 2030 and shift to integrated approach[80]).	Aligned to Climate Bonds Taxonomy. EU Taxonomy does not include agriculture. Colombian Taxonomy applies a similar approach.
Ineligible activities	• Use of chemicals listed in the Stockholm Convention 1a or 1b in the WHO classification of pesticides by hazard or not in compliance with the Rotterdam Convention[81]; • Operations on land that has been converted from high-carbon stock (HCS[82]) after Jan 1, 2010.	Aligned to Climate Bonds Taxonomy. EU Taxonomy does not include agriculture. Colombian Taxonomy applies a similar approach.

[79] Integrated Farm Management (IFM) is a site-specific farm business approach that uses the best of modern technology and traditional methods (as defined by IFMA).
[80] Ibid
[81] https://www.pic.int/default.aspx
[82] As defined by High Carbon Stock Approach – https://highcarbonstock.org/ HCS land are mainly primary forests, and not young regenerative forests.

10.2. Animal production

Sector	**Agriculture**	
Activity	**Animal production (bovine cattle and poultry)**	
ISIC Code	A 0121, A 0122, A 0140	
ISIC Description	Animal production	
Objective	Identify Green, Amber and Ineligible operations dedicated to animal production.	
Traffic Light	**Criteria**	**Alignment with international best practice/reference from other taxonomies or methodologies**
Green	• Agricultural equipment powered by renewable energy; or • Agriculture equipment that appears amongst the most resource efficient in the country e.g. in terms of electricity, water, land, labour efficiency; or • Low-carbon livestock management: regenerative agriculture, organic farming, precision agriculture, agroforestry, controlled environments, as certified by eligible schemes (see list aside); or • Food additives with the aim of reducing methanogenesis from enteric fermentation (e.g. 3-NOP and seaweed) • Adoption and maintenance of monitoring and tracking technology (with the goal of enhancing predictability and precision in agricultural operation, and thus being a resilience and adaptation measure); • Bio-digesters (Bio-septic tank); • Use of superior inputs which enables production with less resources, e.g. those obtained through pasture and animal breeding (with focus on productivity and resilience).	Aligned to Climate Bonds Taxonomy; EU Taxonomy does not include agriculture; Colombian Taxonomy applies a similar approach. **Eligible certification schemes:** • The Global Roundtable for Sustainable Beef (GRSB) • Sustainable Poultry Network (SPN – USA) • PoultryCARE
Amber	• Nutrient management plan (grazing crops) based solely on chemical fertilisers (Phase out by 2030 and shift to integrated approach; or • Phytosanitary management (grazing crops) plan based solely on chemicals (Phase out by 2030 and shift to integrated approach).	Climate Bonds Taxonomy. Colombian Taxonomy applies a similar approach.
Ineligible activities	• Use of chemicals listed in the Stockholm Convention 1a or 1b in the WHO classification of pesticides by hazard or not in compliance with the Rotterdam Convention; • Operations on land that has been converted from high-carbon stock (HCS) after Jan 1, 2010; • Use of feed that is related to non-eligible operations under the perennial and non-perennial crops standards (under Section 10.1).	Climate Bonds Taxonomy. Colombian Taxonomy applies a similar approach.

Taxonomy in Practice

Preamble

A key principle of this Taxonomy is that of the interoperability with other regional and national taxonomies. Capital is global, as are capital market participants, and it is therefore important that the Taxonomy is both consistent and compatible with other taxonomies, particularly the EU Taxonomy and the ASEAN Taxonomy. In drafting the Taxonomy, the approach, metrics and language adopted should be similar to other taxonomies. In particular, the structural underpinnings of this Taxonomy will be seen to be largely consistent with the EU Taxonomy.

While the Taxonomy represents current thinking around climate, transition, and activity thresholds, it is not designed to be static. It is not only permissible, but also desirable, that the Taxonomy be iterated in the future to reflect new initiatives and understandings, particularly in regard to the thresholds used for transition. Thresholds that are viewed as appropriate in this version may be less appropriate in years to come, and as such periodic updates will be necessary.

Mandatory use of the Taxonomy

It is important to note that the Taxonomy is not mandatory or contained in any regulation at the time of publishing. It is intended to be voluntary for use in the first years as adoption grows. The following sections outline how the Taxonomy could be used by different users now and in the future.

Users of the Taxonomy

By business line: it is anticipated that Singapore-based Financial Institutions providing debt and/or equity capital, including both public and private capital, would be the primary users of the Taxonomy; while it can also be used by companies, regulators, policymakers, and other financial market participants that need to define green activities.

By Geography: It will be primarily applicable to the provision of finance to companies in ASEAN member states (Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Laos, Myanmar, Cambodia and Vietnam), with the main focus on Singapore.[83]

Primary Users: Financial Market Participants

a. **Financial Institutions:** These are intended as the primary users of the Taxonomy and include equity fund management, debt fund management, alternative investment management, private equity, venture capital, infrastructure financing, investment-linked insurance products, among others (see full list below).

While these would be the primary, direct users of the Taxonomy, the ultimate end "users" would be the clients of the Financial Institutions outlined above. The Taxonomy is designed to assist in their decision making when allocating capital to financial institutions, investment funds and other vehicles that are aligned with their overall environmental objectives and the long-term development of a green, sustainable, economy.

Secondary Users: Companies, Industry Regulators and Policymakers

a. **Companies:** Companies can use the Taxonomy to help align their businesses to green economic activities, which may help them access green financing opportunities, bring sustainable investment opportunities to the market, and/or help them in their investment decisions. Taxonomy reporting can also be harmonised with reporting for other frameworks, including TCFD, CDP, and SBTi, to provide a comprehensive assessment of a company's performance on sustainability and environmental objectives.

b. **Financial Service Providers:** The Taxonomy can also be used by providers of services

[83] This geographic scope would refer to the nexus of operations, rather than strict issuer-driven geographic classification. For example, entities incorporated in Cayman but with substantial or an overwhelming majority of operations in ASEAN would be covered.

to these financial institutions and companies, including ESG ratings or scores providers, ESG researchers and financial or non-financial data providers.

c. **Regulators:** A Taxonomy can be helpful for macro-prudential regulators that wish to understand potential risks to financial stability that stem from "unsustainable" activities, as well as direct capital flows to green investment and promote financing to support Singapore's main environmental objectives.

d. **Academic Institutions and Policymakers:** The Taxonomy may have additional applications beyond these, including for example academic research and the development of national environmental policy.

Table 16 — Users and Uses of the Taxonomy

Primary user	
Asset Managers	Financial institutions and asset managers that provide financial products that are aligned with Taxonomy activities, including retail and institutional fund offerings, savings products and pensions. a. Equity funds, bond funds, ETFs, fund-of-funds, real estate funds, private equity and venture capital funds, infrastructure funds, portfolio management.
Secondary users: financials	
Asset Owners	Allocating and managing assets in line with Taxonomy activities, aligning investments with Green companies and projects, as well as helping the institution to achieve its environmental objectives.
Insurance	Managing insurance assets and allocating to external fund managers in line with the Taxonomy's Green activities, helping the institution to achieve its environmental objectives, as well as offering insurance products that are aligned with the Taxonomy. b. Insurance-based investment products
Investment banking	Ensuring capital raising for corporate and public clients is in line with the Taxonomy and funding is aligned with Green activities and the institution's environmental objectives. Support the promotion of Green lending and funding operations. c. Portfolio management, index funds, primary issuance/corporate financing.
Commercial banking	Ensuring lending for corporate and public clients is in line with the Taxonomy and loans are aligned with Green activities and the institution's environmental objectives. Support the promotion of Green lending and funding operations. d. Project finance, lending and corporate financing.
Retail banking	Ensuring lending and retail financial products are aligned with Taxonomy and overall environmental objectives. e. Mortgages, car loans, building loans.
Secondary users: other	
Regulators	Support regulatory interventions to help align investment flows with eligible Green activities and companies. Support new climate and sustainability reporting disclosures for companies and financial institutions to ensure alignment with the Taxonomy and national environmental objectives and Green activities. Avoid reputational risk for the financial market of 'greenwashing'.
Policymakers and government agencies	Align national policies and financial flows at an economic level towards Green activities and meeting national environmental objectives. Monitor and assess overall corporate and economic progress towards meetings national environmental priorities.
Companies	Align company development plans and investment priorities towards Green and transition activities and associated financing opportunities. Assess and report companies' activities and disclosures against Taxonomy criteria and long-term business alignment.

Financial institutions

While the Taxonomy is not mandated for any institutions at the time of publishing, Financial Institutions can use it to report on the degree to which their investments, products or range of transactions (in the case of single loans, etc.) are aligned with the Taxonomy and the environmental objectives to which the undertaking contributes.

In doing so, the Financial Institution can assess the alignment (or percentage alignment) of the activity or issuer being financed, aggregate these alignments to the portfolio or product level, and disclose aggregate alignment accordingly.

At the initial stage, Financial Institutions can identify investments that are eligible under the Taxonomy classifications and then determine whether they are aligned with the different Taxonomy classifications (Green, Amber and Ineligible). This will be partly dependent upon company reporting.

Over the next few years, investors are recommended to report eligibility and alignment of their investments with the Taxonomy using the activity classification for eligibility and additional data, where available, for alignment. Where investors do not have the source information from the underlying investee company, they can use the terms "potentially aligned" or "estimated aligned".

Over the long term, as companies begin to report activity-level financial data and metrics on the alignment of their activities using the technical screening criteria, investors should report both eligibility and alignment of their investments with the Taxonomy.

Companies

Companies can report revenues and/or expenditure, including data that justifies the performance of economic activities it operates in. An economic activity is considered eligible to the Taxonomy if included in the technical annex. An economic activity is considered to be aligned to the Taxonomy when it can demonstrate it meets the technical screening criteria. DNSH criteria are best efforts disclosure in the initial years of taxonomy implementation.

a. **Revenue breakdown by Taxonomy-eligible activities**, or capital expenditure (CapEx) and/or operating expenditure (OpEx) allocation to each Taxonomy-eligible activity;

b. **Performance against the technical screening criteria,** or environmental management data where this is an acceptable proxy for compliance with the technical screening criteria – including DNSH assessment;

c. **Management data on social issues:** Labour rights policies, management systems, audits, reporting.

At present, there is limited company disclosure on the breakdown of a company's revenue, capital expenditures and operating expenditures by activity level and, by extension, its alignment with the Taxonomy technical screening criteria. Additional company disclosure will therefore be required to determine an issuers' actual alignment with the overall environmental objectives and threshold.

Geographical Alignment

The Taxonomy is designed to focus primarily on Singapore, as well as being applicable to other ASEAN countries. It has been constructed to align with the EU Taxonomy and other international taxonomies to ensure interoperability, harmonisation, and to provide standardised reporting, classification criteria and due-diligence requirements.

The technical screening criteria, thresholds and transition pathways have been determined based on Singapore's Green Plan 2030 and Enhanced Nationally Determined Contribution and Long-Term Low-Emissions Development Strategy (2020), as well as the Singapore government's goals for a sustainable economy and its associated policies, legislation and regulations.

As a result, these may not be appropriate or achievable in the short term for companies in other markets or international investments. Financial institutions are, however, still encouraged to seek out international investments and projects that are aligned with the Taxonomy criteria and standards. As such:

a. International investments which meet the Green or Amber Taxonomy technical screening criteria can still be classed as aligned with the Taxonomy for reporting purposes.

b. International investments which do not meet the Green or Amber Taxonomy technical screening criteria will be classed as Ineligible under the Taxonomy classification.

For international investments that do not fall into the scope of the Taxonomy, these will be classed as Ineligible under the Taxonomy.

Sector Reporting

The chapter in the Taxonomy on **Sectors** deals in more detail with the sector classification system chosen, and the sectors covered by the Taxonomy. The ISIC system has been selected as a starting point for the Taxonomy development as it is comprehensive in its coverage of economic sectors worldwide. It is acknowledged that many financial market participants use other classification systems, such as the Global Industry Classification System (GICS) or Industry Classification Benchmark (ICB), and a mapping of alternative classification systems to the selected ISIC sectors will be provided.

Green, Amber & Ineligible activities classification

The chapter of the Taxonomy on **Classification** deals in more detail with the way that green, amber and ineligible activities should be assessed in the context of alignment and the technical screening criteria. This Taxonomy by design allows for capital to be deployed in a way that recognizes the differing economic, social, and technological contexts of ASEAN member states, and acknowledges that capital being deployed to make substantial (but alone insufficient) progress towards a desired end-state is both legitimate and desirous. For example, a power plant that is retrofitting carbon capture and storage technology. The activity itself may not meet thresholds for alignment, but the project to decarbonise would be consistent with the one of the Environmental Objectives.

In this instance, the CapEx that is incurred would potentially be eligible for alignment. However, the revenue of the underlying activity (in this example power generation) would not.

The DNSH requirements are detailed in its chapter. This assesses in more detail the way that investors must assess if an activity is doing harm to a different environmental objective.

The Taxonomy establishes certain minimum safeguards that are applicable to all assessments — investors must determine that the issuer is compliant with for example the OECD Guidelines on Multinational Enterprises (MNEs)[84] and the UN Guiding Principles on Business and Human Rights, with specific reference to the ILO Core Labour Conventions.[85]

Definitions

What is revenue?

Revenue or net turnover means the amounts derived from the sale of products and the provision of services after deducting sales rebates and value added tax and other taxes directly linked to turnover. Overall turnover is equivalent to a firm's total revenues over a defined period.

Turnover ratios are used by financial analysts to understand a company's efficiency and profitability based on data found in financial statements.

Use: The primary way of aggregating from an economic activity to a company level. Some companies may need to aggregate from asset to economic activity level.

What is CapEx?

Capital expenditure (CapEx) is a payment for goods or services recorded, or capitalised, on the balance sheet instead of expensed on the income statement.

Use: Aside from helping investors analyse a company's investment in its existing and new fixed assets, capital expenditures can give an indication of a company's strategy for improving environmental performance and resilience.

What is OpEx?

Operating expenses (OpEx) are shorter-term expenses required to meet the ongoing operational costs of running a business.

While revenue is an indicator of ongoing operations and activities, and is the primary indicator for alignment, where new investment is being made in a technology to better align an issuer, then CapEx would be a more appropriate indicator.

The use of revenue, CapEx, or OpEx is dependent on the vehicle being financed. In particular, where capital is being extended to fund a particular activity or project, then CapEx would be more appropriate.

[84] See: https://www.oecd.org/corporate/mne/
[85] See: https://www.ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang--en/index.htm

What is an activity?

When a company offers goods or services, it is performing an economic activity. The universe of economic activities is described using ISIC codes, which cover 21 broad sectors and with four further levels of differentiation. At the fourth level, 615 classes of economic activity are identified. The ISIC codes map directly to the EU's NACE classification system. Any economic activities that are not directly covered by ISIC codes, such as buildings, have been identified as a cross-cutting activity for both climate change mitigation and adaptation, in line with the EU Taxonomy.

What is a project?

For economic activities that do not meet the technical screening criteria for alignment with the Taxonomy, the financing of improvement measures (CapEx and, if relevant, OpEx) can be counted as Taxonomy-aligned if they are part of an implementation plan to meet the activity threshold over a defined time period.

How is this aggregated to the company level?

At the issuer level, net turnover from aligned activities would be aggregated to determine issuer level alignment. For example, one activity representing 45% and another representing 15% of issuer/company revenue may be aligned, but an activity representing 40% of revenue may not. In this case, an issuer/company would be determined as having 60% revenue alignment.

For projects, following completion, the company can claim 100% of the turnover associated with the project as being aligned with the Taxonomy if it meets the technical screening criteria for Green or Amber. During the project timeframe, it is only the project itself which is considered to be aligned with the Taxonomy and so the turnover associated with the project cannot be classed as aligned until completion.

Step by step guide

- An assessment of the activity or issuer being financed.
- Three tiers of assessment: activity, project, and company/issuer (please refer to Definitions box for more detail).

a. An activity refers to an economic activity as categorised using the UN ISIC[86] framework.

b. A project refers to a smaller project that is undertaken within the context of an activity.

c. A company/issuer refers to an entity which issues a capital markets instrument, for example debt issuance, equity issuance, and so on, or raises financing from a financial institution such as loans or project financing.

1) In the case of an **activity** (i.e., where capital is extended to an issuer to finance a specific activity), the financial Institution must:

a. Determine that the activity (rather than that company/issuer) falls within one of the target sectors (Energy, Transportation, or Buildings);

b. Examine the activity to determine alignment with one of the Environmental Objectives,

c. Disclosure as best practice that the activity does not breach DNSH criteria or minimum social safeguards.

2) In the case of a **project** (i.e. where capital is expected to an issuer to finance a specific project), the financial institution must:

a. Determine whether the project falls within one of the target sectors;

b. Examine whether it contributes to an improvement in the alignment of the activity to one of the five Environmental Objectives (whether from Amber to Green, 'dark Amber' to 'light Amber', or Ineligible to Amber). For example, a power plant that is retrofitting scrubbers or carbon capture and storage technology. Even if the activity itself does not currently meet the criteria for alignment with the Environmental Objective, the project can be considered to be aligned if it brings the activity into alignment upon completion.

c. Disclose as best practice that the project does not breach DNSH requirements or minimum social safeguards.

3) In the case of a **company/issuer** (i.e., where an investment is made in or a loan extended to a company or other pooled vehicle), the Financial Institution must:

[86] International standard industrial classification of all economic activities (ISIC), developed by the United Nations Statistics Division. https://unstats.un.org/unsd/classifications/Econ/ISIC.cshtml.

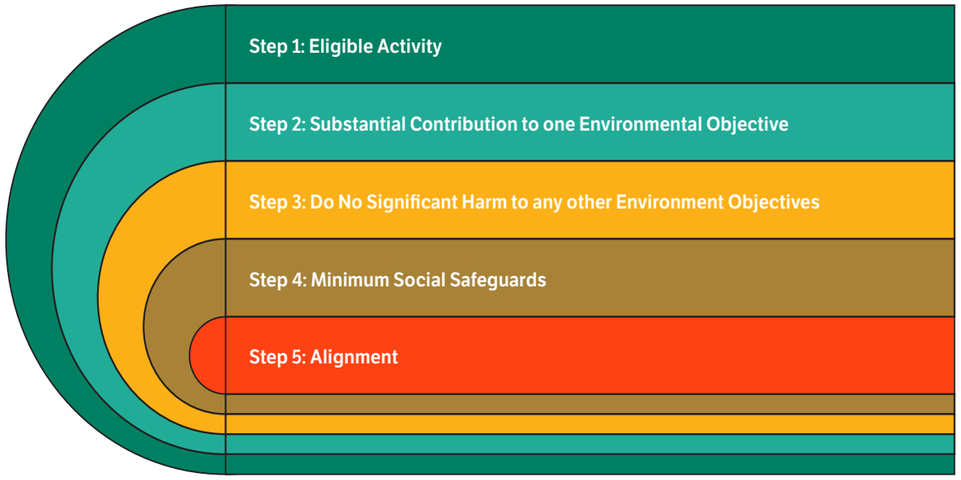


Figure 1: Step by Step Guide to Taxonomy Assessment

a. Determine the extent to which the company/ issuer's activities fall within one of the target sectors;

b. Assess the proportion of revenue (or CapEx/ OpEx) that is aligned with one (or more) of the Environmental Objectives; and then

c. Disclose as best practice that the company/ issuer's activities that are aligned with the Taxonomy DNSH criteria or minimum social safeguards.

Note: At present, the Taxonomy only covers climate change mitigation as an Environmental Objective, with the remaining four expected to be added in future iterations of the Taxonomy. As such, activities, projects and a company/issuer can only currently be classified as being aligned with climate change mitigation, although DNSH criteria should be considered for all of the remaining four Environmental Objectives. DNSH requirements are detailed in its own chapter.

Economic Activity Eligibility and Alignment

Eligibility under the Taxonomy is assessed by economic activity according to its ISIC Classification (see Appendices for more details). Economic activities will be classed as 'Ineligible' under the Taxonomy if the economic activity does not fall within the scope of the Taxonomy (currently limited to the Energy, Transportation and Buildings sectors).

- If the eligible activity already meets the Green technical screening criteria for at least one of the five environmental objectives, then it can be considered to be aligned as a Green activity under the Taxonomy as long as it also does no significant harm to the other four environmental objectives and complies with minimum safeguards.

- If the eligible activity is not aligned with the Green technical screening criteria, then the activity is assessed against the amber, or transition, technical screening criteria and, if it also does no significant harm to the other four environmental objectives, can be considered to be aligned as an amber, or transition, activity under the Taxonomy.

- Eligible activities which are aligned with either the Green or Amber technical screening criteria. Users are recommended to provide disclosure against DNSH tests and to prepare for DNSH requirements should they be mandatory in the future. In the future, a breach the DNSH requirements for the remaining four environmental objectives will result in the activity being classified as Ineligible under the Taxonomy.

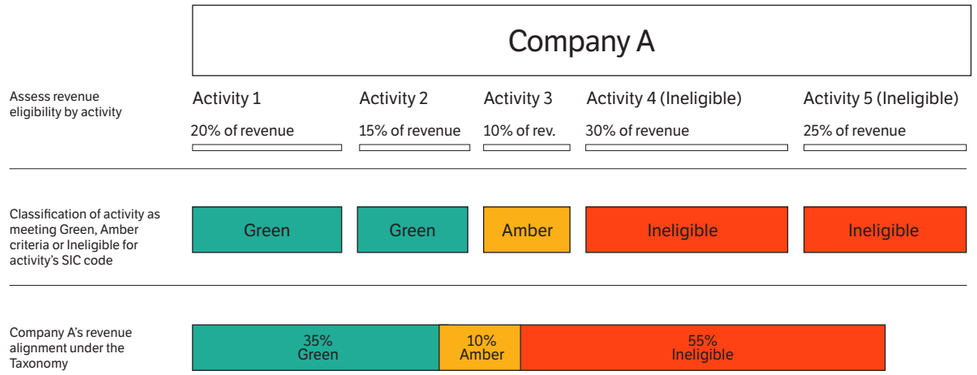


Figure 2: Determining a Company's Eligibility and Alignment

- If the eligible activity is not aligned with either the Green or Amber technical screening criteria, it is classified as Ineligible under the Taxonomy.

Company Taxonomy Reporting and Eligibility

Non-financial companies may disclose the proportion of their economic activities that align with the Taxonomy criteria. The translation of environmental performance into financial variables (revenue/turnover, CapEx and OpEx) allows investors and financial institutions to have clear and comparable data to help them with their investment and financing decisions. The main reporting options for non-financial companies would be:

- **Taxonomy-aligned Revenues** represents the proportion of the net turnover derived from products or services that are from activities that are aligned with the Green or Amber technical screening criteria for at least one of the six environmental objectives of the Taxonomy.

- **Taxonomy-aligned CapEx** represents the proportion of the capital expenditure of an activity that is either already Taxonomy-aligned or is part of a credible plan to extend or reach Taxonomy alignment.

- **Taxonomy-aligned OpEx** represents the proportion of the operating expenditure associated with taxonomy-aligned activities or to the CapEx plan. The operating expenditure covers direct non-capitalised costs relating to research and development, renovation measures, short-term lease, maintenance and other direct expenditures relating to the day-to-day servicing of assets of property, plant and equipment that are necessary to ensure the continued and effective use of such assets.

The plan that accompanies both the CapEx and OpEx reporting should be disclosed at the economic activity aggregated level.

To determine overall Taxonomy alignment at an entity level, the proportion of eligible revenues from each activity which meets the technical screening criteria for Green, Amber or Ineligible classifications should be aggregated to give the total revenues that are aligned with each classification as shown below.

Financial Institution Taxonomy Reporting and Portfolio Alignment

After constructing a portfolio of investments, financial institutions would aggregate this information to a portfolio level, using this information to determine (and disclose) how much of a product is aligned with the Taxonomy. Whilst regulatory activity is not within scope of this Taxonomy, one outcome could be that regulators provide thresholds for alignment, whereby portfolios with a green alignment greater than x% would be permitted to identify as a "green" product, but those with an alignment is lower than x% would

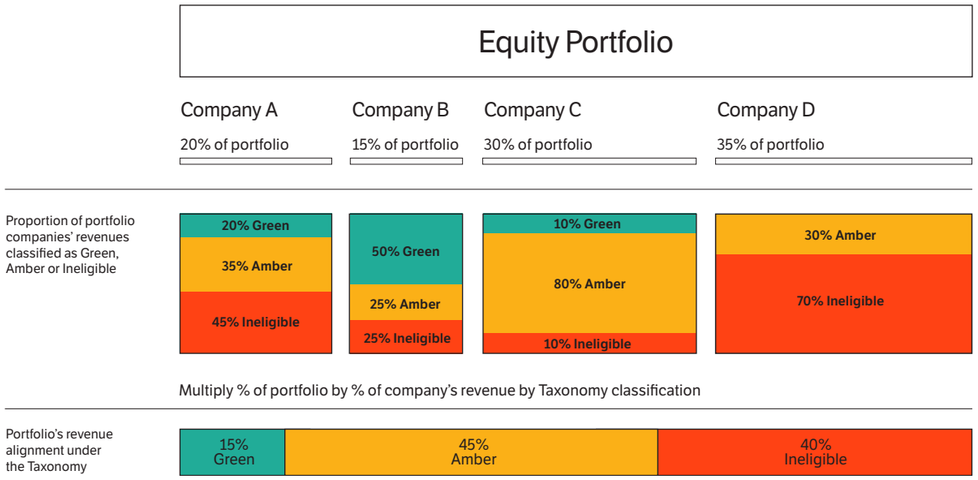


Figure 3: Determining an Equity Portfolio's Eligibility and Alignment

not. Regulators would be able to set a threshold for determining whether a product is "green" based on the percentage alignment that sits under a product. Ultimately, the end objective is to understand how much of the capital being allocated is "green".

Equity investments

For equity investments, company revenue is used as the main proxy for equity exposure to Taxonomy-aligned economic activities. In order to calculate total portfolio alignment, the calculation is the weight of the asset within the portfolio multiplied by the proportion of the company revenue which is eligible and aligned with each Taxonomy alignment classification (Green, Amber, and Ineligible) for inclusion under the Taxonomy.

Debt capital

The approach for general debt capital is broadly the same as for equity investments, with revenue being used as a proxy for portfolio exposure to Taxonomy-aligned economic activities, where appropriate. For corporate debt and/or bonds which are being used to fund Taxonomy-aligned projects, then 100% of the investment can be classed as Taxonomy-aligned where it commits to meeting the technical screening criteria for the environmental objective at the maturity of the project.

Reporting and Disclosures

What would disclosure look like?

Financial Institutions would report the degree of alignment of an investment portfolio or financial product with the Taxonomy, on a weighted basis.

It is currently envisaged that Financial Institutions should disclose:

- **General alignment:** How products have used the Taxonomy to classify investments, on a narrative basis;
- **Overall ESG objective:** How that usage is consistent with the specified product-level ESG outcomes (for example, in the case of an environmental fund, or a climate fund);
- **Proportion of aligned investment:** The percentage of the product that is assessed to be aligned with the Taxonomy;
- **Data usage:** The way that data has been utilised, either publicly disclosed, via engagement, or estimated;
- **Taxonomy Environmental Objective:** The environmental objectives (and their exposure) to which the product contributes;
    - For example, percentage of the product which contributes to climate change mitigation, or percentage of the product which contributes to climate change adaptation, and so on.
- **Alignment assessment:** How due diligence was carried out, the technical screening criteria were assessed, and the number of portfolio companies that were estimated to substantially contribute but which failed the DNSH test (and how the Financial Institution intends to address this failure, either through portfolio construction or engagement);
- **Other factors:** Reasons for a low-level or alignment, where the outcome deviates from what might reasonably be expected from the specified product-level ESG outcomes (for example, in the case of an environmental fund, or a climate fund); and
- **Engagement objective:** How engagements are undertaken in the context of the Taxonomy (for example, to focus on issuers with low alignment, or to engage for continued momentum from an issuer operating within a "Transition" activity).

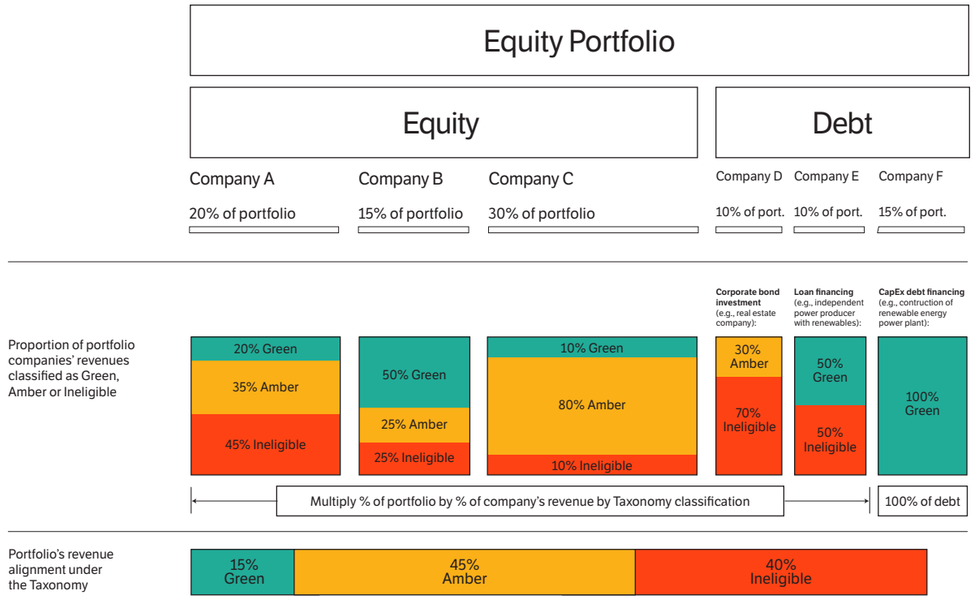


Figure 4: Determining a Mixed Asset Portfolio's Eligibility and Alignment

In doing so, Financial Institutions need to aggregate the alignment of the issuers / companies within the product.

After aggregating activity alignment at the issuer level, this alignment is then aggregated at the portfolio level on a weighted basis.

The Financial Institution should also clearly label in fund / product / equivalent documents where a metric other than revenue, CapEx, or OpEx has been used to assess alignment. Whilst these metrics are assumed to be sufficient in the majority of cases, there may be very uncommon cases where an alternate measurement might be used. Financial Institutions should ensure that an internal governance process is established to govern the use alternative metrics so as to ensure a robust process remains in place.

This would be helpful for regulators and exchanges in thinking about disclosure requirements.

What disclosure is recommended from Companies?

The success of the Taxonomy will be enabled by high quality disclosure from issuers, with this ideally aligned with other reporting standards and frameworks, such as the International Sustainability Standards Board (ISSB) and GRI, and frameworks, such as TCFD and CDP.

Issuers should disclose sufficient information so as to allow investors to assess alignment with the Taxonomy, using internationally-recognised data and metrics from the organisations listed above or more specific frameworks such as the World Green Building Council for Net Zero framework, GRESB, and Climate Bond Initiative.

This information would be disclosed both in listing documents (for example, prospectus documents) and on an ongoing basis via annual reports or equivalent (incluing dedicated non-financial or sustainability reports).

Specifically, issuers should disclose the percentage of their business that is aligned with the Taxonomy (by way of revenue, CapEx or OpEx), the specific Environmental Objective/Objectives with which the company is aligned, and the ways in which the issuer has ensured compliance with the minimum safeguards as described in the relevant DNSH section of the Taxonomy.

The issuer should present such information on an activity-by-activity basis, where the issuer is involved in more than one activity.

Where an issuer claims alignment, it should provide the requisite revenue, CapEx, or OpEx data on an activity-by-activity basis.

Whilst these disclosures are not currently a regulatory requirement, issuers wishing to attract "green" capital would be motivated to make such disclosures. One additional outcome of the Taxonomy as discussed earlier is that regulators consider incorporating mandatory regulatory disclosures that are aligned with and would facilitate consideration of Taxonomy alignment.

Taxonomy Reporting Recommendations/ Expectations in Practice

At present, the Taxonomy is only considering the first environmental objective, climate change mitigation, with subsequent environmental objectives to follow in future iterations of the Taxonomy. This means promoting activities that are already low carbon or can contribute to a transition to a low-carbon economy. Under this assessment, the recommended reporting elements are as follows:

Green Activities

Where the issuer is reporting alignment with an activity determined to be Green, the issuer should describe (both quantitatively and qualitatively) how the activity meets the technical screening criteria for climate change mitigation, any external verification or due diligence of these metrics, and the level of associated revenue/turnover.

Transition/Amber Activities

Where the issuer is reporting alignment with an activity determined to be amber (transition), there is a particular emphasis on the issuer to describe (both quantitatively and qualitatively) the way that such an activity is aiding in transition.
In general:

- The issuer should outline the current alignment of the activity or project with the transition thresholds and the operational plan to transition the activity or project to the Green thresholds, including target date(s) and final Environmental Objectives.
- The issuer could also provide more information about CapEx/OpEx requirements to meet that objective/threshold or feasibility plan of meeting the threshold.

Ineligible activities

Where an economic activity does not meet the technical screening criteria for Green or Amber, then the activity will, by default, be classed as ineligible as this is neither currently aligned with a low-carbon economy or has a transition pathway to alignment.

Economic activities will be classed as 'Ineligible' under the Taxonomy if the economic activity does not fall within the scope of the Taxonomy.

Do No Significant Harm

To be classed as aligned, an economic activity has to meet the technical screening criteria for that activity. It is also recommended for all users of the Taxonomy to provide disclosures about how DNSH requirements are met (or not met).

The DNSH assessment is to ensure that, at the same time as an economic activity or project is making a substantial contribution to one of the five Environmental Objectives under the Taxonomy, it is not doing so through practices or policies which would cause potential or actual harm to any of the other four Environmental Objectives.

While compliance with the DNSH tests are not compulsory in the early implementation of the Taxonomy, in the future this may be required so that if there is no identifiable approach or option to mitigate this potential harm, then the activity will be classed as 'ineligible' under the Taxonomy.

DNSH requirements are detailed in its own chapter. For the purposes of this section, the discussion on DNSH and case studies provided below are to help users of the Taxonomy understand how the DNSH requirements are intended to work.

The DNSH sections of the Classification chapter are designed to help in assisting financiers, highlighting the issues, the principal harm that could possibly come, and the metrics to be monitoring.

The due diligence process includes: understanding the risk associated with an activity or project, with reference to the activity or project, and its location, and potential social impact; and assessing the metrics that need to interrogated.

Note that this DNSH-based due diligence does not end at the point of investment. Investors are expected to continually monitor indicators and engage with issuers to understand the way that materiality, probability and risk management have evolved. Investors should also remain apprised of new and emerging risks to the issuer.

Minimum Social Safeguards

The Taxonomy establishes certain minimum safeguards that are applicable to all assessments – investors should determine that the issuer is compliant with the OECD Guidelines on Multinational Enterprises (MNEs)[87] and the UN Guiding Principles on Business and Human Rights, with specific reference to the ILO Core Labour Conventions.[88]

In this instance, the "OECD Due Diligence Guidance for Responsible Business Conduct"[89] is a helpful guide for investors. The Guidance states:

"The OECD Guidelines for MNEs acknowledge and encourage the positive contributions that business can make to economic, environmental and social progress, but also recognise that business activities may result in adverse impacts related to corporate governance, workers, human rights, the environment, bribery, and consumers. Due diligence is the process enterprises should carry out to identify, prevent, mitigate and account for how they address these actual and potential adverse impacts in their own operations, their supply chain and other business relationships, as recommended in the OECD Guidelines for MNEs. Effective due diligence should be supported by efforts to embed RBC into policies and management systems, and aims to enable enterprises to remediate adverse impacts that they cause or to which they contribute."[90]

Case Studies

Case study: Off-shore wind farm, equity financed

Principles for substantial contribution to climate mitigation

Off-shore wind energy is considered to make a substantial contribution to climate change mitigation by providing zero-emissions energy and are classified as Green under the Taxonomy. Company A makes 20% of its revenue from off-shore wind farms and 80% of its revenue from thermal coal-fired power stations.

Financial institution portfolio reporting:

The offshore wind farm activity automatically falls under the Green classification; the financial institution would then check that the company does not breach the DNSH tests and disclose key considerations.

For company A, which makes 20% of its revenue from its offshore wind farm activity and 80% from its thermal coal-fired power station activity, 20% of its revenue will be classified as green and the remainder as Ineligible.

For portfolio reporting, if this company accounts for 5% of the financial institution's equity portfolio, then the financial institution will report 1% of its portfolio as Green and 4% as Ineligible (weight in portfolio x% of Green revenues).

[87] See: https://www.oecd.org/corporate/mne/
[88] See: https://www.ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang--en/index.htm
[89] See: http://mneguidelines.oecd.org/OECD-Due-Diligence-Guidance-for-Responsible-Business-Conduct.pdf
[90] See: http://mneguidelines.oecd.org/OECD-Due-Diligence-Guidance-for-Responsible-Business-Conduct.pdf, p15

Case study: Freight transportation, equity financed

Principles for substantial contribution to climate mitigation

Freight transportation currently accounts for a significant proportion of carbon emissions from transportation in Singapore and the wider ASEAN region so reducing tailpipe emissions from this source would make a substantial contribution to climate change mitigation. Company B makes 100% of its revenues from freight transportation, with 10% from its local, electric-powered delivery fleet and 90% from its revenues from energy-efficient long distance delivery trucks.

The Taxonomy classifies freight transportation with zero direct tailpipe emissions as green, as long as the vehicles are not used to transport fossil fuels, while heavy-duty vehicles that have specific CO_2 emissions of less than half of the reference CO_2 emissions of all vehicles in the vehicle sub-group to which the heavy-duty vehicle belongs are classified as Amber, as long as they are also not used to transport fossil fuels.

Financial institution portfolio reporting:

The electric-powered transportation activity automatically falls under the green classification. The Financial Institution then should take steps to satisfy itself that the company does not breach the DNSH tests on pollution and the circular economy to classify this company's activity as Green under the Taxonomy.

For the truck delivery activity, the company needs to provide both current CO_2 emissions as well as a credible transition pathway for its delivery fleet to reach zero tailpipe emissions by the sunset date in order to be classified as amber under the Taxonomy. The Financial Institution should also satisfy itself that the company does not breach the DNSH requirements on pollution and the circular economy for this activity.

In total, for company B, 10% of its revenue will be classified as Green and the remainder as Amber.

For portfolio reporting, if this company accounts for 10% of the financial institution's equity portfolio, then the Financial Institution will report 1% of its portfolio as Green and 9% as Amber (weight in portfolio x% of Green and Amber revenues).

Case study: Construction of new buildings, debt financed

Principles for substantial contribution to climate mitigation

Construction of energy and resource efficient new buildings can make a substantial contribution to climate change mitigation by reducing GHG emissions from the operational and construction phase of the building lifecycle and this should be measured by appropriate indicators of energy and GHG emissions both in the operational phase and along the lifecycle (including embodied emissions).

- The Taxonomy relies on the Singapore's Green Mark 2021 certification standards as well as the energy intensity of the buildings to assess eligibility for Green or Amber classification.

- A new building is eligible when it meets the Green Mark 2021 certification standard, which requires construction companies to meet set parameters on the design, construction and operation of buildings to increase energy efficiency and enhanced environmental performance.

- A new building can only be classified as green or ineligible under the Taxonomy as it is not considered possible for a new building to transition to Green over time.

- The construction of new buildings for the purpose of occupation by fossil fuel extraction, transporting transport of fossil fuels or manufacturing of fossil fuels activities (either for actual extraction, transporting, manufacturing and/or administrative purpose) are excluded.

Financial Institution portfolio reporting:

If the new building

- Meets the Green Mark 2021 criteria;
- Meets the DNSH and minimum social safeguards requirements;

It will be classed as Green under the Taxonomy, with 100% of the value of the debt to finance the construction of the new building classified as Green in the financial institution's portfolio.

Conclusion

It is envisaged that some criteria and methods outlined in this Taxonomy will need periodic revision, while other areas could entail further progression subject to industry development and technology advancement down the road. There could also be changes on the economic activities in and out of scope as transition moves along. The Taxonomy would allow monitoring capital flows towards sustainable finance and facilitate greater growth of green finance in Singapore and the broader ASEAN region.

Do No Significant Harm

1. INTRODUCTION
2. ENERGY SECTOR
- 2.1. Energy from solar PV and CSP (including electricity, heat, cool)
- 2.2. Wind power generation
- 2.3. Hydropower generation
- 2.4. Geothermal energy generation (including electricity, heat, cool)
- 2.5. Bioenergy power generation (including electricity, heat, cool)
- 2.6. Electricity generation from ocean energy
- 2.7. Transmission and distribution of electricity
- 2.8. Transmission and distribution of renewable and low-carbon gases
- 2.9. Storage of energy and green hydrogen
- 2.10. Electricity generation from hydrogen
- 2.11. Energy production from natural gas
- 2.12. District heating and cooling systems
- 2.13. Production of heat or cool from waste heat
- 2.14. Decommissioning of fossil fuel-based power plants

3. CONSTRUCTION
- 3.1. Construction of new buildings
- 3.2. Installation, maintenance, repair of equipment
- 3.3. Renovation of existing buildings
- 3.4. Acquisition or ownership of buildings

4. TRANSPORT
- 4.1. Transport via railways
- 4.2. Other passenger land transport
- 4.3. Urban and suburban passenger land transport
- 4.4. Freight transport by road
- 4.5. Transport infrastructure
- 4.6. Sea and coastal water transport
- 4.7. Inland water transport
- 4.8. Freight air transport
- 4.9. Passenger air transport

5. WATER
- 5.1. Construction, extension and operation of new water collection and treatment systems
- 5.2. Renewal of water collection, treatment and supply systems
- 5.3. Construction, extension and operation of new water supply systems
- 5.4. Renewal of water supply systems
- 5.5. Construction, extension and operation of wastewater collection and treatment
- 5.6. Renewal of wastewater collection and treatment
- 5.7. Desalination systems

6. WASTE
- 6.1. Collection and transport of non-hazardous waste
- 6.2. Biowaste treatment: composting of biowaste
- 6.3. Biowaste treatment: Anaerobic digestion
- 6.4. Waste to Energy
- 6.5. Landfill gas capture and utilisation
- 6.6. Material recovery facilities

7. INDUSTRY
- 7.1. Manufacture of iron and steel
- 7.2. Manufacture of basic chemicals
- 7.3. Manufacture of cement
- 7.4. Manufacture of hydrogen
- 7.5. Manufacture of aluminium
- 7.6. Manufacture of batteries
- 7.7. Manufacture of plastics in primary form
- 7.8. Manufacture of renewable energy technologies
- 7.9. Manufacture of equipment for the production and use of hydrogen
- 7.10. Manufacture of low-carbon technologies for transport
- 7.11. Manufacture of energy efficiency equipment for buildings
- 7.12. Manufacture of other low-carbon technologies

8. ICT
- 8.1. Data processing, storage, transmission and management
- 8.2. GHG-related solutions and software

9. AGRICULTURE
- 9.1. Perennial crops
- 9.2. Non-perennial crops
- 9.3. Animal Production

10. FORESTRY
- 10.1. Sustainable Forest Management
- 10.2. Forestry plantation
- 10.3. Conservation, restoration and maintenance

11. CARBON CAPTURE AND STORAGE
- 11.1. Direct air capture of CO_2
- 11.2. Captured CO_2 Transportation
- 11.3. Permanent sequestration of captured CO_2
- 11.4. Research, development and innovation for CCS-related technologies
- 11.5. Point-source capture of CO_2

1. Introduction

The Do No Significant Harm (DNSH) assessment ensures that while the economic activities make substantial contribution to climate change mitigation, they do not cause significant harm to all other environmental objectives of the Taxonomy.

The other environmental objectives of Singapore Taxonomy are as follows:

- Climate change adaptation
- Protect healthy ecosystems and biodiversity
- Promote resource resilience and circular economy
- Pollution prevention and control

Climate change adaptation refers to activities that substantially reduce the adverse impact of the current and expected future climate on either

(i) other people, nature or assets or
(ii) the economic activity itself, in each case without increasing the risk of an adverse impact on other people, nature and assets.

Across all activities, the generic DNSH criteria for climate change adaptation objective are as follows (as referred from EU Taxonomy):

Table 1 — Do no significant harm to climate change adaptation (EU Taxonomy)

Criteria	Description
1. Reducing material physical climate risks	**The economic activity must reduce all material physical climate risks to the activity to the extent possible and on a best effort basis.**
1.1	The activity integrates physical and non-physical measures aimed at reducing – to the extent possible and on a best effort basis – all material risks that have been identified through a climate risk assessment. • For existing activities, the implementation of those physical and non-physical measures may be phased and executed over a period of up to 5 years. • For new activities, implementation of these measures must be met at the time of design and construction.
1.2	The above-mentioned climate risk assessment has the following characteristics: • considers both current weather variability and future climate change, including uncertainty; • is based on robust analysis of available climate data and projections across a range of future scenarios; • is consistent with the expected lifetime of the activity
2. Supporting system adaptation	**The economic activity and its adaptation measures do not adversely affect the adaptation efforts of other people, nature and assets.**
2.1	The economic activity and its adaptation measures do not increase the risks of an adverse climate impact on other people, nature and assets or hamper adaptation elsewhere. Consideration should be given to the viability of 'Green' or 'nature-based-solutions' over 'grey' measures to address adaptation.
2.2	The activity is consistent with sectoral, regional, and/or national adaptation efforts.

2. Energy sector

2.1. Energy from solar PV and CSP (including electricity, heat, cool)

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the installation and operation of photovoltaic (PV) panels relate to:

- The PV installation siting: impacts on ecosystems and biodiversity if built in a designated conservation area or other areas with important ecosystem and biodiversity value.
- The impacts from the production and end-of-life management of the PV systems and its component/materials: potentially significant environmental impacts are associated with the sourcing/production of materials and components of PV systems.

The main potential significant harm to other environmental objectives from CSP is associated with:

- the construction of the installation and the substantial land-take associated with the installation
- impact on birdlife from the high temperatures generated by the plant
- impact of the cooling system on water resources

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Identify and manage risks related to water quality and/or water consumption at the appropriate level. • Avoid possible negative impacts of the cooling system on water resources.
Promote resource resilience and circular economy	• Ensure PV panels, CSP installations and associated components have been designed and manufactured for high durability, easy dismantling, refurbishment, and recycling, aligned to international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • Ensure reparability of the solar photovoltaic (PV) installation or plant thanks to accessibility and exchangeability of the components.

2.2 Wind power generation

Do no significant harm assessment

In spite of the crucial contribution of wind energy to mitigating climate change, there may be conflicts arising between its deployment and nature conservation at a local level. The main environmental exposures to be considered as a DNSH criteria, in the most stringent sense, include:
- Underwater noise created in the installation of bottom-fixed offshore wind turbines;
- The composite waste generated from both on- and offshore wind turbine blades at the end of their lifetime;
- The possible disturbance, displacement or collision of birds and bats by the construction and operation of wind farms.
- The possible deterioration of water ecosystem associated to the construction of wind farms

The possible visual impacts created by landscape change in the installation of wind turbines.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure any required mitigation measures for avoiding underwater noise created by the installation of offshore wind turbines • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • State ambition to maximise recycling at end of life based on waste management plans, dismantling/decommissioning processes at time of decommissioning (e.g. through contractual agreements with recycling partners, reflection in financial projections or official project documentation), aligned to international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system).

2.3 Hydropower generation

Do no significant harm assessment

The main environmental impacts associated with hydropower installations are:

- Emissions to water and generation of waste during construction.
- Impacts on biodiversity associated with fragmentation of ecosystems and changes to habitat.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e. avoid fragmentation of ecosystems and hydrological and hydrogeological regimes, affecting species migration pathways) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Establishing a River Basin Management Plan and ensure compliance with applicable IFC's and World Bank Group's environmental and social standards. Parameters and acceptable limits/ranges and necessary sampling and measuring frequency addressing the quality of freshwaters in order to support fish life, should be observed as per international and national standards. • Avoid discharges to water bodies during hydropower construction.
Promote resource resilience and circular economy	For new projects: Ensure implementation of a River Basin Management Plan and ensure that an appropriate cumulative impact assessment or equivalent study has been undertaken that identifies and addresses any significant regional or basin-level environmental and social impacts, in compliance with international standards and guidelines (ex: IFC and World Bank Environmental and social standards, San José Declaration on Sustainable Hydropower; Hydropower sustainability Secretariat's Hydropower Sustainability Guidelines on Good International Industry Practice; EIB's Environmental, Climate and Social Guidelines on Hydropower Development), preferably at the strategic planning stage. Such a study must consider all of the planned infrastructure developments in the basin, for example as part of a hydropower cascade at the scale of the river catchment, involving all relevant stakeholders. Ensure that the following conditions are met based on ground evidence: • All practical steps are taken to mitigate the impacts. • The project has been recognised of overriding public interest and/or it is proven that the benefits of the project outweigh its impacts. • There are no significantly environmentally better option. • The project does not show significant adverse impact on upstream or downstream water bodies. • This applies to newly built hydropower and extension of existing hydropower. Construction of new hydropower should not lead to increase fragmentation of rivers, consequently refurbishment of existing hydropower plant and rehabilitation of existing barriers should be prioritised. Construction of small hydropower (<10MW) should be avoided. During operation: • All necessary mitigation measures should be implemented to reach good ecological status or potential, in particular regarding ecological continuity and ecological flow. Priority should be given to nature-based solutions. • Aligned to IFC's and World Bank Group's environmental and social standards. General impact: Operation of the hydropower plant must adhere to the principles of the UNECE Convention on the Protection and Use of Transboundary, Watercourses and International Lakes.

2.4. Geothermal energy generation (including electricity, heat, cool)

Do no significant harm assessment

The main potential significant harm to other environmental objectives from production of electric energy from high-enthalpy geothermal system is associated with:

- Non-condensable geothermal gases with specific environmental threats, such as H_2S, CO_2, and CH_4, are often released from flash-steam and dry-steam power plants. Binary plants ideally represent closed systems, and no steam is emitted.
- Possible emissions to surface and underground water

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e. avoid fragmentation of ecosystems and hydrological and hydrogeological regimes, affecting species migration pathways) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • Discharges to water bodies should comply with individual license conditions for specific operations, where applicable, and/or national threshold values in line with the international standards and guidelines. • Emissions to air: the operations of high-enthalpy geothermal energy systems should ensure that adequate abatement systems are in place to comply with international standards and guidelines. (ex: IFC's Environmental, Health, and Safety Guidelines for Geothermal Power Generation. ISO 14001:2015 Environmental management systems — Requirements with guidance for use). Thermal anomalies associated with the discharge of waste heat should not exceed 3°K for groundwater environments or 1.5°K for surface water environments, respectively.

2.5. Bioenergy power generation (including electricity, heat, cool)

Do no significant harm assessment

The key environmental aspects to be taken into account when investing in this activity are the impact on local water (consumption and sewage), the fulfilment of the applicable waste and recycling criteria, the SO_2, NOx dust and other emissions control and the avoidance of direct impacts on sensitive ecosystems, species or habitats.

Intelligent pathways for cascading use are environmentally superior and preferable to single use.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e. avoid fragmentation of ecosystems and hydrological and hydrogeological regimes, affecting species migration pathways) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 13065:2015: Sustainability Criteria for Bioenergy) • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management as per international standards and guidelines (ex: IFC EHS Guidelines: Air emissions and ambient air quality; KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.6. Electricity generation from ocean energy

Do no significant harm assessment

The main potential significant harm to other environmental objectives from ocean energy is associated with:
- Construction, deployment, operation and maintenance of ocean energy installations can impact on marine ecosystems and biodiversity.
- Pollution from lubricants and anti-fouling paints and emissions from maintenance and inspection vessels

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Measures in place to minimise toxicity of anti-fouling paint and biocides as per international standards and guidelines. (ex: International Convention on the Control of Harmful Anti-fouling Systems on Ships; ISO 13073).
Promote resource resilience and circular economy	State ambition to maximise recycling at end of life based on waste management plans, dismantling/ decommissioning processes at time of decommissioning (e.g. through contractual agreements with recycling partners, reflection in financial projections or official project documentation), aligned to international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system).

2.7. Transmission and distribution of electricity

Do no significant harm assessment

The impacts of transmission and distribution lines are a function of the spatial alignment of the grid, the structures and conductors required for various voltages, the extent to which pre-existing corridors are used, and how the transmission and distribution lines are operated and maintained. The most common environmental impacts of electricity transmission and distribution infrastructure are visual, ecosystem and land use. In the cases of underground offshore electricity lines, water and marine resources may be impacted.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented • Underground power lines: Avoid routings with heavy impact on marine and terrestrial ecosystems and follow the principles of IFC General EHS Guidelines for construction site activities.
Pollution prevention and control	Overground high voltage lines: • For construction site activities follow the principles of IFC General EHS Guideline. • Respect applicable norms and regulations to limit impact of electromagnetic radiation on human health. (ex: 1998 ICNIRP (International Commission on Non-Ionizing Radiation Protection)) • Do not use PCBs Polyclorinated Biphenyls.
Promote resource resilience and circular economy	State ambition to maximise recycling at end of life based on waste management plans, dismantling/ decommissioning processes at time of decommissioning (e.g. through contractual agreements with recycling partners, reflection in financial projections or official project documentation), aligned to international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system).

2.8. Transmission and distribution of renewable and low-carbon gases

Do no significant harm assessment

The key environmental aspects to be taken into account when investing in this activity are the impact on local water (consumption and sewage), the fulfilment of the applicable waste and recycling criteria, the NOx and CO emissions control and the avoidance of direct impacts on sensitive ecosystems, species or habitats.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Fans, compressors, pumps and other equipment used comply, where relevant, with the top class requirements of the energy label, and with implementing regulations and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.9. Storage of energy and green hydrogen

Do no significant harm assessment

The energy storage activities differ considerably in their physical, chemical and biological bases and forms, which result in divergent environmental impacts in each case.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	The activity complies with international standards, particularly if the storage is above five tonnes. (ex: ISO 19884 Gaseous Hydrogen – Cylinders and tubes for stationary storage; IEC 63341-2 Railway applications – Rolling stock – Fuel cell systems for propulsion -Part 2: Hydrogen storage system; ISO 16111 Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydrides).
Promote resource resilience and circular economy	State ambition to maximise recycling at end of life based on waste management plans, dismantling/ decommissioning processes at time of decommissioning (e.g. through contractual agreements with recycling partners, reflection in financial projections or official project documentation), aligned to international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system).

2.10. Electricity generation from hydrogen

Do no significant harm assessment

The key environmental aspects to be taken into account when investing in this activity are the impact on local water (consumption and sewage), the fulfilment of the applicable waste and recycling criteria, the NOx and CO emissions control and the avoidance of direct impacts on sensitive ecosystems, species or habitats.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.11. Energy production from natural gas

Do no significant harm assessment

The key environmental aspects to be taken into account when investing in this activity are the impact on local water (consumption and sewage), the fulfilment of the applicable waste and recycling criteria, the NOx and CO emissions control and the avoidance of direct impacts on sensitive ecosystems, species or habitats.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.12. District heating and cooling systems

Do no significant harm assessment

Key environmental aspects to be considered for the investments in Distribution of District Level Heating and Cooling are summarised as follows:

- For the construction of the mains, the potential significant harms to the environmental objectives are constituted by the typical potential harms connected to construction of facilities in general. This includes inter alia, terrestrial habitat alteration, loss of valuable ecosystem, land consumption, overburden disposal, negative effects on biodiversity, emissions of particles and NOx, noise and hazardous materials.
- For the operation of the district heating networks, potential significant impacts are considered low. They relate mainly to the potential impact of underground district heating networks on drinking water/ground water systems and local ecosystems through corrosion products from corrosion of the distribution system elements and applied water additives that may be non-biodegradable.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Fans, compressors, pumps and other equipment used must comply, where relevant, with the top class requirements of the energy label, and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.13. Production of heat or cool from waste heat

Do no significant harm assessment

Key environmental aspects to be considered for the production of heat/cool using waste heat are generally moderate and should mostly be covered by considerations at the heat / cool source.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Pumps and whatever kind of equipment used should comply, where relevant, with the top class requirements of the energy label, and representing the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

2.14. Decommissioning of fossil fuel-based power plants

Do no significant harm assessment

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e. avoid fragmentation of ecosystems and hydrological and hydrogeological regimes, affecting species migration pathways) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • Implement measures concerning waste management as per international standards and guidelines (ex: IFC EHS Guidelines: Air emissions and ambient air quality; KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system).

3. Construction

3.1. Construction of new buildings

Do no significant harm assessment

The main potential for significant harm to the other environmental objectives associated with the construction of new buildings is determined by:

- Lack of resistance to extreme weather events (including flooding), and lack of resilience to future temperature increases in terms of internal comfort conditions.
- Excessive water consumption due to inefficient water appliances.
- Landfill and/or incineration of construction and demolition waste that could be otherwise recycled/reused.
- Presence of asbestos and/or substances of very high concern in the building materials.
- Presence of hazardous contaminants in the soil of the building site.
- Inappropriate building location: impacts on ecosystems if built on greenfield and especially if in a conservation area or high biodiversity value area.
- Indirect damage to forest ecosystems due to the use of timber products originating form forests that are not sustainably managed.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	The new construction must not be built on protected natural areas, such as land designated as Natura 2000, UNESCO World Heritage and Key Biodiversity Areas (KBAs), or equivalent as defined by UNESCO and/or the International Union for Conservation of Nature (IUCN) under the following categories: • Category Ia: Strict Nature Reserve • Category Ib: Wilderness Area • Category II: National Park Buildings that are associated supporting infrastructure to the protected natural area, such as visitor centres, museums or technical facilities are exempted from this criterion. The new construction must not be built on arable or greenfield land of recognised high biodiversity value and land that serves as habitat of endangered species (flora and fauna) listed on the IUCN Red List. At least 80% of all timber products used in the new construction for structures, cladding and finishes must have been either recycled/reused or sourced from sustainably managed forests as certified by third-party certification audits performed by accredited certification bodies, e.g. FSC/PEFC standards or equivalent.
Pollution prevention and control	• Ensure that building components and materials do not contain asbestos nor substances of very high concern as per national and international standards. • If the new construction is located on a potentially contaminated site (brownfield site), the site must be subject to an investigation for potential contaminants. • Non-road mobile machinery used on the construction site should comply with national and international standards
Promote resource resilience and circular economy	• At least 80% (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material) generated on the construction site must be prepared for re-use or sent for recycling or other material recovery, including backfilling operations that use waste to substitute other materials. • All relevant water appliances (shower solutions, mixer showers, shower outlets, taps, WC suites, WC bowls and flushing cisterns, urinal bowls and flushing cisterns, bathtubs) must be water efficient as per national or international water labelling systems (ex: WELS, WaterSense).

3.2. Installation, maintenance, repair of equipment

Do no significant harm assessment

The main potential for significant harm to the other environmental objectives associated with individual measures is determined by:

- Excessive water consumption due to inefficient water appliances.
- The handling of building components that are likely to contain substances of concern (e.g. asbestos containing materials) and of any hazardous construction and demolition waste arising from the building renovation;
- Ensuring the future possibility of reusing and recycling building component and materials through careful selection of components/materials that prioritises recyclable materials and avoids hazardous substances.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	Ensure that building components and materials do not contain asbestos nor substances of very high concern as per national and international standards. In case of addition of thermal insulation to the existing building envelope: a building survey must be carried out in accordance with national legislation by a competent specialist with training in asbestos surveying and in identification of other materials containing substances of concern. Any stripping of lagging that contains or is likely to contain asbestos, breaking or mechanical drilling or screwing and/or removal of insulation board, tiles and other asbestos containing materials shall be carried out by appropriately trained personnel, with health monitoring before, during and after the works, in accordance with national legislation.
Promote resource resilience and circular economy	

3.3. Renovation of existing buildings

Do no significant harm assessment

The main potential for significant harm to the other environmental objectives associated with the renovation of existing buildings is determined by:

- Lack of resistance to extreme weather events (including flooding), and lack of resilience to future temperature increases in terms of internal comfort conditions.
- Excessive water consumption due to inefficient water appliances.
- Landfill and/or incineration of construction and demolition waste that could be otherwise recycled/reused.
- Presence of asbestos and/or substances of very high concern in the building materials.
- Presence of hazardous contaminants in the soil of the building site.
- Inappropriate building location: impacts on ecosystems if built on greenfield and especially if in a conservation area or high biodiversity value area.
- Indirect damage to forest ecosystems due to the use of timber products originating form forests that are not sustainably managed.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	The new construction must not be built on protected natural areas, such as land designated as Natura 2000, UNESCO World Heritage and Key Biodiversity Areas (KBAs), or equivalent as defined by UNESCO and / or the International Union for Conservation of Nature (IUCN) under the following categories: • Category Ia: Strict Nature Reserve • Category Ib: Wilderness Area • Category II: National Park Buildings that are associated supporting infrastructure to the protected natural area, such as visitor centres, museums or technical facilities are exempted from this criterion. The new construction must not be built on arable or greenfield land of recognised high biodiversity value and land that serves as habitat of endangered species (flora and fauna) listed on the IUCN Red List. At least 80% of all timber products used in the new construction for structures, cladding and finishes must have been either recycled/reused or sourced from sustainably managed forests as certified by third-party certification audits performed by accredited certification bodies, e.g. FSC/ PEFC standards or equivalent.
Pollution prevention and control	• Ensure that building components and materials do not contain asbestos nor substances of very high concern as per national and international standards. • If the new construction is located on a potentially contaminated site (brownfield site), the site must be subject to an investigation for potential contaminants. • Non-road mobile machinery used on the construction site should comply with national and international standards.
Promote resource resilience and circular economy	• At least 80% (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material) generated on the construction site must be prepared for re-use or sent for recycling or other material recovery, including backfilling operations that use waste to substitute other materials. • All relevant water appliances (shower solutions, mixer showers, shower outlets, taps, WC suites, WC bowls and flushing cisterns, urinal bowls and flushing cisterns, bathtubs) must be water efficient as per national or international water labelling systems (ex: WELS, WaterSense).

3.4. Acquisition or ownership of buildings

Do no significant harm assessment

The main potential for significant harm to the other environmental objectives associated with the acquisition or ownership of buildings is determined by:

- Lack of resistance to extreme weather events (including flooding), and lack of resilience to future temperature increases in terms of internal comfort conditions.
- Excessive water consumption due to inefficient water appliances.
- Presence of asbestos and/or substances of very high concern in the building materials.
- Presence of hazardous contaminants in the soil of the building site.
- Inappropriate building location: impacts on ecosystems if built on greenfield and especially if in a conservation area or high biodiversity value area.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	The new construction must not be built on protected natural areas, such as land designated as Natura 2000, UNESCO World Heritage and Key Biodiversity Areas (KBAs), or equivalent as defined by UNESCO and/or the International Union for Conservation of Nature (IUCN) under the following categories: • Category Ia: Strict Nature Reserve • Category Ib: Wilderness Area • Category II: National Park Buildings that are associated supporting infrastructure to the protected natural area, such as visitor centres, museums or technical facilities are exempted from this criterion. The new construction must not be built on arable or greenfield land of recognised high biodiversity value and land that serves as habitat of endangered species (flora and fauna) listed on the IUCN Red List. At least 80% of all timber products used in the new construction for structures, cladding and finishes must have been either recycled/reused or sourced from sustainably managed forests as certified by third-party certification audits performed by accredited certification bodies, e.g. FSC/ PEFC standards or equivalent.
Pollution prevention and control	If the property is located on a potentially contaminated site (brownfield site), the site must be subject to an investigation for potential contaminants.
Promote resource resilience and circular economy	

4. Transport

4.1. Transport via railways

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the operation of rail transport activities are attributed to air pollution, noise and vibration, water use. Direct emissions of air pollutants are not an issue of concern in the case of electrified rail, but only where (very efficient) diesel or hybrid engines would meet the CO^2e-threshold defined to ensure substantial mitigation of GHG emissions

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	Engines for the propulsion of railway locomotives (RLL) and engines for the propulsion of railcars (RLR) must comply with latest applicable standards (currently stage V) of Non-Road Mobile Machinery Regulation. Minimise noise and vibrations of rolling stock, thresholds in line with Noise Regulations. Align with national and international emission standards. Ex: (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 13.040.50: Transport Exhaust emissions;).
Promote resource resilience and circular economy	Ensure proper waste management both at the use phase (maintenance) and the end-of-life for the rolling stock, e.g. reuse and recycle of parts like batteries, in compliance with international and national legislation on hazardous waste generation, management and treatment. (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system). Measures are in place to manage waste in accordance with the waste hierarchy, in particular during maintenance

4.2. Other passenger land transport

Do no significant harm assessment

Key environmental aspects to be considered for investments on passenger cars and light commercial vehicles are the following:

- Direct emissions to air from the exhaust gases of internal combustion engine: nitrogen oxides (NOx), total hydrocarbon (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), particulate matter (PM) and particle number, and from tyre abrasion and brakes friction and noise emissions
- Indirect emissions to air from the production of fuels and energy carriers. However, this is out of the control of vehicles manufacturers and operators.
- Waste generation (hazardous and non-hazardous) during maintenance and end-of-life of the vehicle.
- Recycling of materials in order to reduce consumption of critical raw materials and impact on ecosystems and natural capital

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Vehicles must comply with the emission thresholds for clean light-duty vehicles. • Tyres must comply with noise and tyre abrasion regulations. • Vehicles must comply with regulations on the sound level of motor vehicles and of replacement silencing systems. (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 13.040.50: Transport Exhaust emissions; ISO 362 Measurement of noise emitted by accelerating road vehicles; ISO 28580:2018 - Passenger car, truck and bus tyre rolling resistance measurement method — Single point test and correlation of measurement results).
Promote resource resilience and circular economy	Compliance with international and national legislation on hazardous waste generation, management and treatment. Special focus on critical raw materials recovery from batteries. (ex: ISO 14001:2015 Environmental management systems; ISO 22628:2002 Road vehicles — Recyclability and recoverability; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989): Basel Action Network Standard for Responsible Recycling and Reuse of Electronic Equipment, known as e-Stewards). Measures are in place to manage waste both in the use phase (maintenance) and the end-of-life of the fleet, including through reuse and recycling of batteries and electronics (in particular critical raw materials therein), in accordance with the waste hierarchy.

4.3. Urban and suburban passenger land transport

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the operation of urban and suburban passenger land transport (public transport) are summarised as follows:

- Direct emissions to air from the exhaust gases of internal combustion engine: nitrogen oxides (NOx), total hydrocarbon (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), particulate matter (PM) and particle number, and from tyre abrasion and brakes friction and noise emissions;
- Waste generation (hazardous and non-hazardous) during maintenance and end-of-life of the vehicle or rolling stock.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Buses must comply with the latest applicable standards of Non-Road Mobile Machinery Regulation. • Vehicles must comply with the emission thresholds for clean light-duty vehicles. • Tyres must comply with noise and tyre abrasion regulations. • Vehicles must comply with regulations on the sound level of motor vehicles and of replacement silencing systems. • Minimise noise and vibrations of rolling stock by applying thresholds on pass-by noise in dB in line with national norms. (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 13.040.50: Transport Exhaust emissions; ISO 362 Measurement of noise emitted by accelerating road vehicles; ISO 28580:2018 - Passenger car, truck and bus tyre rolling resistance measurement method — Single point test and correlation of measurement results).
Promote resource resilience and circular economy	• For both Maintenance and end-of-life management of vehicles or rolling stock, ensure compliance with international and national legislation on hazardous waste generation, management and treatment.(ex: ISO 14001:2015 Environmental management systems; ISO 22628:2002 Road vehicles — Recyclability and recoverability; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989): Basel Action Network Standard for Responsible Recycling and Reuse of Electronic Equipment, known as e-Stewards). • Ensure that measures are in place to manage waste both in the use phase (maintenance) and the end-of-life of the fleet, including through reuse and recycling of batteries and electronics (in particular critical raw materials therein), in accordance with the waste hierarchy.

4.4. Freight transport by road

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the operation of freight road transport are summarised as follows:
- Direct emissions to air from the exhaust gases of internal combustion engine: nitrogen oxides (NOx), total hydrocarbon (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), particulate matter (PM) and particle number, and from tyre abrasion and brakes friction and noise emissions
- Waste generation (hazardous and non-hazardous) during maintenance and end-of-life of the vehicle.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Vehicles must comply with the emission thresholds for clean light-duty vehicles. • Tyres must comply with noise and tyre abrasion regulations. • Vehicles must comply with regulations on the sound level of motor vehicles and of replacement silencing systems (ex: (IFC EHS Guidelines: Air emissions and ambient air quality; ISO 13.040.50: Transport Exhaust emissions; ISO 362 Measurement of noise emitted by accelerating road vehicles; ISO 28580:2018 - Passenger car, truck and bus tyre rolling resistance measurement method — Single point test and correlation of measurement results).
Promote resource resilience and circular economy	Compliance with international and national legislation on hazardous waste generation, management and treatment. Special focus on critical raw materials recovery from batteries. (ex: ISO 14001:2015 Environmental management systems; ISO 22628:2002 Road vehicles — Recyclability and recoverability; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989): Basel Action Network Standard for Responsible Recycling and Reuse of Electronic Equipment, known as e-Stewards). Measures are in place to manage waste both in the use phase (maintenance) and the end-of-life of the fleet, including through reuse and recycling of batteries and electronics (in particular critical raw materials therein), in accordance with the waste hierarchy.

4.5. Transport infrastructure

Do no significant harm assessment

The main potential significant harm to other environmental objectives from infrastructure activities are attributed to noise and vibration pollution, water contamination, waste generation and impacts on biodiversity (habitat and wildlife) and land use consumption with ecosystem impacts specifically:

- Contamination of water during construction and unsustainable use of water during construction and operations
- Unsustainable use of resources during constructions, e.g. generation of high amount of waste, no recycling/reuse of construction waste
- Noise pollution can be relevant for both rolling stock and railway infrastructure as noise can be generated by both rolling stock and poor conditions of rail tracks.
- Construction of infrastructure can cause significant harm when taking place in protected areas or areas of high biodiversity values outside protected areas.
- Infrastructure can cause fragmentation and degradation of the natural and urban landscape due to the "barrier" effects of the infrastructure and can involve risks of wildlife accidents caused by collisions. Railway infrastructure (in particular tunnels) can cause change and degradation of hydromorphological conditions of water bodies and therefore have impacts on aquatic ecosystems.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	Infrastructure for low carbon transport is land use intensive and is a major factor of ecosystem deterioration and biodiversity loss. Projects should ensure that: • Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment). • Such impact assessments should, at the very least, identify, evaluate, and mitigate any potential negative impacts of the designated activities, projects, or assets on ecosystems and its biodiversity. • Invasive plants are appearing very often along transport infrastructure and are sometimes even spread duo to transport infrastructure, which might negatively impact natural ecosystems (e.g. natural fauna). Care should be taken not to spread any invasive plants through proper maintenance. • Wildlife collisions is a problem and should be considered. Solutions developed for should be applied for the detection and avoidance of potential traps that may cause the unnecessary death of animals. • Mitigation options exist and different types of measures can be beneficial for wildlife, such as: ◦ Wildlife warning systems combined with heat sensors can reduce the number of collisions. ◦ Fences along areas with high strike risk. ◦ Viaducts, tunnels, overpasses and bridges, etc. ◦ Warning signals that are triggered by approaching traffic, particularly in areas of high strike risk.
Pollution prevention and control	• Minimise noise and vibrations from use of infrastructure by introducing open trenches/wall barriers/other measures and comply with national and international standards. (Ex: ISO/TS 21929-2, Sustainability in building construction – Sustainability indicators – Part 2: Framework for the development of indicators for civil engineering works). • Minimise noise, dust, emissions pollution during construction/maintenance works. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Re-use parts and use recycled material during the renewal, upgrade and construction of infrastructure. • At least 80% (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material) generated on the construction site must be prepared for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials. • Activities aligned with international standards. Ex: ISO 20887:2020-Sustainability in buildings and civil engineering works. • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

4.6. Sea and coastal water transport

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the operation of \sea and coastal water transport are summarised as follows:

- Direct emissions to air of carbon oxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), and particulate matter (PM), as well as noise emissions
- Waste generation (hazardous and non-hazardous) during maintenance and end-of-life of the vessel.
- Direct and indirect emission of pollutants in water.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Releases of ballast water containing non-indigenous species are prevented in line with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). • Measures are in place to prevent the introduction of non-indigenous species by biofouling of hull and niche areas of ships taking into account the IMO Biofouling Guidelines. • Noise and vibrations are limited by using noise reducing propellers, hull design or on-board machinery in line with the guidance given in the IMO Guidelines for the Reduction of Underwater Noise.
Pollution prevention and control	• Engines in vessels must comply with latest applicable standards of Non-Road Mobile Machinery Regulation. • As regards the reduction of sulphur oxides emissions and particulate matters, vessels comply with Regulation 14 of Annex VI to the IMO MARPOL Convention. • As regards nitrogen oxides (NOx) emissions, vessels comply with Regulation 13 of Annex VI to IMO MARPOL Convention. Tier II NOx requirement applies to ships constructed after 2011. Only while operating in NOx emission control areas established under IMO rules, ships constructed after 1 January 2016 comply with stricter engine requirements (Tier III) reducing NOx emissions. • Discharges of black and grey water comply with Annex IV to the IMO MARPOL Convention. • Measures are in place to minimise toxicity of anti-fouling paint and biocides. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Compliance with international and national legislation on hazardous waste generation, management and treatment. Special focus on critical raw materials recovery from batteries. (ex: ISO 14001:2015 Environmental management systems; ISO 22628:2002 Road vehicles — Recyclability and recoverability; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989): Basel Action Network Standard for Responsible Recycling and Reuse of Electronic Equipment, known as e-Stewards). • Measures are in place to manage waste, both in the use phase and in the end-of-life of the vessel, in accordance with the waste hierarchy. • For battery-operated vessels, those measures include reuse and recycling of batteries and electronics, including critical raw materials therein. • The ship is operated in accordance with Annex V to the International Convention for the Prevention of Pollution from Ships of 2 November 1973 (the IMO MARPOL Convention), in particular with a view to producing reduced quantities of waste and to reducing legal discharges, by managing its waste in a sustainable and environmentally sound manner. • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

4.7. Inland water transport

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the operation of inland passenger and freight water transport are summarised as follows:

- Direct emissions to air of carbon oxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), and particulate matter (PM), as well as noise emissions
- Waste generation (hazardous and non-hazardous) during maintenance and end-of-life of the vessel.
- Direct and indirect emission of pollutants in water.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	The activity should not lead to releases of ballast water containing aquatic invasive species.
Pollution prevention and control	• Engines in vessels must comply with latest applicable standards of Non-Road Mobile Machinery Regulation. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Compliance with international and national legislation on hazardous waste generation, management and treatment. Special focus on critical raw materials recovery from batteries. (ex: ISO 14001:2015 Environmental management systems; ISO 22628:2002 Road vehicles — Recyclability and recoverability; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989): Basel Action Network Standard for Responsible Recycling and Reuse of Electronic Equipment, known as e-Stewards). Measures are in place to manage waste, both in the use phase and in the end-of-life of the vessel, in accordance with the waste hierarchy, including the control and management of hazardous materials on board of ships and ensuring their safe recycling. • For battery-operated vessels, those measures include reuse and recycling of batteries and electronics, including critical raw materials therein. • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

4.8. Freight air transport

Do no significant harm assessment

-

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1, ensuring that changing climate conditions do not compromise safety or airworthiness of the operation of an aircraft. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Amendment 13 of Volume I (noise), Chapter 14, of Annex 16 to the Chicago Convention; • Amendment 10 of Volume II (engine emissions), Chapters 2 and 4 of Annex 16 to the Chicago Convention;
Promote resource resilience and circular economy	• Measures are in place to prevent generation of waste in the use phase (maintenance, operation of air transport services with regards to catering waste) and manage any remaining waste in accordance with the waste hierarchy. • Measures are in place to manage and recycle waste in the end-of life of the fleet, including through decommissioning contractual agreements with aircraft recycling service providers, ensuring that measures are in place to segregate and treat components and materials in order to maximise recycling and reuse in accordance with the waste hierarchy and airworthiness regulations.

4.9. Passenger air transport

Do no significant harm assessment

-

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1, ensuring that changing climate conditions do not compromise safety or airworthiness of the operation of an aircraft. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Amendment 13 of Volume I (noise), Chapter 14, of Annex 16 to the Chicago Convention; • Amendment 10 of Volume II (engine emissions), Chapters 2 and 4 of Annex 16 to the Chicago Convention;
Promote resource resilience and circular economy	• Measures are in place to prevent generation of waste in the use phase (maintenance, operation of air transport services with regards to catering waste) and manage any remaining waste in accordance with the waste hierarchy. • Measures are in place to manage and recycle waste in the end-of life of the fleet, including through decommissioning contractual agreements with aircraft recycling service providers, ensuring that measures are in place to segregate and treat components and materials in order to maximise recycling and reuse in accordance with the waste hierarchy and airworthiness regulations.

5. Water

5.1. Construction, extension and operation of new water collection and treatment systems

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• water abstraction.
• possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

5.2. Renewal of water collection, treatment and supply systems

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• water abstraction;
• possible detrimental effects to ecosystems.
Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

5.3. Construction, extension and operation of new water supply systems (distribution networks)

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

- water abstraction.
- possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

5.4. Renewal of water supply systems (distribution networks)

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

- water abstraction;
- possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

5.5. Construction, extension and operation of wastewater collection and treatment

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

- emissions to water from wastewater treatment
- combined sewer overflow in case of heavy rainfall
- sewage sludge treatment
- possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Discharges to receiving waters meet the requirements laid down by national provisions stating maximum permissible pollutant levels from discharges to receiving waters. • Appropriate measures have been implemented to avoid and mitigate excessive storm water overflows from the waste water collection system, which may include nature-based solutions, separate storm water collection systems, retention tanks and treatment of the first flush. • Ensure emissions to water are within the ranges set in national and international standards. • Implement appropriate measures to avoid and mitigate combined sewer overflow in case of heavy rainfall, such as Nature-based solutions, separate rainwater collection systems, retention tanks and/or treatment of the first flush. • Ensure sewage sludge is managed/used (e.g. anaerobic digestion, land application) according to relevant international and respective national legislation. (ex: ISO/TC 224 Drinking water, wastewater and stormwater systems and services; ISO/TC 275 Sludge recovery, recycling, treatment and disposal; ISO/TC 275 Sludge recovery, recycling, treatment and disposal).
Promote resource resilience and circular economy	

5.6. Renewal of wastewater collection and treatment

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

- emissions to water from wastewater treatment
- combined sewer overflow in case of heavy rainfall
- sewage sludge treatment
- possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Discharges to receiving waters meet the requirements laid down by national provisions stating maximum permissible pollutant levels from discharges to receiving waters. • Appropriate measures have been implemented to avoid and mitigate excessive storm water overflows from the waste water collection system, which may include nature-based solutions, separate storm water collection systems, retention tanks and treatment of the first flush. • Ensure emissions to water are within the ranges set in national and international standards. • Implement appropriate measures to avoid and mitigate combined sewer overflow in case of heavy rainfall, such as Nature-based solutions, separate rainwater collection systems, retention tanks and/or treatment of the first flush. • Ensure sewage sludge is managed/used (e.g. anaerobic digestion, land application) according to relevant international and respective national legislation. (ex: ISO/TC 224 Drinking water, wastewater and stormwater systems and services; ISO/TC 275 Sludge recovery, recycling, treatment and disposal; ISO/TC 275 Sludge recovery, recycling, treatment and disposal).
Promote resource resilience and circular economy	

5.7. Desalination systems

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

- water abstraction;
- possible detrimental effects to ecosystems.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Discharges to receiving waters meet the requirements laid down by national provisions stating maximum permissible pollutant levels from discharges to receiving waters. • Appropriate measures have been implemented to avoid and mitigate excessive storm water overflows from the water collection system, which may include nature-based solutions, separate storm water collection systems, retention tanks and treatment of the first flush. • Ensure emissions to water are within the ranges set in national and international standards. • Implement appropriate measures to avoid and mitigate combined sewer overflow in case of heavy rainfall, such as Nature-based solutions, separate rainwater collection systems, retention tanks. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

6. Waste

6.1. Collection and transport of non-hazardous waste

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• emissions of collection vehicles that cause harm to human health and the environment
• mixing source segregated waste fractions that could impair subsequent material recovery and recycling.
Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	If waste collection is carried out by trucks, vehicles must comply with emission guidelines. (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products).
Promote resource resilience and circular economy	Avoid mixing different source segregated waste fractions in waste storage and transfer facilities.

6.2. Biowaste treatment: composting of biowaste

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• emissions of collection vehicles that cause harm to human health and the environment
• mixing source segregated waste fractions that could impair subsequent material recovery and recycling.
Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Composting plant emissions to air and water are within national and international guidelines (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • The site has a system in place that prevents leachate reaching groundwater. • The resulting compost meets the requirements for fertilising materials as per national rules on fertilisers/soil improvers for agriculture use.
Promote resource resilience and circular economy	

6.3. Biowaste treatment: Anaerobic digestion

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• emissions of collection vehicles that cause harm to human health and the environment
• mixing source segregated waste fractions that could impair subsequent material recovery and recycling.
Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• AD plant emissions to air and water are within national and international guidelines (ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Emissions to air (e.g. SOx, NOx) after combustion of biogas are controlled, abated (when needed) and within the limits set by national legislation. • The resulting digestate meets the requirements for fertilising materials as per national rules on fertilisers/soil improvers for agriculture use.
Promote resource resilience and circular economy	

6.4. Waste to Energy

Do no significant harm assessment

The main potential significant harm linked to this activity is related to:

• emissions of collection vehicles that cause harm to human health and the environment
• mixing source segregated waste fractions that could impair subsequent material recovery and recycling.
Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimized as per international standards and guidelines. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Avoid mixing different source segregated waste fractions in waste storage and transfer facilities. Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

6.5. Landfill gas capture and utilisation

Do no significant harm assessment

The main potential significant harm linked to this activity is related to emissions resulting from the energetic utilization of landfill gas, such as sulphur dioxide, nitrous oxide and particulates.

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• The permanent closure and remediation as well as the after-care of old landfills, where the landfill gas capture system is installed, are carried out following the national and international provisions. (Ex: 13.030.40 INSTALLATIONS AND EQUIPMENT FOR WASTE DISPOSAL AND TREATMENT; Global Methane Initiative's International Best Practices Guide for Landfill Gas Energy Projects). • Emissions to air (e.g. SOx, NOx) after combustion of landfill gas are controlled, abated (when needed) and within the limits set by national legislation.
Promote resource resilience and circular economy	

6.6. Material recovery facilities

Do no significant harm assessment

Compliance with relevant international and respective national law as well as consistency with national, regional or local water management strategies and plans is a minimum requirement

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	
Promote resource resilience and circular economy	

7. Industry

7.1. Manufacture of iron and steel

Do no significant harm assessment

The main potential significant harm to other environmental objectives from iron and steel production is associated with:
- emissions to air from coke-making and smelting operations, especially particulate matter (dust), oxides of nitrogen, sulphur dioxide, carbon monoxide, chlorides, fluorides, volatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzodioxins/furans, and heavy metals;
- emissions to water of hydrocarbons and suspended solids;
- water consumption for quenching and cooling operations in water stressed areas;
- the potential to impact local ecosystems and biodiversity due to the polluting emissions (if not properly mitigated) and due to the large land footprint of the operations and associated ancillary activities; and
- wastes and by products from the coking and smelting operations including, tar and benzole.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented.
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines for iron and steel production (e.g. for pH, total suspended solids (TSS), chemical oxygen demand (COD), chromium (total) and heavy metals, for sulphur dioxide – SO_2, nitrogen oxide – NOx, particulate matter, polychlorinated dibenzo-dioxins/furans, mercury (Hg), hydrogen chloride (HCL) and hydrogen fluoride (HF) (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.2. Manufacture of basic chemicals

Do no significant harm assessment

The main potential significant harm to other environmental objectives from manufacture of inorganic basic chemicals:

Carbon black:
- polluting emissions to air, especially volatile organic compounds (VOC) and dust;
- the use of water in water stressed areas for cooling purposes; and
- the generation of wastes.

Disodium Carbonate (soda ash):
- the generation of process effluents (e.g. calcium chloride in aqueous solution), by products and wastes with the potential to pollute groundwater and surface water bodies as well as soils;
- polluting air emissions;
- the use of water in water scarce areas for cooling purposes; and
- impacts on ecosystems and biodiversity from the disposal of wastes and by-products (primarily calcium carbonate, gypsum, sodium chloride and calcium chloride, although there can be trace amounts of toxic materials such as mercury, cadmium, arsenic and zinc depending on the source of the raw materials (e.g. limestone) for the production process) which create 'waste beds'.

Chlorine:
- polluting emissions to air (e.g. chlorine);
- process water effluents which can contain oxidising agents (e.g. chlorine)
- the use of water in water stressed areas; and
- the generation of wastes
- Due to the intrinsic hazard properties of chlorine it is recommended to further assess when Chlorine could be considered part of the solution to achieving zero pollution (toxic free environment) and therefore should not excluded from the taxonomy due to DNSH implications

The main potential significant harm to the environment from the production of other organic chemicals is associated with:
- polluting emissions to air and water from the production process;
- vulnerable ecosystems might be damaged by the construction and/or operation of the production facilities;
- the use of water resources for production purposes (e.g. cooling water) in water stressed areas;
- the generation of hazardous wastes

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented

Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards and guidelines (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use;). A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.3. Manufacture of cement

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the manufacture of cement is associated with:
- Polluting emissions to air associated to the consumption of fossil fuels and calcinations reaction in the cement kiln;
- Water consumption at production facilities located in water-stressed areas;
- Potential for soil and groundwater contamination associated with the handling and storage of (hazardous) wastes used as fuel substitute ('secondary' fuels) in the cement production process;

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.

Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
	• Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented.
	• For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area.
	
	• For such sites/operations, ensure that:
	  ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6;
	  ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and
	  ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented

Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines for the Production of Cement, Lime and Magnesium Oxide. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Ensure implementation of a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Exclusion of refuse derived fuels for cement production. Co-incineration of waste has significant impacts on health and the environment due to the polluting nature of the associated emissions, and higher emissions ceiling for cement plants in comparison with dedicated waste incineration plants. Furthermore, promoting waste as eligible fuel source may undermine waste minimisation efforts in other sectors. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Cement manufacturing plants accept alternative fuels such as SRF originating from waste, as well as secondary raw materials such as recycled concrete aggregates (RCA). For cement production sites using hazardous wastes as alternative fuels, ensure a waste management plan and Implement measures concerning waste management to minimise and manage waste and material use as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.4. Manufacture of hydrogen

Do no significant harm assessment

The main potential significant harm to other environmental objectives from manufacture of hydrogen is, in practical terms, inseparable from the potential for significant harm created by the hydrocarbon refining activity more generally and is associated with:
- polluting emissions to air (in the case of hydrogen production via electrolysis, there is an indirect environmental impact associated with the generation of electricity);
- water used for cooling might lead to local resource depletion, dependent of the local scarcity of water resources; and
- the generation of wastes (e.g. spent catalysts and by-products of the various physical and chemical treatment processes used in purifying the hydrogen produced via hydrocarbon processing)

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Where manufacture of hydrogen takes place within the context of an oil and gas refining installation, ensure appropriate measures are in place to minimise and manage waste and material use in accordance with international standards and guidelines for the Refining of Mineral Oil and Gas (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.5. Manufacture of aluminium

Do no significant harm assessment

The main potential significant harm to other environmental objectives from manufacture of aluminium is associated with:
- the potential for significant air emission impacts: perfluorocarbons, fluoride gases, polycyclic aromatic hydrocarbons (PAHs), and particulate matter (e.g. unused cryolite). Hydrogen fluorides can be toxic to vegetation;
- the toxic, corrosive and reactive nature of waste generated by the used linings (cathodes) from the electrolytic cells (known as spent pot lining (SPL)). Dissolved fluorides and cyanides from the SPL material can create significant environmental impacts including groundwater contamination and pollution of local watercourses;
- the ability (or lacking thereof) of aluminium manufacturing plants to incorporate aluminium scrap (including scrap from their own manufacturing processes) in the production process; and the potential to impact ecosystems as a result of the land footprint of the site and from polluting emissions.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air (e.g. sulphur dioxide - SO_2, nitrogen oxide - NOx, particulate matter, Total Organic Carbon (TOC), dioxins, , mercury (Hg), hydrogen chloride (HCL), hydrogen fluoride (HF), Total Fluoride, and (PFCs) polyfluorinated hydrocarbons (PFCs)) are prevented / minimised as per international standards and guidelines (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products) • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • In order to avoid risks to circular economy, aluminium manufacturing plants need to be able to process aluminium scrap. In order to avoid unnecessary resource and energy consumption, the aluminium scrap collection and sorting activities should be optimised for separation on an alloy specific basis. If scrap alloys are mixed, the functionality of the recycled material is restricted, and valuable alloying elements may be lost.

7.6. Manufacture of batteries

Do no significant harm assessment

-

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.7. Manufacture of plastics in primary form

Do no significant harm assessment

The main potential significant harm to other environmental objectives from production of plastics in primary form is associated with:
• polluting emissions to air and water from the production process;
• vulnerable ecosystems might be damaged by the construction and/or operation of the production facilities;
• the use of water resources for production purposes (e.g. cooling water) in water stressed areas); and
• the generation of hazardous wastes

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent).

7.8. Manufacture of renewable energy technologies

Do no significant harm assessment

-

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.9. Manufacture of equipment for the production and use of hydrogen

Do no significant harm assessment

The main potential significant harm to other environmental objectives from manufacture of hydrogen is, in practical terms, inseparable from the potential for significant harm created by the hydrocarbon refining activity more generally and is associated with:
- polluting emissions to air (in the case of hydrogen production via electrolysis, there is an indirect environmental impact associated with the generation of electricity);
- water used for cooling might lead to local resource depletion, dependent of the local scarcity of water resources; and
- the generation of wastes (e.g. spent catalysts and by-products of the various physical and chemical treatment processes used in purifying the hydrogen produced via hydrocarbon processing)

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO 19884; IEC 63341-2 ; ISO 16111). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Where manufacture of hydrogen takes place within the context of an oil and gas refining installation, ensure appropriate measures are in place to minimise and manage waste and material use in accordance with international standards and guidelines for the Refining of Mineral Oil and Gas (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.10. Manufacture of low-carbon technologies for transport

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the manufacture of low-carbon technologies for transport is associated with:
- the (potential) use of toxic substances and generation of toxic wastes (both at the manufacturing stage as well as at other stages of the product/equipment lifecycle); and
- the potential for polluting emissions to air, water and soil from the manufacturing process.

Depending on the product/equipment being manufactured, there may, also be issues with respect to the embodied carbon and the demand for certain metals and materials (e.g. rare earth metals) which are in limited supply and may have significant environmental impact issues associated with the mining phase.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines and compliance with restricted chemicals and hazardous substances regulations. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Where applicable, vehicles do not contain lead, mercury, hexavalent chromium and cadmium, in accordance to national and international guidelines. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

7.11. Manufacture of energy efficiency equipment for buildings

Do no significant harm assessment

-

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ○ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ○ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ○ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality.

7.12. Manufacture of other low-carbon technologies

Do no significant harm assessment

The main potential significant harm to other environmental objectives from the manufacture of low-carbon technologies is associated with:
- the (potential) use of toxic substances and generation of toxic wastes (both at the manufacturing stage as well as at other stages of the product/equipment lifecycle); and
- the potential for polluting emissions to air, water and soil from the manufacturing process.

Depending on the product/equipment being manufactured, there may, also be issues with respect to the embodied carbon and the demand for certain metals and materials (e.g. rare earth metals) which are in limited supply and may have significant environmental impact issues associated with the mining phase.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented. • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines and compliance with restricted chemicals and hazardous substances regulations. (Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • Where applicable, vehicles do not contain lead, mercury, hexavalent chromium and cadmium, in accordance to national and international guidelines. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Implement measures concerning waste management to minimise and manage waste and material use as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; ETP Clean Energy Technology Guide). • Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality.

8. ICT

8.1. Data processing, storage, transmission and management

Do no significant harm assessment

The main DNSH risks are related to lifecycle considerations, from manufacturing of equipment, to disposal.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	• Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015 Environmental management systems — Requirements with guidance for use; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products). • A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). • Refrigerants employed in the refrigeration systems must meet the national regulatory requirement
Promote resource resilience and circular economy	• The production of servers, storage devices and network technology also consumes a great deal of energy and thus emits CO_2. The equipment used should meet the requirements of the national and international standards for servers and data storage products. • When electrical and electronic equipment reaches its end of service, the waste electrical and electronic equipment is collected and managed by an authorised operator and treated according to the waste hierarchy. • Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS): is a voluntary product standard for tracking and verifying the content of recycled materials in a final product. ; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ETP Clean Energy Technology Guide).

8.2. GHG-related solutions and software

Do no significant harm assessment

Activities falling in this category are mostly based on small-scale data processing and storage, with negligible physical impacts.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	
Promote resource resilience and circular economy	

9. Agriculture

9.1. Perennial crops

Do no significant harm assessment

Key environmental aspects to be considered for investments in growing of perennial crops span across all other five objectives and are summarised as follows:
- ability of farming systems to adapt to a changing climate;
- impact on water quantity, water quality and water ecosystems;
- impacts on air quality;
- inefficiencies in the production system including nutrient management;
- pollutant and nutrient run-off and leaching;
- impacts on habitats and species, e.g. through conversion of areas, intensification of existing arable land, and invasive alien species.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Activities ensure the protection of soils, particularly over winter, to prevent erosion and run-off into water courses/bodies and to maintain soil organic matter. • Activities do not lead to the conversion, fragmentation or unsustainable intensification of high-nature-value land, wetlands, forests, or other areas of high-biodiversity value. This includes highly biodiverse grassland spanning more than one hectare that is: i) natural, namely grassland that would remain grassland in the absence of human intervention and that maintains the natural species composition and ecological characteristics and processes; or ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and that is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority. • Activities should not ○ result in a decrease in the diversity or abundance of species and habitats of conservation importance or concern; ○ contravene existing management plans or conservation objectives. ○ Where activities involve the production of novel non-native or invasive alien species, their cultivation should be subject to an initial risk assessment and ongoing monitoring in order to ensure that sufficient safeguards are in place to prevent escape to the environment. • Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Activities ensure that nutrients (fertilisers) and plant protection products (e.g. pesticides and herbicides) are targeted in their application (in time and area treated) and are delivered at appropriate levels (with preference to sustainable biological, physical or other non-chemical methods if possible) and with appropriate equipment and techniques to reduce risk and impacts of pesticide use on human health and the environment (e.g. water and air pollution) and the loss of excess nutrients. • The use only of plant protection products with active substances that ensure high protection of human and animal health and the environment. • Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Activities should minimise raw material use per unit of output, including energy through increased resource use efficiency. • Activities should minimise the loss of nutrients (in particular nitrogen and phosphate) leaching out from the production system into the environment. • Activities should use residues and by-products the production or harvesting of crops to reduce demand for primary resources, in line with good agricultural practice. • Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS); Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products;). Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

9.2. Non-perennial crops

Do no significant harm assessment

Key environmental aspects to be considered for investments in growing of non-perennial crops span across all other five objectives and are summarised as follows:
- ability of farming systems to adapt to a changing climate;
- impact on water quantity, water quality and water ecosystems;
- impacts on air quality;
- inefficiencies in the production system including nutrient management;
- pollutant and nutrient run-off and leaching;
- impacts on habitats and species, e.g. through conversion of areas, intensification of existing arable land, and invasive alien species.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Activities ensure the protection of soils, particularly over winter, to prevent erosion and run-off into water courses/bodies and to maintain soil organic matter. • Activities do not lead to the conversion, fragmentation or unsustainable intensification of high-nature-value land, wetlands, forests, or other areas of high-biodiversity value. This includes highly biodiverse grassland spanning more than one hectare that is: iii) natural, namely grassland that would remain grassland in the absence of human intervention and that maintains the natural species composition and ecological characteristics and processes; or iv) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and that is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority. • Activities should not ○ result in a decrease in the diversity or abundance of species and habitats of conservation importance or concern; ○ contravene existing management plans or conservation objectives. • Where activities involve the production of novel non-native or invasive alien species, their cultivation should be subject to an initial risk assessment and ongoing monitoring in order to ensure that sufficient safeguards are in place to prevent escape to the environment. • Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Activities ensure that nutrients (fertilisers) and plant protection products (e.g. pesticides and herbicides) are targeted in their application (in time and area treated) and are delivered at appropriate levels (with preference to sustainable biological, physical or other non-chemical methods if possible) and with appropriate equipment and techniques to reduce risk and impacts of pesticide use on human health and the environment (e.g. water and air pollution) and the loss of excess nutrients. • The use only of plant protection products with active substances that ensure high protection of human and animal health and the environment. Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Activities should minimise raw material use per unit of output, including energy through increased resource use efficiency. • Activities should minimise the loss of nutrients (in particular nitrogen and phosphate) leaching out from the production system into the environment. • Activities should use residues and by-products the production or harvesting of crops to reduce demand for primary resources, in line with good agricultural practice. • Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS); Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products;). Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

9.3. Animal Production

Do no significant harm assessment

The activity livestock production captures a distinct set of sub-activities that would include intensive and extensive forms of livestock rearing, as well as the management of permanent grassland. These come with different key environmental aspects that need to be considered for investments in this sector, summarised as follows:
- ability of farming systems to adapt to a changing climate;
- impact on water quantity, water quality and water ecosystems incl. waste water treatment from intensive rearing;
- manure treatment;
- Emissions of pollutants (such as methane, ammonia, dust, odour, noise) to air, water and soil, in particular in the case of intensive rearing;
- impact on habitats and species.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Activities ensure the protection of soils, particularly over winter, to prevent erosion and run-off into water courses/bodies and to maintain soil organic matter. • Activities do not lead to the conversion, fragmentation or unsustainable intensification of high-nature-value land, wetlands, forests, or other areas of high-biodiversity value. This includes highly biodiverse grassland spanning more than one hectare that is: v) natural, namely grassland that would remain grassland in the absence of human intervention and that maintains the natural species composition and ecological characteristics and processes; or vi) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and that is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority. • Activities should not ○ result in a decrease in the diversity or abundance of species and habitats of conservation importance or concern; ○ contravene existing management plans or conservation objectives. ○ lead to overgrazing other forms of degradation of grasslands. Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Activities ensure that nutrients (fertilisers) and plant protection products (e.g. pesticides and herbicides) are targeted in their application (in time and area treated) and are delivered at appropriate levels (with preference to sustainable biological, physical or other non-chemical methods if possible) and with appropriate equipment and techniques to reduce risk and impacts of pesticide use on human health and the environment (e.g. water and air pollution) and the loss of excess nutrients and the loss of excess nutrients through leaching, volatilisation or oxidisation.. • The use only of plant protection products with active substances that ensure high protection of human and animal health and the environment. • Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Ensure that mitigation and emission reduction techniques for feeding and housing of livestock and for manure storage and processing are applied, as recommended in the UNECE Framework Code for Good Agricultural Practice for Reducing Ammonia; • Where manure is applied to the land, activities should comply with the limit of 170kg nitrogen application per hectare per year, or alternatively, the derogated threshold as per national standards. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Activities should use residues and by-products and take any other measures to minimise primary raw material use per unit of output, including energy. • Activities should minimise the loss of nutrients from the production system into the environment. • Implement measures concerning waste management to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (ex: KAPSARC Guide to circular economy, French standard, XP X30-901, Circular economy – Circular economy project management system; ISO/TC 323 (In development Scenario 2); ISO/AWI 59014: Secondary materials — Principles, sustainability and traceability requirements ; Global Recycled Standard (GRS); Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products;). Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

10. Forestry

10.1. Sustainable Forest Management

Do no significant harm assessment

Key environmental aspects span across all other five objectives and are summarised as follows:
- ability of forests to adapt to a changing climate;
- impact on water resources as well as on water quality;
- pollution to water, air, and soil, and risks associated from the use of pesticides and fertiliser;
- impacts on biodiversity and ecosystems from intensification and conversion of land of high ecological value to forests and illegal logging.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Take measures to ensure sustained or improved long term conservation status at the landscape level. • In designated conservation areas, actions should be demonstrated to be in line with the conservation objectives for those areas. • No conversion of habitats specifically sensitive to biodiversity loss or of high conservation value such as grasslands and any high carbon stock area (e.g. peat lands and wetlands), and areas set aside for the restoration of such habitats in line with national legislation • Develop a forest management plan (or equivalent) that includes provisions for maintaining biodiversity. • Evaluate the ecosystem service provision with the aim to not decrease the amount and quality of ecosystem services provided. • Forests are monitored and protected to prevent illegal logging, in compliance with national laws. • Promote close-to-nature forestry or similar concepts depending on the local requirements and limitations. • Select native species or species, varieties, ecotypes and provenance of trees that adequately provide the necessary resilience to climate change, natural disasters and the biotic, pedologic and hydrologic condition of the area concerned, as well as the potential invasive character of the species under local conditions, current and projected climate change. • Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Minimise the use of pesticides and favour alternative approaches or techniques, such as non-chemical alternatives to pesticides. With exception of occasions that this is needed to control pest and diseases outbreaks. Adapt the use of fertilisers to what is needed to prevent leeching of nutrients to waters. • Take well documented and verifiable measures to avoid the use of active ingredients that are listed in the Stockholm Convention, the Rotterdam Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer, or that are listed as classification Ia or Ib in the WHO recommended Classification of Pesticides by Hazard. • Prevent pollution of water and soil in the forest concerned and undertake clean up measures when it does happen. Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	• Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

10.2. Forestry plantation

Do no significant harm assessment

Key environmental aspects span across all other five objectives and are summarised as follows:
- ability of forests to adapt to a changing climate;
- impact on water resources as well as on water quality;
- pollution to water, air, and soil, and risks associated from the use of pesticides and fertiliser;
- impacts on biodiversity and ecosystems from intensification and conversion of land of high ecological value to forests and illegal logging.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Take measures to ensure sustained or improved long term conservation status at the landscape level. • In designated conservation areas, actions should be demonstrated to be in line with the conservation objectives for those areas. • No conversion of habitats specifically sensitive to biodiversity loss or of high conservation value such as grasslands and any high carbon stock area (e.g. peat lands and wetlands), and areas set aside for the restoration of such habitats in line with national legislation . • Develop a forest management plan (or equivalent) that includes provisions for maintaining biodiversity. • Evaluate the ecosystem service provision with the aim to not decrease the amount and quality of ecosystem services provided. • Forests are monitored and protected to prevent illegal logging, in compliance with national laws. • Promote close-to-nature forestry or similar concepts depending on the local requirements and limitations. • Select native species or species, varieties, ecotypes and provenance of trees that adequately provide the necessary resilience to climate change, natural disasters and the biotic, pedologic and hydrologic condition of the area concerned, as well as the potential invasive character of the species under local conditions, current and projected climate change. • Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Minimise the use of pesticides and favour alternative approaches or techniques, such as non-chemical alternatives to pesticides. With exception of occasions that this is needed to control pest and diseases outbreaks. Adapt the use of fertilisers to what is needed to prevent leeching of nutrients to waters. • Take well documented and verifiable measures to avoid the use of active ingredients that are listed in the Stockholm Convention, the Rotterdam Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer, or that are listed as classification Ia or Ib in the WHO recommended Classification of Pesticides by Hazard; • Prevent pollution of water and soil in the forest concerned and undertake clean up measures when it does happen. Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

10.3. Conservation, restoration and maintenance

Do no significant harm assessment

Key environmental aspects span across all other five objectives and are summarised as follows:
- ability of forests to adapt to a changing climate;
- impact on water resources as well as on water quality;
- pollution to water, air, and soil, and risks associated from the use of pesticides and fertiliser;
- impacts on biodiversity and ecosystems from intensification and conversion of land of high ecological value to forests and illegal logging.

Note that areas of environmental risk are highly geographically variable. Guidance should be sought from the relevant competent national or regional authority to identify areas or issues of importance and relevance within the area or project concerned.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Take measures to ensure sustained or improved long term conservation status at the landscape level. • In designated conservation areas, actions should be demonstrated to be in line with the conservation objectives for those areas. • No conversion of habitats specifically sensitive to biodiversity loss or of high conservation value such as grasslands and any high carbon stock area (e.g. peat lands and wetlands), and areas set aside for the restoration of such habitats in line with national legislation • Develop a forest management plan (or equivalent) that includes provisions for maintaining biodiversity. • Evaluate the ecosystem service provision with the aim to not decrease the amount and quality of ecosystem services provided. • Forests are monitored and protected to prevent illegal logging, in compliance with national laws. • Promote close-to-nature forestry or similar concepts depending on the local requirements and limitations. • Select native species or species, varieties, ecotypes and provenance of trees that adequately provide the necessary resilience to climate change, natural disasters and the biotic, pedologic and hydrologic condition of the area concerned, as well as the potential invasive character of the species under local conditions, current and projected climate change. • Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment)) – including ancillary services, e.g. transport infrastructure and operations).
Pollution prevention and control	• Minimise the use of pesticides and favour alternative approaches or techniques, such as non-chemical alternatives to pesticides. With exception of occasions that this is needed to control pest and diseases outbreaks. Adapt the use of fertilisers to what is needed to prevent leeching of nutrients to waters. • Take well documented and verifiable measures to avoid the use of active ingredients that are listed in the Stockholm Convention, the Rotterdam Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer, or that are listed as classification Ia or Ib in the WHO recommended Classification of Pesticides by Hazard. • Prevent pollution of water and soil in the forest concerned and undertake clean up measures when it does happen. Ensure emissions to air, water and soil are prevented / minimised as per international and national standards Ex: IFC EHS Guidelines: Air emissions and ambient air quality; ISO 14001:2015; Strategic Approach to International Chemicals Management (SAICM); ISO 11014:2009(en) Safety data sheet for chemical products; ISO/TC 134, Fertilisers and soil conditioners; ISO 27065, Protective clothing – Performance requirements for protective clothing worn by operators applying liquid pesticides; FAO's The International Code of Conduct on Pesticide Management; Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade, the Minamata Convention on Mercury, the Montreal Protocol on Substances that Deplete the Ozone Layer, and of active ingredients). • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

11. Carbon capture and storage

11.1. Direct air capture of CO_2

Do no significant harm assessment

The main environmental impacts associated with Capture of Anthropogenic Emissions are due to chemicals/technologies used to capture carbon.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent); Follow all the requirements of national and international standards to ensure emissions to air, water and soil are prevented / minimised and in particular: ◦ Prevent release during operation by implementing permanent leakage detection systems. ◦ Avoid loss of ammonia. ◦ Minimise the formation of secondary aerosol and the production of tropospheric ozone. Fans, compressors, pumps and other equipment, must comply, where relevant, with the top class requirements of the energy label, and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

11.2. Captured CO_2 Transportation

Do no significant harm assessment

The main environmental impacts associated with Capture of Anthropogenic Emissions are due to chemicals/technologies used to capture carbon.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent); Follow all the requirements of national and international standards to ensure emissions to air, water and soil are prevented / minimised and in particular: ◦ Prevent release during operation by implementing permanent leakage detection systems. ◦ Avoid loss of ammonia. ◦ Minimise the formation of secondary aerosol and the production of tropospheric ozone. • Fans, compressors, pumps and other equipment, must comply, where relevant, with the top class requirements of the energy label, and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

11.3. Permanent sequestration of captured CO_2

Do no significant harm assessment

The main environmental impacts associated with sequestration of CO_2 are due to:
- the risk of leakage
- the long-term lack of geological containment of the reservoirs, central issues regarding the monitoring and the interrelation of carbon with physical, chemical and geological conditions in the reservoir is still a debated argument, however the safety of CO_2 storage may be assured with the implementation of specific rules and requirements

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent). Follow all the requirements of national and international standards to ensure emissions to air, water and soil are prevented / minimised and in particular: ◦ Prevent release during operation by implementing permanent leakage detection systems. • Fans, compressors, pumps and other equipment, must comply, where relevant, with the top class requirements of the energy label, and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

11.4. Research, development and innovation for CCS-related technologies

Do no significant harm assessment

Activities falling in this category are mostly based on research and development, with negligible physical impact.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	
Pollution prevention and control	
Promote resource resilience and circular economy	

11.5. Point-source capture of CO_2

Do no significant harm assessment

The main environmental impacts associated with Capture of Anthropogenic Emissions are due to chemicals/technologies used to capture carbon.

Objectives	Criteria
Climate change adaptation	• Refer to the screening criteria for DNSH to climate change adaptation: Table 1. • Also, can refer to ISO Standard for Adaptation to climate change: ISO 14091:2021 — Guidelines on vulnerability, impacts and risk assessment.
Protect healthy ecosystems and biodiversity	• Ensure an Environmental Impact Assessment (EIA) has been completed in accordance with national and international standards (e.g IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks; Convention of Biological Diversity (CBD) Voluntary guidelines on biodiversity-inclusive impact assessment) – including ancillary services, e.g. transport infrastructure and operations). • Ensure any required mitigation measures for protecting biodiversity/eco-systems have been implemented (i.e.: avoid possible collision of birds and visual impacts, generated by the change in landscape, due to the construction and operation of wind farms) • For sites/operations located in or near to biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas (KBAs), as well as other protected areas), ensure that an appropriate assessment has been conducted in compliance with international standards (e.g. IFC Performance Standard 6) – based on the conservation objectives of the protected area. • For such sites/operations, ensure that: ◦ a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6; ◦ all necessary mitigation measures are in place to reduce the impacts on species and habitats; and ◦ a robust, appropriately designed and long-term biodiversity monitoring and evaluation programme exists and is implemented
Pollution prevention and control	• A minimum requirement is the implementation and adherence to a recognised environmental management system (ISO 14001, EMAS, or equivalent); Follow all the requirements of national and international standards to ensure emissions to air, water and soil are prevented / minimised and in particular: ◦ Prevent release during operation by implementing permanent leakage detection systems. ◦ Avoid loss of ammonia. ◦ Minimise the formation of secondary aerosol and the production of tropospheric ozone. • Fans, compressors, pumps and other equipment, must comply, where relevant, with the top class requirements of the energy label, and represent the best available technology. • Identify and manage risks related to water quality and/or water consumption at the appropriate level.
Promote resource resilience and circular economy	Ensure that water use/conservation management plans, developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (ex: UNEP International Water Quality Guidelines for Ecosystems (IWQGES); ISO 13.060: Water Quality).

Appendices

Appendix A
Detailed mapping of CAIT to ISIC

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91, 92]	Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)						**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Agriculture (IPCC Category 4)	FAO[53]	4A Enteric Fermentation[54(Page 11)] (Methane production from herbivores as a by-product of digestive and microbial activity inside the animal's gut) 4A1 Cattle (a. Dairy; b. Non-dairy)	A012 Farming of animals A0121 Farming of cattle, sheep, goats, horses, asses, mules and hinnies; dairy farming A0122 Other animal farming; production of animal products A013 Growing of crops combined with farming of animals (mixed farming) A014 Agricultural and animal husbandry service activities, except veterinary activities A050 Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	16.0%	2.0%	15.4%	13.6%	13.2%	14.9%	15.2%	13.9%
		4A2 Buffalo 4A3 Sheep 4A4 Goats 4A5 Camels and Llamas 4A6 Horses 4A7 Mules and Asses 4A9 Swine 4A10 Poultry 4A10 Other									
		4B Manure Management[54(Page 11)] (Methane and nitrous oxide produced from the decomposition of manure) 4B1 Cattle (a. Dairy; b. Non-dairy) 4B2 Buffalo 4B3 Sheep 4B4 Goats 4B5 Camels and Llamas 4B6 Horses 4B7 Mules and Asses 4B8 Swine 4B9 Poultry 4B10 Anaerobic 4B11 Liquid Systems 4B12 Solid Storage and Drylot 4B13 Other			1%						
		4C Rice Cultivation[54(Page 12)] (Methane emitted from anaerobic decomposition of organic material in flooded rice fields) 4C1 Irrigated (a. continuously flooded; intermittently flooded) 4C2 Rainfed 4C3 Deepwater (a. 50-100cm; 100am water depth) 4C Other	A011 Growing of crops; market gardening; horticulture A0111 Growing of cereals and other crops A0112 Growing of vegetables, horticultural specialties and nursery products A0113 Growing of fruit, nuts, beverage and spice crops A013 Growing of crops combined with farming of animals (mixed farming)		6%						
		4D Agricultural Soils[54(Page 12)] i. Emission and removal of methane/ nitrous oxides from agricultural soil ii. Nitrous oxide emissions from fertilizers iii. Nitrogen fixation			4%						

[91]World Resources Institute. (2015). CAIT Country Greenhouse Gas Emissions: Sources & Methods. Pg 16. Retrieved from: http://cait.wri.org/docs/CAIT2.0_CountryGHG_Methods.pdf

[92]Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reporting Instructions. Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ri.pdf.

[93]International Standard Industrial Classification of All Economic Activities (ISIC) Revision 3. (1989). Retrieved from: https://unstats.un.org/unsd/classifications/Econ/Download/In%20Text/ISIC_Rev_3_english_structure.txt

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91,92]		Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	 2014	 2015	 2016	 2017	 2018
Total Emissions ($MtCO_2$)							**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Agriculture (IPCC Category 4)	FAO[53]	4E Prescribed Burning of Savannas[7(Page 13)] (Burning of savannas to control the growth of vegetation, remove pests and weeds, promote the nutrient cycle and to encourage the growth of new grass for animal grazing) iv. CH_4, CO, N_2O, and NO_x emitted	Other Agricultural Sources[53]	No direct mapping under ISIC, but can be put under ISIC categories mapped to CAIT 4A — 4D as savannah burning is both for crop and livestock growth		0%	15.4%	13.6%	13.2%	14.9%	15.2%	13.9%
		4F Field Burning of Agricultural Residues[54(Page 13)] 4F1 Cereals 4F2 Pulse 4F3 Tuber and Root 4F4 Sugar Cane 4F5 Other		Same as ISIC mappings for CAIT 4C and 4D (as it is related to the growing of crops)		0%						
		4G Other[54(Page 13)]		Any other emission source/ sink from agricultural activities (Does this mean all the remaining sectors under 'Agriculture' in ISIC can be mapped here?)		0%						
Bunker Fuels (Referred to as 'International Bunkers') in CAIT document53 (Not a sector under IPCC)[54(Page 21)]	IEA[53]	1A3ai Aviation Bunkers 1A3di Marine Bunkers v. In CAIT, emissions from Aviation and Marine Bunkers are summed into a single yearly estimate for International Bunkers[54(Page 21)] vi. International Bunkers are shown as a sector, but not included in total national emissions, in accordance with IPCC Guidelines[54(Page 16)] vii. Note that IEA reported transport emissions for world total includes international marine bunkers and international aviation bunkers, which are not included in transport at a national or regional level[54(Page 16)]		I611 Sea and coastal water transport I621 Scheduled air transport I622 Non-scheduled air transport Note that the Bunker Fuels sector refers only to emissions released when fuel is used for international bunkers[53,54(Page 4)] I612 Inland water transport is excluded as being inland, it likely only refers to domestic water transport	–	–	5.8%	5.1%	5.3%	6.3%	6.5%	6.0%

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91,92]		Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)							**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Industrial Processes (IPCC Category 2) While the document by the World Resources Institute6 states that data under CAIT in in the Industrial sector only includes cement, adipic acid, etc., the IPCC Guidelines document7 includes the full range of IPCC subsections	CDIAC (for cement)[53]	2A Mineral Products[54(Page 8)] 2A1 Cement production 2A2 Lime Production 2A3 Limestone and Dolomite 2A4 Soda Ash Production and Use 2A5 Asphalt Roofing 2A6 Road Paving with Asphalt 2A7 Other	Cement[53]	ISIC Division 26[54(Page 8)] D26 Manufacture of other non-metallic mineral products D261 Manufacture of glass and glass products 269 Manufacture of non-metallic mineral products D2691 Manufacture of non-structural non-refractory ceramic ware D2692 Manufacture of refractory ceramic products D2693 Manufacture of structural non-refractory clay and ceramic products D2694 Manufacture of cement, lime and plaster D2695 Manufacture of articles of concrete, cement and plaster D2696 Cutting, shaping and finishing of stone D2699 Manufacture of other non-metallic mineral products n.e.c.	5.1%	3.1%	4.2%	3.9%	4.0%	5.2%	5.5%	5.4%
	EPA[53]	**2B Chemical Industry**[54(Page 8)] 2B1 Ammonia Production 2B2 Nitric Acid Production 2B3 Adipic Acid Production 2B4 Carbide production 2B5 Other	Adipic and Nitric Acid Production[53]	ISIC Division 24[54(Page 8)] D24 Manufacture of chemicals and chemical products D241 Manufacture of basic chemicals D2411 Manufacture of basic chemicals, except fertilizers and nitrogen compounds D2412 Manufacture of fertilizers and nitrogen compounds D2413 Manufacture of plastics in primary forms and of synthetic rubber D242 Manufacture of other chemical products D2421 Manufacture of pesticides and other agro-chemical products D2422 Manufacture of paints, varnishes and similar coatings, printing ink and mastics D2423 Manufacture of pharmaceuticals, medicinal chemicals and botanical products D2424 Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations D2429 Manufacture of other chemical products D243 Manufacture of man-made fibres		0.7%						

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91,92]		Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)							**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Industrial Processes (IPCC Category 2) While the document by the World Resources Institute6 states that data under CAIT in in the Industrial sector only includes cement, adipic acid, etc., the IPCC Guidelines document7 includes the full range of IPCC subsections	EPA[53]	**2C Metal Production**[54(Page 8)] 2C1 Iron and Steel Production 2C2 Ferroallloys Production 2C3 Aluminium Production 2C4 SF6 Used in Aluminium and Magnesium Founders 2C5 Other	Other Industrial Non-Agriculture[53]	ISIC Division 27[54(Page 8)] D27 Manufacture of basic metals D271 Manufacture of basic iron and steel D2710 Manufacture of basic iron and steel D272 Manufacture of basic precious and non-ferrous metals D2720 Manufacture of basic precious and non-ferrous metals D273 Casting of metals D2731 Casting of iron and steel D2732 Casting of non-ferrous metals		0.5%	4.2%	3.9%	4.0%	5.2%	5.5%	5.4%
		2D Other Production[54(Page 9)] 2D1 Pulp and Paper 2D2 Food and Drink		ISIC Division 15 and 29[54(Page 9)] D15 Manufacture of food products and beverages D151 Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats D1511 Production, processing and preserving of meat and meat products D1512 Processing and preserving of fish and fish products D1513 Processing and preserving of fruit and vegetables D1514 Manufacture of vegetable and animal oils and fats D152 Manufacture of dairy products D1520 Manufacture of dairy products D153 Manufacture of grain mill products, starches and starch products, and prepared animal feeds D1531 Manufacture of grain mill products D1532 Manufacture of starches and starch products D1533 Manufacture of prepared animal feeds D154 Manufacture of other food products D1541 Manufacture of bakery products D1542 Manufacture of sugar D1543 Manufacture of cocoa, chocolate and sugar confectionery D1544 Manufacture of macaroni, noodles, couscous and similar farinaceous products D1549 Manufacture of other food products n.e.c. D155 Manufacture of beverages D1551 Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials D1552 Manufacture of wines		0.0%						

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91,92]		Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)							**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Industrial Processes (IPCC Category 2) While the document by the World Resources Institute6 states that data under CAIT in in the Industrial sector only includes cement, adipic acid, etc., the IPCC Guidelines document7 includes the full range of IPCC subsections	EPA[53]	2D Other Production[54(Page 9)] 2D1 Pulp and Paper 2D2 Food and Drink	Other Industrial Non-Agriculture[53]	D1553 Manufacture of malt liquors and malt D1554 Manufacture of soft drinks; production of mineral waters D29 Manufacture of machinery and equipment D291 Manufacture of general purpose machinery D2911 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines D2912 Manufacture of pumps, compressors, taps and valves D2913 Manufacture of bearings, gears, gearing and driving elements D2914 Manufacture of ovens, furnaces and furnace burners D2915 Manufacture of lifting and handling equipment D2919 Manufacture of other general purpose machinery D292 Manufacture of special purpose machinery D2921 Manufacture of agricultural and forestry machinery D2922 Manufacture of machine-tools D2923 Manufacture of machinery for metallurgy D2924 Manufacture of machinery for mining, quarrying and construction D2925 Manufacture of machinery for food, beverage and tobacco processing D2926 Manufacture of machinery for textile, apparel and leather production D2927 Manufacture of weapons and ammunition D2929 Manufacture of other special purpose machinery D293 Manufacture of domestic appliances D2930 Manufacture of domestic appliances		0.5%	4.2%	3.9%	4.0%	5.2%	5.5%	5.4%
		2E Production of Halocarbons and Sulphur Hexafluoride[54(Page 9)] 2E1 By-Product Emissions 2E2 Fugitive Emissions 2E3 Other	All Fluorinated Gases	Possibly ISIC Class 2411 or 2429[54(Page 9)] D2411 Manufacture of basic chemicals, except fertilizers and nitrogen compounds D2429 Manufacture of other chemical products n.e.c.		0.0%						

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91, 92]		Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)							**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Industrial Processes (IPCC Category 2) While the document by the World Resources Institute6 states that data under CAIT in in the Industrial sector only includes cement, adipic acid, etc., the IPCC Guidelines document7 includes the full range of IPCC subsections	EPA[53]	2E Consumption of Halocarbons and Sulphur Hexafluoride[54(Page 9)] 2F1 Refrigeration and Air Conditioning 2F2 Foam Blowing 2F3 Fire Extinguishers 2F4 Aerosols 2F5 Solvents 2F6 Other	All Fluorinated Gases	ISIC category not stated[54(Page 9)]		0.0%	4.2%	3.9%	4.0%	5.2%	5.5%	5.4%
		2G Other[54(Page 9)]										
Land-Use Change and Forestry (IPCC Category 5)	FAO53	Total emissions and removals from forest and land use change activities[54(Page 14)] Land Use Total (Forest land, cropland, grassland and biomass burning) [53] **5A Changes In Forest And Other Woody Biomass Stocks**[54(Page 14)] (Emissions and removals of CO2 from decreases or increases in biomass stocks due to forest management, logging, fuelwood collection, etc.) 5A1 Tropical Forests (a. Wet/ very moist, b. Moist, short dry season, c. Moist, long dry season, d. Dry, e. Mountain moist, f. Mountain dry, g. Plantations, h. Other) 5A2 Temperate Forests (a. Coniferous, b. Broadleaf, c. Plantations, d. Other) 5A3 Boreal Forests . (a. Mixed Broadleaf/Coniferous, b. Coniferous, c. Forest Tundra) 5A4 Grasslands/ Tundra 5A5 Other		A020 Forestry, logging and related service activities	20.2%	(-) 20.3%	28.1%	34.4%	34.2%	24.5%	22.8%	25.8%
		5B Forest and Grassland Conversion (Burning and decay of biomass from the conversion of existing forests and natural grasslands to other land uses) 5B1 Tropical Forests (a. Wet/ very moist, b. Moist, short dry season, c. Moist, long dry season, d. Dry, e. Mountain moist, f. Mountain dry, g. Plantations, h. Other) 5B2 Temperate Forests (a. Coniferous, b. Broadleaf, c. Plantations, d. Other) 5B3 Boreal Forests . (a. Mixed Broadleaf/Coniferous, b. Coniferous, c. Forest Tundra) 5B4 Grasslands/ Tundra 5B5 Other			46.0%						

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91,92]	Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)						**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Land-Use Change and Forestry (IPCC Category 5)	FAO[53]	5C Abandonment of Managed Lands (Removal of CO2 from the abandonment of formerly managed lands, e.g. croplands and pastures) 5C1 Tropical Forests 5C2 Temperate Forests 5C3 Boreal Forests 5C4 Grasslands/Tundra 5C5 Other	A020 Forestry, logging and related service activities		(-) 13.2%	28.1%	34.4%	34.2%	24.5%	22.8%	25.8%
		5D CO_2 Emissions and Removals from Soil (Emissions and removals of CO2 in soil associated with land-use change and management, including liming of agricultural soil)			13.4%						
		5E Other (Emissions and removals of CO2 from land use or land-use change activities which not included under the categories provided above)			9.4%						
Waste (IPCC Category 6)	EPA[53]	Total emissions from solid waste disposal on land, wastewater, waste incineration and any other waste management activity[54(Page 17)]	O90 Sewage and refuse disposal, sanitation and similar activities	12.2%	3.1%	5.9%	5.4%	5.3%	6.0%	6.0%	5.6%
		6A Solid Waste Disposal on Land[54(Page 17)] Only applicable for methane gas released by soiled waste in landfills[10] 6A1 Managed Waste Disposal on Land 6A2 Unmanaged Waste Disposal Sites 6A3 Other			0.4%						
		6B Wastewater Handling[54(Page 17)] Methane from wastewater treatment and nitrous oxides from human sewage[10] 6B1 Industrial Wastewater 6B2 Domestic and Commercial Wastewater 6B3 Other 6C Waste Incineration is not listed under CAIT[53]			0.2%						
		6D Other[54(Page 17)] Applies to other non-agricultural sources of methane and nitrous oxides			7.3%						
Energy (o/w) (IPCC Category 1)	IEA[53]	Divided into the subcategories below[53]: • Electricity and Heat • Manufacturing and Construction • Transportation • Other Fuel Combustion • Fugitive Emissions		46.8%		40.5%	37.6%	38.1%	43.2%	44.1%	43.3%

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91, 92]	Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)						**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Electricity and Heat11 (IPCC Category 1A1)	IEA[53]	Electricity & heat plants (fossil fuels) i. 1A1a Public plants[53] (electricity, heat, CHP) **Public Electricity and Heat Production:** The sum of emissions from public electricity generation, public combined heat, power generation and public heat plants[54(Page 3)] ii. 1A Autoproducers[53] (electricity, heat, CHP) Autoproducers may be in public or private ownership, and should be assigned to the sector where they were generated[54(Page 3)] This contradicts the allocation of autoproducers to the electricity and heat category by CAIT[53]	E40 Electricity, gas, steam and hot water supply E401 Production, collection and distribution of electricity E402 Manufacture of gas; distribution of gaseous fuels through mains D232 Manufacture of refined petroleum products D233 Processing of nuclear fuel		14.2%	16.0%	15.3%	15.6%	18.3%	18.1%	18.9%
		Other Energy Industries[53] (fossil fuels) (IPCC 1A1b, 1A1c) **1A1b Petroleum Refining**[54(Page 3)] All combustion activities supporting the refining of petroleum products 1A1c Manufacture of Solid Fuels and Other Energy Industries[54(Page 3)] Combustion emissions from fuel use during the manufacture of secondary and tertiary products from solid fuels including production of charcoal									
Manufacturing & Construction (IPCC Category 1A2)	IEA[53]	1A2 Manufacturing Industries & Construction[53] Emissions from combustion of fuels in industry including combustion for the generation of electricity and heat[54(Page 4)] 1A2a Iron and Steel (ISIC 271,2731) 1A2b Non-Ferrous Metals (ISIC 272,2732) 1A2c Chemicals (ISIC 24) 1A2d Pulp, Paper and Print 1A2e Food Processing, Beverages and Tobacco 1A2f Other The remaining emissions from fuel combustion in industry should be reported here, including emissions from the construction branch	**D271 Manufacture of basic iron and steel**[54(Page 4)] D2731 Casting of Iron and Steel		7.2%	6.8%	7.4%	7.7%	8.3%	7.9%	7.2%
			D272 Manufacture of basic precious and non-ferrous metals D2732 Casting of Non-Ferrous Metals								
			D24 Manufacture of Chemicals and Chemical Products								
			D21 Manufacture of Paper and Paper Products D22 Publishing, Printing and Reproduction of Recorded Media								
			D15 Manufacture of Food Products and Beverages D16 Manufacture of Tobacco Products								
			F45 Construction Any other fuel combustion under ISIC category D (Manufacturing)								

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91, 92]	Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)						**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Transportation (IPCC Category 1A3)	IEA[53]	**1A3 Transport**[53,54(Page 4)] Emissions from the combustion and evaporation of fuel for all transport activities[54(Page 4)] NOTE: Excludes fuel used in international transport (international bunker fuels)[54(Page 4)] 1A3aii Civil Aviation (Domestic)[54(Page 4)] 1A3b Road Transportation All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on highways •Cars • Light Duty Trucks • Heavy Duty Trucks and uses • Motorcycles • Evaporative Emissions from Vehicles 1A3c Railways Includes emissions from both freight and passenger traffic routes 1A3d Navigation Emissions from fuels used to propel water-borne vessels, including hovercraft and hydrofoils • National Navigation (Emissions from fuel used for navigation of all vessels not engaged in international transport, except fishing) 1A3e Other Transportation Combustion emissions from all remaining transport activities including pipeline transportation, ground activities in airports and harbours • Pipeline Transport • Off-road	I60 Land transport; transport via pipelines I601 Transport via railways I602 Other land transport I6021 Other scheduled passenger land transport I6022 Other non-scheduled passenger land transport I6023 Freight transport by road I603 Transport via pipelines I61 Water transport I611 Sea and coastal water transport I6110 Sea and coastal water transport I612 Inland water transport I62 Air transport I621 Scheduled air transport I622 Non-scheduled air transport		8.5%	10.1%	9.2%	8.7%	10.5%	10.8%	10.2%
Other Fuel Combustion (IPCC Category 1A4, 1A5)		1A4 Other Sectors (fossil fuels)[54(Page 6)] Emission from combustion activities as described below Assumption made that 1A4a and 1A4b have been placed under the 'Building' emissions category instead (last row of this table) 1A4c Agriculture/ Forestry/ Fishing [54(Page 6)] • Stationary • Off-road Vehicles and Other Machinery • Fishing	Any carbon dioxide, methane or nitrous oxide emissions resulting from the combustion of fossil fuels for the following possible activities[53]: ISIC Category A: Agriculture, hunting and forestry ISIC Category B: Fishing Any other fuel-burning activity not mentioned in other sections			2.5%	2.2%	2.2%	2.3%	2.3%	2.1%
	EPA[53]	Biomass Combustion (considered under IPCC 1A5[53]) **1A5 Other (not elsewhere specified)** [54(Page 6)] All remaining emissions from non-specified fuel combustion									
	EPA[53]	1A5 Stationary and Mobile Sources[53] **1A5 Other (not elsewhere specified)**[54(Page 6)] a) Stationary b) Mobile (vehicles and other machinery, marine and aviation not included elsewhere)									

GHG Emissions Sectors[53]	Data source[53]	IPCC/CAIT sector and subsectors[91, 92]	Mapped ISIC Category[93]	2000 (sector)	2000 (subsector)	ASEAN GHG Emissions (% Total) 2013	2014	2015	2016	2017	2018
Total Emissions ($MtCO_2$)						**3,348**	**3,789**	**3,912**	**3,522**	**3,580**	**3,890**
Fugitive Emissions[18] (IPCC Category 1B1, 1B2)	EPA[53]	1B2c Gas Venting/ Flaring[53] 1B2 Oil & Natural Gas Systems 1B1 Coal Mining 1B1, 1B2 Other Energy Sources 1B2 Oil and Natural Gas[54(Page 7)] Total fugitive emissions from oil and gas activities. Fugitive emissions may arise from equipment exhaust (non-combustion), leakages, upsets and mishaps at any point in the chain from production through final use 1B2a Oil Fugitive emissions from the following activities in the oil industry: • Exploration • Production • Transport • Refining/ Storage • Distribution of Oil Products • Other 1B2b Natural Gas o Production/ Processing o Transmission/ Distribution o Other Leakage 1B2c Venting and Flaring The release/ combustion of excess gas at facilities for the production of oil or gas and for the processing of gas • Oil • Gas • Combined (in cases where oil and gas cannot be separated)	Fugitive emissions from the following oil and gas activities: C11 Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying D232 Manufacture of refined petroleum products		3.1%	2.7%	2.6%	2.9%	2.8%	2.5%	3.1%
Building (Absent in CAIT document[53])		Possibly: 1A4a Commercial/ Institutional[54(Page 6)] Emission from fuel combustion in commercial and institutional buildings (All activities included in ISIC 4103, 42, 6, 719, 72, 8, 91-96)	ISIC 4103, 42, 6, 719, 72, 8, 94, 96 mentioned in Revised IPCC Guidelines document[54]cannot be found K72 Computer and related activities O91 Activities of membership organizations O92 Recreational, cultural and sporting activities O93 Other service activities P95 Private households with employed persons			1.6%	1.4%	1.5%	1.7%	1.9%	1.7%
		1A4b Residential All emissions from fuel combustion in households (Activities included in ISIC 5, 11, 12, 1302) 14	ISIC 1302 mentioned in Revised IPCC Guidelines document[54] cannot be found								

Data Source: World Resource Institute and CAIT (2013 onwards data), UNFCCC (2010 data)

*Categorisation of sectors to ISIC is made by comparing and matching CAIT/ IPCC sector descriptions with ISIC sector descriptions

ISIC sections highlighted in green are the recommended mappings provided by the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

Instances where sectors listed in WRI document (pg 16, CAIT Country Greenhouse Gas Emissions: Sources & Methods) matches the sectors listed under Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

Appendix B
GHG Emission of Main ASEAN Economies

% of total emissions Sectors	Singapore					
	2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**214.0**	**214.5**	**225.3**	**238.8**	**248.6**	**247.9**
Agriculture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bunker Fuels	72.2%	71.7%	72.2%	73.2%	73.5%	73.1%
Industrial Processes	21.1%	21.3%	20.8%	19.9%	19.6%	19.7%
Land-Use Change and Forestry	5.4%	5.7%	5.7%	5.6%	5.6%	5.9%
Waste	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Energy (o/w)	1.3%	1.4%	1.3%	1.3%	1.3%	1.3%
Building	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Electricity/Heat	11.7%	11.4%	11.0%	10.6%	10.5%	10.4%
Fugitive Emissions	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Manufacturing/Construction	5.5%	5.9%	5.7%	5.5%	5.5%	5.7%
Other Fuel Combustion	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Transportation	3.0%	3.1%	3.2%	3.0%	2.8%	2.8%

% of total emissions Sectors	Indonesia					
	2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**1,640.9**	**2,021.1**	**2,075.1**	**1,458.6**	**1,471.7**	**1,709.6**
Agriculture	10.6%	8.9%	8.8%	13.1%	13.3%	11.7%
Bunker Fuels	0.3%	0.2%	0.2%	0.4%	0.4%	0.3%
Industrial Processes	28.8%	25.2%	24.6%	35.1%	37.3%	35.0%
Land-Use Change and Forestry	1.8%	1.5%	1.5%	2.4%	2.5%	2.2%
Waste	51.1%	57.9%	58.7%	40.2%	37.6%	42.9%
Energy (o/w)	7.3%	6.2%	6.1%	8.9%	8.9%	7.8%
Building	1.4%	1.1%	1.2%	1.6%	1.7%	1.5%
Electricity/Heat	10.3%	9.6%	9.4%	14.2%	14.9%	14.2%
Fugitive Emissions	2.0%	1.7%	1.6%	2.3%	2.1%	1.8%
Manufacturing/Construction	4.8%	4.4%	4.8%	5.8%	6.8%	6.7%
Other Fuel Combustion	2.0%	1.6%	1.7%	2.1%	2.2%	1.8%
Transportation	8.3%	6.8%	5.9%	9.2%	9.6%	9.0%

% of total emissions Sectors	Malaysia					
	2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**183.0**	**214.1**	**200.7**	**386.7**	**374.3**	**397.2**
Agriculture	8.1%	7.0%	7.4%	3.9%	3.9%	3.6%
Bunker Fuels	4.7%	4.0%	4.4%	2.1%	2.5%	2.3%
Industrial Processes	127.3%	114.1%	122.2%	62.4%	62.9%	63.5%
Land-Use Change and Forestry	9.0%	8.2%	9.0%	4.8%	5.2%	5.0%
Waste	-59.4%	-42.4%	-52.8%	21.6%	20.1%	20.5%
Energy (o/w)	10.2%	9.0%	9.8%	5.2%	5.4%	5.2%
Building	2.5%	1.9%	2.0%	1.1%	1.4%	0.9%
Electricity/Heat	62.2%	55.7%	61.5%	30.6%	29.2%	31.6%
Fugitive Emissions	11.7%	9.9%	11.0%	5.7%	5.7%	5.2%
Manufacturing/Construction	15.9%	13.4%	14.4%	7.7%	8.7%	8.9%
Other Fuel Combustion	3.3%	2.8%	2.8%	1.1%	1.7%	1.6%
Transportation	31.8%	30.4%	30.5%	16.3%	16.2%	15.3%

% of total emissions Sectors	Thailand 2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**411.3**	**408.5**	**411.3**	**427.6**	**446.0**	**450.1**
Agriculture	18.5%	17.2%	15.7%	14.3%	15.8%	15.3%
Bunker Fuels	3.4%	3.6%	3.8%	3.9%	3.8%	4.2%
Industrial Processes	65.4%	65.1%	65.6%	62.2%	59.7%	58.5%
Land-Use Change and Forestry	9.3%	10.2%	11.1%	13.0%	14.3%	16.0%
Waste	0.4%	0.9%	0.7%	3.7%	3.5%	3.2%
Energy (o/w)	3.0%	3.0%	3.0%	2.9%	2.8%	2.8%
Building	1.8%	1.7%	1.6%	1.5%	1.5%	1.5%
Electricity/Heat	27.9%	27.8%	26.8%	25.8%	23.3%	23.5%
Fugitive Emissions	3.1%	3.2%	3.2%	3.0%	2.9%	2.8%
Manufacturing/Construction	12.3%	12.4%	13.2%	11.4%	11.1%	9.8%
Other Fuel Combustion	5.1%	5.2%	5.1%	4.3%	4.0%	4.1%
Transportation	15.2%	14.8%	15.8%	16.2%	16.9%	16.9%

% of total emissions Sectors	Vietnam 2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**251.0**	**264.0**	**308.2**	**333.3**	**331.7**	**368.8**
Agriculture	28.2%	26.2%	23.4%	21.3%	21.5%	19.3%
Bunker Fuels	0.9%	0.8%	1.0%	0.9%	1.0%	1.2%
Industrial Processes	61.2%	63.5%	66.9%	64.9%	64.3%	67.3%
Land-Use Change and Forestry	10.0%	10.1%	9.5%	10.2%	10.8%	10.1%
Waste	-8.0%	-8.0%	-7.1%	-3.4%	-3.6%	-3.3%
Energy (o/w)	7.6%	7.4%	6.4%	6.0%	6.1%	5.5%
Building	4.3%	4.0%	4.5%	3.9%	4.8%	4.3%
Electricity/Heat	17.7%	20.1%	23.1%	23.9%	21.6%	29.6%
Fugitive Emissions	8.1%	7.8%	6.7%	6.0%	5.8%	5.1%
Manufacturing/Construction	17.7%	18.8%	20.5%	18.9%	19.4%	17.3%
Other Fuel Combustion	1.7%	1.6%	1.4%	1.2%	1.3%	1.1%
Transportation	11.7%	11.3%	10.7%	10.9%	11.5%	9.8%

% of total emissions Sectors	Philippines 2013	2014	2015	2016	2017	2018
Total Emissions (Mt)	**186.1**	**193.5**	**202.9**	**216.1**	**233.4**	**239.9**
Agriculture	32.2%	31.1%	29.1%	27.3%	26.6%	25.6%
Bunker Fuels	2.0%	1.8%	1.8%	1.9%	2.2%	2.1%
Industrial Processes	51.4%	52.6%	54.2%	56.0%	56.9%	57.7%
Land-Use Change and Forestry	6.3%	6.7%	7.2%	7.5%	7.5%	7.8%
Waste	1.3%	1.3%	1.2%	1.2%	1.1%	1.0%
Energy (o/w)	6.8%	6.6%	6.4%	6.2%	5.8%	5.7%
Building	3.1%	3.4%	3.2%	3.7%	4.0%	4.2%
Electricity/Heat	24.0%	24.8%	25.6%	25.9%	27.5%	29.4%
Fugitive Emissions	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%
Manufacturing/Construction	7.1%	7.2%	7.0%	7.8%	7.6%	6.4%
Other Fuel Combustion	3.1%	3.0%	3.0%	2.9%	2.8%	2.7%
Transportation	13.7%	13.8%	15.2%	15.4%	14.7%	14.9%

Appendix C
ISIC Rev 1 Finalised Sectors

Sectors chosen	ISIC Subsectors		Description
Agriculture and Forestry/Land Use	A	0111	Growing of cereals and other crops n.e.c.
	A	0112	Growing of vegetables, horticultural specialties and nursery products
	A	0113	Growing of fruit, nuts, beverage and spice crops
	A	0121	Farming of cattle, sheep, goats, horses, asses, mules and hinnies; dairy farming
	A	0122	Other animal farming; production of animal products n.e.c.
	A	0130	Growing of crops combined with farming of animals (mixed farming)
	A	0140	Agricultural and animal husbandry service activities, except veterinary activities
	A	0150	Hunting, trapping and game propagation including related service activities
	A	0200	Forestry, logging and related service activities
	A	0500	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing
Construction/Real Estate	F	4510	Site preparation
	F	4520	Building of complete constructions or parts thereof; civil engineering
	F	4530	Building installation
	F	4540	Building completion
	F	4550	Renting of construction or demolition equipment with operator
	K	7010	Real estate activities with own or leased property
	K	7020	Real estate activities on a fee or contract basis
Transportation and Fuel	I	6010	Transport via railways
	I	6021	Other scheduled passenger land transport
	I	6022	Other non-scheduled passenger land transport
	I	6023	Freight transport by road
	I	6030	Transport via pipelines
	I	6110	Sea and coastal water transport
	I	6120	Inland water transport
	I	6210	Scheduled air transport
	I	6220	Non-scheduled air transport
Energy, including upstream	D	2320	Manufacture of refined petroleum products
	D	2330	Processing of nuclear fuel
	E	4010	Production, collection and distribution of electricity
	E	4020	Manufacture of gas; distribution of gaseous fuels through mains
Industrial	D	151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
	D	152	Manufacture of dairy products
	D	153	Manufacture of grain mill products, starches and starch products, and prepared animal feeds
	D	154	Manufacture of other food products
	D	155	Manufacture of beverages
	D	241	Manufacture of basic chemicals
	D	242	Manufacture of other chemical products
	D	243	Manufacture of man-made fibres
	D	261	Manufacture of glass and glass products
	D	269	Manufacture of non-metallic mineral products n.e.c.
	D	271	Manufacture of basic iron and steel
	D	272	Manufacture of basic precious and non-ferrous metals
	D	273	Casting of metals
	D	291	Manufacture of general purpose machinery
	D	292	Manufacture of special purpose machinery
	D	293	Manufacture of domestic appliances n.e.c.
Information and Communications Technology	I	6420	Telecommunications
Waste/Circular Economy	O	9000	Sewage and refuse disposal, sanitation and similar activities
Carbon Capture and Sequestration	–	–	–

Appendix M
Cross-cutting criteria for iron and steel

Table 21 — Cross-cutting criteria

Eligible assets	Facility-specific mitigation criteria
Fossil gas	Using fossil gas both as reducing agent and for energy generation, is only eligible for existing facilities prior to 2030. To qualify after 2030 such facilities would have to use fossil gas combined with CCUS measures that meet the Taxonomy criteria for CCS and: o Utilisation of direct CO_2 emissions from steel production is used for the manufacture of durable products and does not lead to enhanced oil recovery and the production of other forms of fossil energy sources. 1. Projects using fossil gas (even if) combined with CCUS should demonstrate that on-site activities: MRV (monitoring, reporting and verification), and mitigation measures for methane leaks as per the best practice recommended.[99] Any venting or burning within the limits of the steel plant shall be avoided, except in emergency situations, in such case it shall be reported and accounted in the GHG assessment. 2. Projects using fossil gas (even if) combined with CCUS should demonstrate that upstream activities: provide evidence of having in place MRV (monitoring, reporting and verification), and mitigation measures for methane leaks as per the best practice recommended.[100]
Coal	Using coal both as reducing agent and fuel in the steelmaking process, is only eligible for existing facilities prior to 2030. After 2030, facilities would have to use coal combined with CCUS measures that meet the Taxonomy criteria for CCS and utilisation of direct CO_2 emissions from steel production is used for the manufacture of durable products and does not lead to enhanced oil recovery and the production of other forms of fossil energy sources. Projects using coal should demonstrate: 3. Upstream activities: provide evidence of having in place MRV (monitoring, reporting and verification), and mitigation measures for methane leaks as per the best practice recommended.[101]

[99]Best practice can be found in the report: Best Practice Guidance for Effective Methane Management in the Oil and Gas Sector. Monitoring, Reporting and Verification (MRV) and Mitigation. United Nations Economic Commission for Europe. 2019 https://unece.org/fileadmin/DAM/energy/images/CMM/CMM_CE/Best_Practice_Guidance_for_Effective_Methane_Management_in_the_Oil_and_Gas_Sector__Monitoring__Reporting_and_Verification__MRV__and_Mitigation-_FINAL__with_covers_.pdf
[100]ibid
[101]ibid
[102]Feedstocks used are certified under one of the following, pre-approved best practice standards: RSB; RTRS; FSC; ISCC, ISCC Plus; Climate Bonds Agriculture Criteria. Alternatively, please see Climate Bonds Bioenergy criteria 3.3.2. Requirement 2: Feedstocks certified under approved best practice standards, Option B https://www.climatebonds.net/files/files/Bioenergy%20Criteria%20Document%20Aug%202022.pdf

Eligible assets	Facility-specific mitigation criteria
Biomass	Facilities using biomass as a reducing agent are only eligible if they use the following sources of biomass (NB dedicated crops are not eligible): • Agricultural residues: feedstocks need to be certified under approved best practice standards.[102] • Plantation wood: the wood plantation shall demonstrate to meet the requirements set out for “plantation forestry” of the Climate Bonds Forestry Criteria.[103] And Facilities using biomass as fuel are only eligible if they use secondary organic streams. Wood and other dedicated crops are not eligible. The production of the biofuel must be demonstrated to meet the Taxonomy criteria for biofuels.
CCS/CCUS	Facilities using CCUS are only eligible if the CCS meets Taxonomy criteria for CCS and utilisation of direct CO_2 emissions from steel production is used for the manufacture of durable products (e.g. construction materials stored in buildings, or recyclable products e.g. PET). CO_2 should not be used for products that release the CO_2 immediately when these are used (such as in urea, carbonated beverages, or fuels), nor for enhanced oil recovery, and the production of other forms of fossil energy sources.

[103]https://www.climatebonds.net/files/files/standards/Forestry/Crit%20Forestry%20Criteria%20document_July%202020.pdf
[104]ISO standards available at: www.iso.org/standard/38498.html; www.iso.org/standard/37456.html
[105]Sixth Assessment Report — IPCC

Appendix N
Additional information on Hydrogen

Methodological notes for Lifecycle Assessment (LCA)

1 — The lifecycle assessment should follow the latest releases of ISO std (ISO 14040, ISO 14044 for lifecycle assessment, and ISO 14067 for product carbon footprint). The Recommendation 2013/179/EU will be acceptable for assets located in the EU. Results should be verified by an independent third party.

2 — GHG emissions must be estimated for a purity of 99.9% vol, and a gauge pressure of at least 3MPa using correction factors. For pressures higher than 3MPa, additional energy compression emissions must be included as well.

3 — The methodology factor in a Global Warming Potential for a period of 100 years (GWP100) for methane should be 30.[105]

4 — GHG emissions accounting:

E total = E1+E2+E3+E4+E5-E6+E7+E8

E total: Total emissions

E1: Upstream feedstock related emissions (including sourcing , processing, transport and storage)

E2: Upstream energy related emissions (including sourcing, processing, transport and storage)

E3: Fugitive emissions (Including hydrogen emissions)

E4: Process emissions

E5: CCS emissions related to energy consumption and leakages

E6: Carbon emissions captured

E7: Compression and purification emission (Energy required to compress and purify hydrogen)

E8: Transportation emissions to the site where hydrogen will be used (energy and electricity related emissions, and fugitive emissions during transportation)

Additional Guidance for different production pathways up to the point of production[108]:

The International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) methodology working paper contains guidelines to a calculation method for GHG accounting for the following production pathways up to the point of production[109]:

1— Steam Methane Reforming combined with CCS: **Appendix P1 of IPHE working document**

2 — Biomass as a feedstock combined with CCS: **Appendix P5 of IPHE working document**

3 — Manure-based production: **P5.4** Bio-digestion

4 — Land fill gas-based production: **P5.4** Bio-digestion

5 — Biomass from secondary sources: **P.5.5** Biomass gasification.

6 — The IPHE working document also has guidelines for emission sources and allocation for biomass-based production:

1 – Emissions sources in Biomass-Based Hydrogen Routes/CCS: **Appendix P.5.6**

2 – Allocation for the Biomass/CCS pathway: **Appendix P.5.7**

[106]Depending on the feedstock, it can be extraction, cultivation, or collection
[107]Transportation infrastructure emissions are not included
[108]The IPHE methodology will develop guidelines for transport emissions accounting in the coming months.
[109]www.iphe.net/_files/ugd/45185a_6159cefcd88f4d9283ab0e60f4802cb4.pdf

Table 22 — Eligible measures for Hydrogen

Area	Activity	Mitigation criteria
Various		
Carbon Capture and Storage	Infrastructure related to CO_2 capture of emissions from the hydrogen production, transportation, and storage	1. The minimum capture rate from process and energy emission streams should be 90% or emissions reduction at the facility level have to be at least of 50%.[110] (Note: Capture rate is not equivalent to emissions reduction at the facility level given that the latter may depend on multiple emission sources) 2. Issuers must present a quantitative performance report of the CCS operations, including the following information[111]: 1. Intended capture rate capacity, maximum capture rate capacity, annual capture of CO_2, annual transport of CO_2, annual storage of CO_2. 2. Issuers must demonstrate MRV (monitoring, reporting and verification), and mitigation measures for methane leaks on site and upstream. 3. There is evidence[114] that demonstrates the CO_2 will be suitably transported and stored in line with the Taxonomy criteria for CCS.
Carbon Capture and Utilisation	Infrastructure related to capture, transportation, and utilisation of CO_2 emissions from the hydrogen production.	1. The minimum capture rate from process and energy emission streams should be 90% or emissions reduction at the facility level have to be at least of 50%.[115] 2. Issuers must present a quantitative performance report of the CCS operations, including the following information[116]: 3. Intended capture rate capacity, maximum capture rate capacity, annual capture of CO_2, annual transport of CO_2, annual utilisation of CO_2. 4. Issuers must demonstrate MRV (monitoring, reporting and verification), and mitigation measures for methane leaks on site and upstream[117]. 5. There is evidence[118] that demonstrates the CO_2 will be suitably transported in line with the Taxonomy criteria for CCS. Utilisation 6. CO_2 must be used for the manufacture of durable products (e.g. construction materials stored in buildings, or recyclable products that will not be incinerated as a final disposal alternative). 7. CO_2 should not be used for products that release the CO_2 immediately when the products are used (such as in urea, carbonated beverages, or fuels) 8. CO_2 is not used for enhanced oil recovery, and the production of other forms of fossil energy sources.
Electrification of processes	Revamps, modifications and acquisition of equipment and other infrastructure necessary for electrification of the processes	Automatically eligible

[110]A minimum capture rate must be demonstrated only for specific investments on CCS or CCU infrastructure. Entire facilities that have CCS embedded do need to meet this requirement if the facility meet the carbon intensity benchmark in Table 8
[111]CCS performance report must be verified by an independent party
[112]Zhang et al, 2021. https://pubs.acs.org/doi/pdf/10.1021/acs.estlett.2c00296
[113]Additional guidance can be found in the report Best Practice Guidance for Effective Methane Management in the Oil and Gas Sector. Monitoring, Reporting and Verification (MRV) and Mitigation. United Nations Economic Commission for Europe. 2019 https://unece.org/fileadmin/DAM/energy/images/CMM/CMM_CE/Best_Practice_Guidance_for_Effective_Methane_Management_in_the_Oil_and_Gas_Sector__Monitoring__Reporting_and_Verification__MRV__and_Mitigation-_FINAL__with_covers_.pdf
[114] Either directly from the facility or through contracts or agreements with a third party
[115]A minimum capture rate must be demonstrated only for specific investments on CCS or CCU infrastructure. Entire facilities that have CCS embedded do need to meet this requirement if the facility meet the carbon intensity benchmark in Table 14
[116]CCS performance report must be verified by an independent party
[117]www.dnv.com/news/dnv-gl-launches-certification-framework-and-recommended-practice-for-carbon-capture-and-storage-ccs--108096 Monitoring alternatives include satellite-based or drone-based measurement. Additional guidance can be found in the report Best Practice Guidance for Effective Methane Management in the Oil and Gas Sector. Monitoring, Reporting and Verification (MRV) and Mitigation. United Nations Economic Commission for Europe. 2019 https://unece.org/fileadmin/DAM/energy/images/CMM/CMM_CE/Best_Practice_Guidance_for_Effective_Methane_Management_in_the_Oil_and_Gas_Sector__Monitoring__Reporting_and_Verification__MRV__and_Mitigation-_FINAL__with_covers_.pdf
[118]Either directly from the facility or through contracts or agreements with a third party

Area	Activity	Mitigation criteria
Relating to feedstock used		
Using biomass as a feedstock	Infrastructure to produce hydrogen using biomass. Refurbishment and retrofitting of facilities to use biomass Acquisition of equipment to produce hydrogen using biomass	The biomass used complies with the criteria applicable for biomass sourcing set out in the Taxonomy criteria for bioenergy. Only secondary organic streams are eligible. Wood and other dedicated crops are not eligible.
Using manure-biomethane	Infrastructure to produce hydrogen using landfill gas Refurbishment and retrofitting of facilities using landfill gas as a feedstock Acquisition of equipment to produce hydrogen using landfill as a feedstock	Issuers must demonstrate MRV (monitoring, reporting and verification), and mitigation measures for methane leakages on site and upstream . Landfill gas complies with the Taxonomy criteria for waste management for landfill gas recovery.

Area	Activity	Mitigation criteria
Relating to electricity source		
Using Wind, solar, hydro, geothermal energy-based electricity	Infrastructure to produce hydrogen using renewable energy sources Refurbishment and retrofitting of facilities using renewable energy sources Acquisition of equipment to produce electrolytic hydrogen using renewable energy sources	Renewable energy produced on site must comply with the most up to date Taxonomy criteria for the relevant source of energy. Issuers must demonstrate the use of only additional renewable electricity. To do that, issuers can implement the following options: 1. Renewable-based captive power generation, or 2. A power purchase agreement demonstrating a commercial link of the electrolyser with new renewable power capacity; Or 3. Excess of renewable-based electricity that would have been otherwise curtailed. Further, temporal and geographical correlation between the additional renewable electricity generation and the electrolyser electricity consumption must be demonstrated. 1. Temporal correlation: Issuers must demonstrate that the electricity is produced and used simultaneously, on a monthly basis, using telemetry measurement techniques. Renewable electricity that has been locally stored can be used as well. 2. Geographic correlation: Issuers must demonstrate physical capacity to transport the electricity from the renewable generation plant to the electricity consumption site. The electricity must not pass a zone of grid congestion.
Using low-carbon electricity	Infrastructure for the production of hydrogen using electricity from the grid.	The carbon intensity of the electricity grid must ensure that the production process is in compliance with the total carbon intensity benchmark in Table 14.

Appendix O

Agriculture references

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F.N. and Leip, A. (2021) Food systems are responsible for a third of global anthropogenic GHG emissions. Nature Food, 2, 198–209. Available at: https://ecbpi.eu/wp-content/uploads/2021/03/Nature-food-systems-GHG-emissions-march-2021.pdf

Ray et al., (2012). Recent patterns of crop yield growth and stagnation. Nature Communications, 3, 1293.

Tao, S.; Xu, Y.; Liu, K.; Pan, J.; Gou, S. (2011). Research progress in agricultural vulnerability to climate change. Advances in Climate Change Research, 2, n.4, 203-210. Available at: https://www.sciencedirect.com/science/article/pii/S1674927811500504#:~:text=Agricultural%20vulnerability%20to%20climate%20change%20is%20the%20function%20of%20characteristics,or%20unable%20to%20cope%20with

Tubiello, F.N.; Karl, K.; Flammini, A.; Gütschow, J.; Obli-Laryea, G.; Conchedda, G.; Pan, X.; Qi, S.Y.; Heiðarsdóttir, H.H.; Wanner, N.; Quadrelli, R.; Souza, L.R.; Benoit, P.; Hayek, M.; Sandalow, D.; Contreras, E.M.; Rosenzweig, C.; Moncayo, J.R.; Conforti, P.; Torero, M. (2022). Pre- and post-production processes increasingly dominate greenhouse gas emissions from agri-food systems. Earth Syst. Sci. Data, 14, 1795–1809. Available at: https://essd.copernicus.org/articles/14/1795/2022/essd-14-1795-2022-discussion.html

Appendix P
Criteria for the early and managed phase-out of coal-fired power plants

Context

IEA's 2021 report indicated that, to be aligned with a 1.5˚C scenario, about 100GW of coal-fired plants need to be phased out during 2021-2030, from both developed and emerging economies.[121]

For coal to green transition the challenge is dual: the focus is not just on scaling-up already zero-emission solutions, but also on how to quickly phase out coal. To date, this phase-out thinking is absent in the green finance discussions despite the vital role it has to play in reducing global emissions.

More countries commit to coal phase-out: at COP26, more than 40 economies from both developed and developing countries and more recently, according to Powering Past Coal Alliance, nearly 50 governments pledged to phase out coal; however, not all are fully aligned with the IEA Net Zero Emissions by 2050 Scenario, where all OECD countries need to phase out coal by 2030, and the rest of the world by 2040.

...but the phase-out ambition level is often questionable: in many instances, coal retirement pledges refer to plants that operate at or near the end of their full life span, those already sitting idle or long overdue for decommissioning. The challenge is to align the ambition of the 1.5°C objective with an actionable strategy required to fast-track the decommissioning and retirement of the plants that still have a long remaining operational lifetime and remain economically competitive, which could be due to lock in of long-term contracts.

Innovative climate finance tools, often labelled coal transition mechanisms (CTMs), could help to accelerate the coal to green transition: these would allow investors to wind down coal assets and their obligations, whilst placing climate change mitigation and just transition objectives at the heart of the solution.

The demand for CTMs is increasing: CTMs have gained momentum in key coal markets, ranging from securitization transactions in the U.S. to comprehensive coal transition packages such as the Just Energy Transition Partnerships that have been launched and implemented in South Africa, Indonesia and Vietnam for now. However, these mechanisms are still in the early stages of design; credibility and wide acceptance have yet been established by many financial institutions, agencies, and key stakeholders. There is a need for clear guidance on the credible use of climate finance to support the coal transition in the power sector to build confidence and enable the scalability of these tools.

Nevertheless, there is no 1.5˚C-aligned, science-based classification system that is currently available to define investments eligible as climate finance under coal transition schemes. While green finance classification systems have provided some clarity in other areas, few of the already developed taxonomies or frameworks offer a robust approach towards the coal transition process. In particular, better guidance is required on what acceptable ambition levels for transition of coal assets would be and how

[121] World energy outlook 2021, IEA (2021)

to commit to them. Even more rarely addressed is the issue of Just Transition, following the UNFCCC's definition, understood as transition that enables "transformation of the economy and economic system in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind".[122]

The global effort to incorporate transition dimension into taxonomies and frameworks does not yet entirely account for assets, such as coal power plants, that pose significant harm to climate objectives, or address the phase-out process. Importantly, in its recent report,[123] the EU Platform on Sustainable Finance explicitly recommends developing technical screening criteria for potential decommissioning/closure of assets that do not have technological possibility of transitioning away from significantly harmful performance levels.[124] Similarly, GFANZ recommends development of criteria for credible coal phaseout.[125]

High-level guidance is not sufficient: existing guidelines on what the credible early coal phase-out means (developed by e.g. GFANZ, Sierra Club) offer only high-level principles. However, the history of development of sustainable investment eligibility criteria has been away from broad-based guidance towards more stringent thresholds due to persistent concerns around greenwashing and usability. Framework[126] outlined in the recent paper by Climate Bonds Initiative, Climate Policy Initiative and RMI begins to address these issues by recommending robust and stringent criteria and initial methodology for the assessment of the CTM's credibility.

Mainstreaming climate finance for coal transition requires detailed evaluation criteria: lack of specific, universal criteria and thresholds associated with each of the activities means that 1.5°C-aligned coal-transition activities will have to be defined independently for each transition process. This increases operational costs, as financial institutions may not have the time and resource to evaluate projects form a wide variance nor use the effect of scale throughout the process to prevent greenwashing claims.

- Credible standards will help market uptake: to increase usability of coal transition debt vehicles it is necessary to identify robust set of criteria that will ensure investments are aligned with a 1.5°C-aligned transition pathway. These need to be:

- Granular: to the extent possible needed to provide detailed information on what is eligible as 'aligned with science-based, 1.5°C-algined targets'. This reduces the need for interpretation and therefore avoid greenwashing.

- Publicly available: they are available publicly and are not based on proprietary methodologies. They can be broadly understood, commonly accepted, and used across by a variety of different users.

- Science-based: to ensure credibility, the criteria have to be based on science as far as possible rather than purely on national priorities or opinions if these are not science-based.

- Future-proof: in a climate context, science-based means criteria are focused on investments that are in line with the pathway that allows for limiting global warming to 1.5°C above the pre-industrial levels.

- Just and inclusive: to the extent possible need to incorporate solutions ensuring a Just Transition

[122] Implementation of just transition and economic diversification strategies: a compilation of best practices from different countries, UNFCCC (2023)
[123] Final Report on Taxonomy extension options supporting a sustainable transition, EU Platform on Sustainable Finance (2022)
[124] Recommendation 10. The Platform recommends developing technical screening criteria for potential 'decommissioning/closure of...' Article 19 (3)-type activities, as well as for other activities for which no technological possibility of improving their environmental performance to avoid significant harm exists. It should be noted that whilst respecting The Polluter Pays Principle, it may be possible to add 'decommissioning of...' in the next Delegated Act, similar to activities such as 'renovation of...' or 'Renewal of...'. This would provide technical clarity on this topic, albeit indirectly, and could incentivise access to green finance for these activities without changing the Taxonomy Regulation
[125] The Managed Phaseout of High-emitting Assets: How to facilitate the early retirement of high-emitting assets as part of a Just Transition to a net-zero world, GFANZ (2022)

Requirements of the hybrid approach

Following the approach devised by the Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms, to determine the substantial contribution of a phase-out activity to climate change mitigation objective, it is necessary for criteria to address the following questions:

- Coal plant eligibility/coal asset identification: Is it credible, from climate perspective, to provide transition finance for the given coal plant?
- Coal transition pathways: Does the coal transition pathway proposed by the phase-out process support 1.5°C goals?
- Social protection: Does the transaction include a strategy, plan and provisions to support a just transition? Is the phase-out activity aligned to the Just Transition principles which will address social consequences and look to provide new economic opportunities for affected communities and stakeholders?

To answer these, it is necessary to devise facility level criteria to determine the level of ambition for the phase-out process, and on top of that, the entity and system level criteria that provide necessary safeguards to protect against perverse outcomes.

Assessment of the credibility of early coal phase-out requires tools that go beyond the scope of taxonomies. While taxonomies are tools that determine sustainability of individual economic activities, it is the transition plans allow for verification of a credible, 1.5°C-aligned transformation of the entity. Therefore, using the Taxonomy and its traffic lights labelling system would not be sufficient, to comprehensively evaluate the credibility of the early coal phase-out process. Guidance on what constitutes credible coal phase-out calls for a hybrid approach to marry these two perspectives.

The criteria for early coal phase-out complement the Taxonomy's effort to develop a credible approach what constitutes a transition finance. While the Amber category defined for the Taxonomy focuses on the "transition within" concept (activities that will be required beyond 2050 but will require extensive decarbonization to be aligned with net-zero), the early coal phase-out criteria aim to operationalise "transition away" approach (managing and fast-tracking the decline of emissions-intensive economic activities for which there is an alternative).

Therefore, early coal phase-out will not be classified using the traffic light system of the Taxonomy but will instead be considered separately under the Taxonomy. Investments towards early coal phase will be eligible as transition finance.

Importantly, the main objective of these criteria is to support early coal phase-out deals under existing or planned CTMs by providing guidelines that help to ensure their credibility from the perspective of 1.5°C-oriented transition to decarbonised economy. While we acknowledge that there might be climate benefits from the phase-out of coal-fired power plants that might not be entirely compliant with the proposed 1.5°C-aligned criteria, at this point in time, these fall outside of the scope of this document.

CTMs and frameworks governing early coal phase-out processes are in the nascent stage of development. Acknowledging limitations of the proposed criteria, the document will need to be revised on a regular basis as more bodies of work become available. Proposed facility and entity level criteria are thus to be valid for a limited period of time – until 2027. After 2027, a new, revised criteria accounting for new developments in the field should replace the current document. Early coal phase-out criteria will be phased-out by 2035. Beyond 2030 they will be applicable only for the early phase-out of CFPPs in emerging economies.

Box 1. Estimating fair value of the coal plant and emissions savings

While comprehensive guidance on the methodologies for estimating fair value of the coal plant (a.ii) and positive absolute emissions savings (a.iii) would offer stakeholders greater clarity on how to ensure alignment with the criteria, both of these requirements are context specific and often still, at this nascent stage of CTM development, require a case by case evaluation, making it difficult to offer top down criteria. Thus, it is advised for CTM frameworks that are tailored to local specificities to offer detailed guidelines on which methodologies stakeholders are expected to use and how to use them. Such guidelines should be aligned with the criteria entailed in this document.

"Measuring the fair value of coal assets can be complex. Fair value assessments often incorporate current and future market and regulatory conditions, which can be subject to volatility and speculation. As a result, fair value assessments can be inherently subjective, and each valuation approach brings specific miscalculation risks. Given the benefits and misevaluation risks of different approaches, the appropriate fair value methodology will depend on market and ownership structures, and the quality and availability of financial reporting data."

"Quantitative emissions savings methodologies are an important area for future work, particularly if CTM transactions will involve results-based carbon finance or generate carbon offsets. Coal plant owners and financial institutions may also wish to provide a quantitative estimate of emissions savings to lend greater transparency to the transaction. Future work could explore whether specific emissions savings thresholds would be appropriate to lend further credibility to transactions."

Source: Climate Bonds Initiative, Climate Policy Initiative and RMI (2022), Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms.

Early coal phase-out criteria — the Hybrid approach[127]

The coal-fired power plant can be considered as aligned with this guidance and potentially suitable for a managed coal phase-out process, if it meets the following conditions:

1) all of the facility-level criteria, and
2) all of the entity-level criteria.

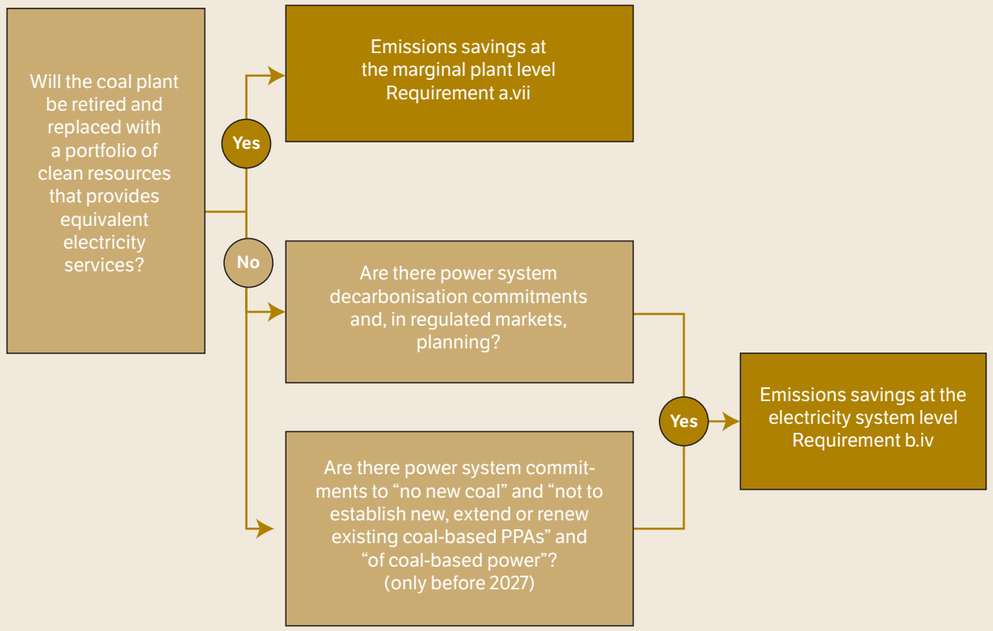
a. Facility-level criteria — the Taxonomy approach

The coal-fired power plant can be considered as aligned with the facility-level criteria if it meets all of the following requirements:

i. The financial close or final investment decision of the coal plant, understood as the point in time at which all the financing agreements have been signed, has been made prior to December 2021.
ii. The fair value of the coal plant is positive at the time of the proposed coal transition.[128] The fair value needs to be independently verified or acknowledged by internationally recognised bodies or programmes.
iii. The early coal phase-out results in positive absolute emissions savings over the expected total lifetime of the coal plant compared with a case without it. The emissions savings need to be independently verified or acknowledged by internationally recognised bodies or programmes.[129]
iv. The phase-out of unabated coal combustion at the coal plant is aligned with, or happens earlier than 1.5°C-aligned coal phase-out deadlines. In advanced economies, this means the coal plant retires at the latest by 2030, and in other countries by 2040, in line with the International Energy Agency's Net Zero pathway.[130,131] Should a country have a national coal phase-out target that is earlier, national targets should be adhered to instead.

[127]The following criteria have been based on and adapted from the working paper published by Climate Bonds Initiative, Climate Policy Initiative and RMI entitled: Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms. Please refer to the paper for detailed rationale and main drivers and methodological discussion behind of each of below-listed requirements. In instances, where additional resources have been used, please refer to footnotes for more details.
[128]For the discussion on different methodologies for estimating fair value please see: Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms
[129]For the discussion on different methodologies for estimating emissions saving please see: Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms
[131]Location of the plant itself determines which phase-out date applies.
[132]World energy outlook 2021, IEA (2021)

Figure 1 — Overview of requirements focused on coal plant's generation replacement.



v. Coal plant has to be retired at or before 25 years of operations at the latest.[132] Retirement has to comply with phase-out requirements in point a.iv. Earlier of the phase-out dates that result from the two criteria (a.iv and a.v) is binding.

vi. Investments made as part of the early coal phase-out process do not extend the expected lifetime for coal combustion[133]. Early coal phase-out has to lead to cessation of fossil fuel–based activities of a plant in line with the timeline specified in points iv and v.

vii. Coal plant's generation is replaced 1-for-1 with a portfolio of clean resources that provides equivalent electricity services within the electricity system[134] and:

1. Clean resources are defined as resources with a lifecycle emissions intensity of 100gCO_2e/kWh or less,
2. Clean resources have to meet Taxonomy criteria for Green category and DNSH criteria.
3. Replacement is based on historical dispatch — i.e. real utilisation of coal capacity based on historical data, rather than nameplate capacity,
4. Replacement resources could include new resources dispatched elsewhere on the local grid (e.g., clean generation or demand-side energy efficiency or battery storage that reduces the system's generation needs at a level equivalent to the coal plant's electricity provision) or retrofits of the original plant to run on a different type of energy source (e.g., renewable power or, where it meets the 100gCO_2e/kWh threshold, burning clean fuels),
5. It needs to be proved that replacement resources would be dispatched at a similar level as the retired generation (e.g., through an assessment of expected dispatch based on clearing prices in wholesale markets).

[133]Refers to both abated and unabated coal combustion – all operations of the coal-fired power plant
[134]The replacement generation need not be developed by the existing coal plant owner but could be done through a partnership with another company or the government

If the requirement a.vii cannot be met (regardless of whether for reasons related to facility/entity plans or grid and energy system capacities and/or planning (e.g. overcapacity)) and the coal plant is retired and not replaced with a portfolio of clean resources that provides equivalent electricity services, then entity and system level requirement b. iv. has to be met. All other facility, entity and system level requirements have to be met.

viii. The coal plant, at a facility level as a minimum, has a just transition plan either as a separate document or as an element embedded into the Transition Plan (requirement b.iii) to mitigate impacts on key stakeholders including workers, electricity customers, and the local community. The just transition plan is designed in line with global best practices devised by internationally recognised bodies, organisations and initiatives,[135] based on the principles outlined in the Paris Agreement and by the International Labour Organisation's Guidelines[136] as well as local laws and regulations. Just transition plan should, inter alia, require the facility owner to:

1. Provide advance notice, of at least six months, or according to local laws and regulations whichever is earlier, of coal plant closure and communicate clear timelines for phase-out,
2. Engage in stakeholder consultations and dialogues,
3. Commit to conduct environmental and social impact assessments of the coal plant closure on its workers, direct supply chain workers, communities and ecosystem,[137]
4. Report on and develop plans to minimise adverse impacts on communities,
5. Develop a worker transition plan that would support relief and reskilling opportunities to affected workers,
6. Consider energy affordability and accessibility aspects of the early coal phase-out
7. Conduct remediation and reclamation.

b. Entity and system level criteria — the Transition Planning approach

The coal-fired power plant can be considered as aligned with the entity- and system-level criteria if it meets all of the following requirements:

Entity-level criteria:

Entity level criteria apply to all actors who have shares in the given coal plant, who are planning purchase of such shares or who had such shares, which they sold, but prior to the sale benefited in any extent from the early coal phase-out scheme. New owners of the coal plant, that is a beneficiary of the early coal phase-out process, need to be aligned with the entity-level criteria and commit to maintaining compliance of the facility with the facility-level criteria.

i. The coal plant owner has an entity-level commitment to no new abated and unabated coal power plant development or procurement globally, beyond their plants that have reached financial close or final investment decision by December 2021 (as per a.i.).
ii. The coal plant owner has an entity-level commitment not to establish new or extend existing fossil-fuel based Power Purchase Agreements beyond these that have been signed by December 2023.
iii. The entity has a Paris Agreement (PA)-aligned transition plan that follow the principles of transition finance outlined by International Platform on Sustainable Finance[138]. The transition plan needs to be independently verified or acknowledged by internationally

[135]Examples include: Assessing a Just Transition: Measuring the Decarbonization and Energy Transformation that Leaves No One Behind, World Benchmarking Alliance, February 2021, https://assets.worldbenchmarkingalliance.org/app/uploads/2021/02/Just-transition-Approach-ReportFebruary-2021.pdf.; and Nick Robins, Translating Just Transition Ambitions into Investor Action, Grantham Research Institute on Climate Change and the Environment, London School of Economics, September 2021, https://www.lse.ac.uk/granthaminstitute/wpcontent/uploads/2021/07/Translating-just-transition-ambitions-into-investor-action_POLICY-BRIEF_8_pages.pdf;
[136]Guidelines for a just transition towards environmentally sustainable economies and societies for all, ILO (2016)
[137]Integrated utilities could also be expected to assess and report on impacts to ratepayers, including any distributional or energy access impacts
[138]Transition Finance Report, International Platform on Sustainable Finance (2022)

recognised bodies or programmes. Acknowledging that this may pose to be a challenge for many of the entities that are in the transition process, it is not expected for the entities to be PA aligned today, but to develop a plan on how to be aligned with that target. The alignment needs to happen by 2030 at the latest.

Power-system-level criteria:

iv. If the coal plant is retired and not replaced with a portfolio of clean resources that provides equivalent electricity services (see facility-level requirement a.vii), at least one of the following requirements set at the power system level has to be met:

1. **Requirement 1**: 1.5°C-aligned, science-based power-sector-level decarbonisation commitments and plans at a national or sub-national level – with a boundary entailing the entire power system in which the entity operates[139]. While these commitments would not necessarily be expected to be fully aligned with 1.5°C to receive support from a CTM today, such a commitment would support a ratcheting process to achieve 1.5°C ambition over time and by 2030 the latest.

2. **Requirement 2**: Consists of the following set of power-system-level commitments that all have to be met to prove the alignment with criteria.

   Commitments will be at a national or sub-national level — with a boundary entailing the entire power system in which the entity operates.

   a. Commitment to no new abated and unabated coal power plant development or procurement globally, beyond the plants that have reached financial close or final investment decision by October 2023, and
   b. Commitment to not establish new or extend existing Power Purchase Agreements with power plants that do not meet Green criteria for the Taxonomy beyond these that have been signed by October 2023, and
   c. Commitment not to increase international imports of power beyond the levels recorded by October 2023, from grids that have energy intensity higher than existing grid.

Requirement 2 is only applicable until 2030 and will not be extended beyond the current version of criteria.

Detailed recommendations on how to ensure that the transactions related to early coal phase-out provide transparency and an accountability mechanism to climate and social outcomes can be found in the Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms.

[139]For the discussion on the examples of how such demonstration of emissions savings could look please see: Guidelines for financing a credible coal transition: A framework for assessing the climate and social outcomes of coal transition mechanisms. CBI, CPI, and RMI (2022).