ผู้สนับสนุน

ผู้จัดทำ

ที่ปรึกษา

THAILAND TAXONOMY

A Deep Dive into the Manufacturing Sector

June 2025

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What You Will Learn Today

1. Recap of the Thailand Taxonomy's overall framework and key principles.
2. Understand the Basic Principles of Thailand Taxonomy for the Manufacturing sector.
3. Deep dive into the Technical Screening Criteria (TSC) for Manufacturing activities.
4. Explore practical applications and use cases for businesses.

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INTRODUCTION
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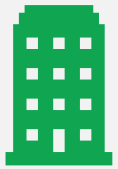
Energy

Transportation

Agriculture



Construction
& Real Estate

Manufacturing

Waste
Management

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The Importance of Thailand Taxonomy for a Sustainable Economy

มาตรฐานกลางแบบภาคสมัครใจ ที่ใช้อ้างอิงการจำแนกและจัดกลุ่มกิจกรรมทางเศรษฐกิจที่เป็นมิตรต่อสิ่งแวดล้อมของไทย

✓ It provides a common framework to steer the market and guide investors and stakeholders.

✓ It helps mobilise green financing, avoid greenwashing, and increase capital flows to truly green projects.

✓ It serves as a tool for the government to direct capital flows and achieve national climate objectives.

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Thailand Taxonomy identified and prioritizes 6 sectors that are both major contributors to environmental impacts for sustainable transformation, aligning with Thailand's economic structure and commitments.

Phase I

- Energy
- Transportation

Phase II

- Agriculture
- Construction & Real Estate
- Manufacturing
- Waste Management

Thailand Taxonomy is structured and designed to improve the ecological and climate credentials of the economy, and activities within each sector are selected on the basis of the following:

1. Contribution to Environmental Objectives
2. Availability of Technologies and Best Practices
3. Align with National Policies & Other Green Taxonomies
   (inclusion into other taxonomies)
4. Economic Significance
   certain activities is provided for information purposes, but it is not the main reason for activities selection.

*Climate-material activities are selected based on the International Standard Industrial Classification of All Economic Activities (ISIC)(Rev. 4) classification system.

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Taxonomy is:

- A system for classifying economic activities to separate sustainable activities from those that are unsustainable and harmful to the environment and climate.
- A convenient tool for use by economic agents, financial market participants and government agencies.
- A tool to categorise financial flows and increase transparency in disclosure, issuance of green financial instruments and financial decision-making.
- A tool to decarbonise those activities that have the potential to affect the climate (climate material) or environment.
- A living document

Taxonomy is NOT:

- A tax collection. The name Taxonomy contains "Tax" but it's not a tax.
- A classifier of activities into 'good' and 'bad'.
- A tool for assessing the financial or economic characteristics of an activity.
- Prohibit lending. Loans can still be issued according to the policies of financial institutions.
- Prohibit investment. Investments can still be made according to the risk appetite of each individual.

Source: Climate Bonds Initiative

Basic Principles of Thailand Taxonomy for the Manufacturing Sector

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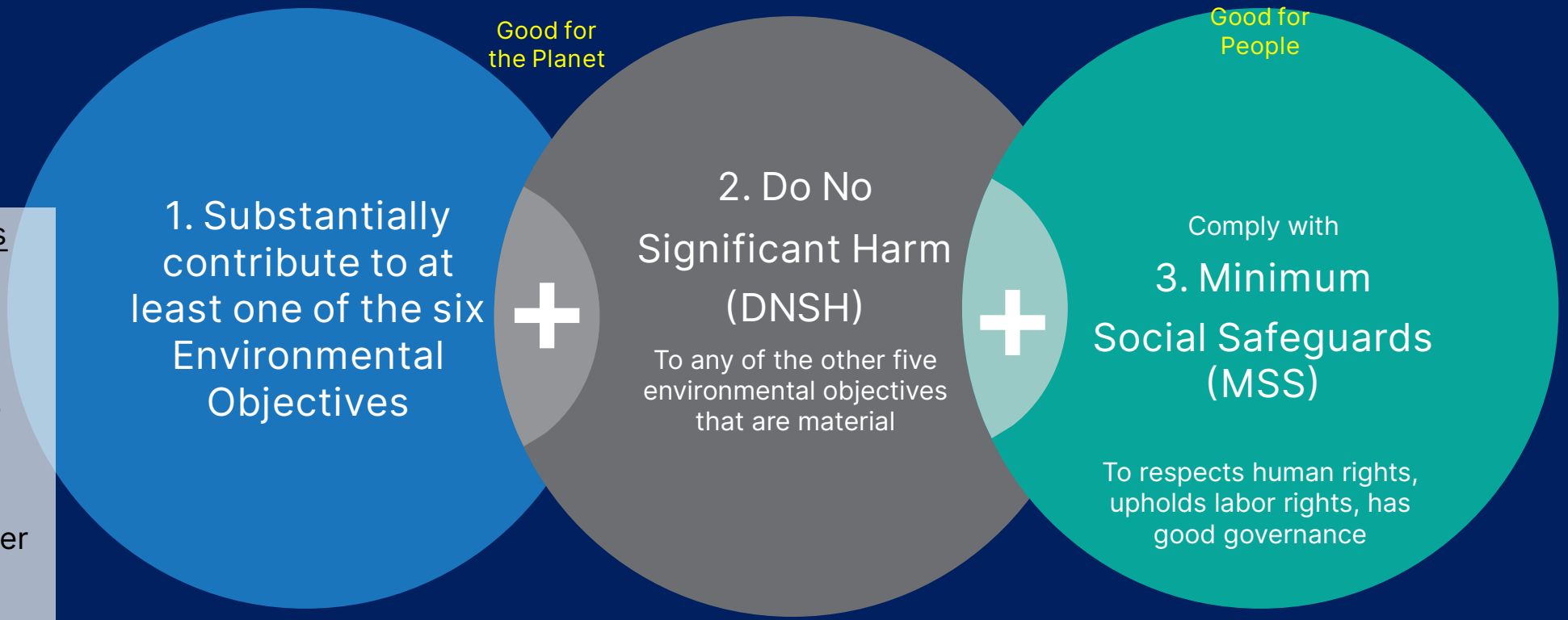
The 3 Core Pillars of Thailand Taxonomy Alignment



Key Development Principles

- ✓ Based on up-to-date climate science
- ✓ Covers a maximum of climate-material activities
- ✓ Interoperable with other green taxonomies
- ✓ Locally applicable, consider Thai Context in amber activities
- ✓ Provides paths to decarbonization for hard-to-abate sectors of the economy
- ✓ Dynamic & Living document

EO1- Climate change mitigation
EO2- Climate change adaptation
EO3- Sustainable use and protection of marine and water resources
EO4- Promotion of resource resilience and transition to a circular economy
EO5- Pollution prevention and control
EO6- Protection and restoration of biodiversity and ecosystems

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Thailand Taxonomy uses a “traffic light system" to assess if an economic activity makes a Substantial Contribution to at least one of the six Environmental Objectives

“Traffic Light System”

Green

Activities that clearly and significantly contribute to achieving one of the six Environmental Objectives

Amber

Activities that can be developed to become more environmentally friendly and potentially move into the green category in the future. They are crucial for the transition to a low-carbon & sustainable economy.

Red

Activities that cause significant harm to one or more Environmental Objectives and must be gradually phased out.

*All activities must comply with important principles such as the Do No Significant Harm (DNSH) principle and Minimum Social Safeguards.

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Classification of Manufacturing activities under Thailand Taxonomy

1.Hard-to-abate activities	These are the activities that the economy needs in the long term, but cannot be decarbonised overnight and need gradual decarbonization such basic chemical, cement, iron & steel, etc.
2. Interim activities	This activity has a definite role in the economy until 2050 , but in their present form must be gradually phased out completely by this date. The main production processes in it should be transformed to such an extent that it is no longer a threat to the fulfilment of the objectives of the Taxonomy. (i.e. only production of plastics).
3. Enabling activities	Activities in the second category (for example, the production of low-emission cars or batteries) may involve significant emissions, but the products they produce are considered critical for the decarbonisation of the economy as a whole, and thus their emissions are negligible compared to the overall benefit to climate.
4. CCS/CCUS-related activities	These activities help decarbonise the economy by capturing, transporting, and burying carbon that would otherwise be released into the atmosphere.
5. Auxiliary transitional activity	This section includes the introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy designed to enable as many businesses as possible to participate in the implementation of the Taxonomy.

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Activities in the Manufacturing Sector of Thailand Taxonomy

Hard-to-abate activities	1.	Manufacture of basic chemicals
	2.	Manufacture of cement
	3.	Manufacture of basic iron and steel
	4.	Manufacture of aluminium
	5.	Manufacture of hydrogen
Interim activities	6.	Manufacture of plastics in primary form
Enabling activities	7.	Manufacture of batteries
	8.	Manufacture of renewable energy technologies and products
	9.	Manufacture of low carbon technologies for transport
	10.	Manufacture of energy efficiency equipment for buildings
	11.	Manufacture of other low-carbon technologies
CCS/CCUS-related activities	12.	CCS/CCUS: Point-source capture of CO_2
	13.	Transportation of captured CO_2
	14.	Permanent sequestration of captured CO_2
	15.	Utilisation of captured CO_2
Auxiliary transitional activity	16.	Introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy

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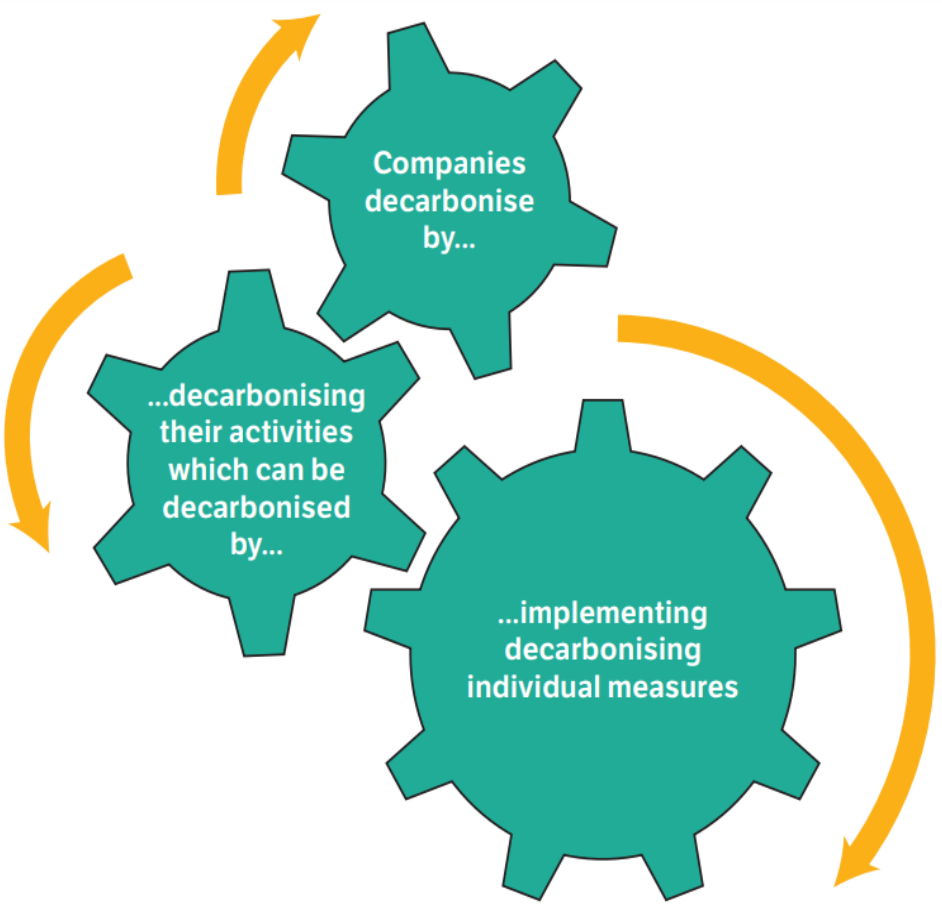
Manufacturing criteria scope & methodological approach

Activity coverage	• The diagrams or descriptions show the parts of an activity's production chain to which the Taxonomy's criteria and thresholds apply. • This means that these elements of the production chain can be replaced during the application of the Taxonomy (e.g. through the application of amber-category measures) and funds coloured compliant (as adaptation or green finance) can be requested for them. • Chain elements outside of this diagram or description CANNOT be subject to change within the Taxonomy criteria and funding defined by the Taxonomy categories cannot be requested for them.
Scope of emissions calculation	• The diagrams or descriptions show how the emission of an activity should be counted to calculate whether or not the activity meets the criteria and thresholds. • Typically, the diagrams and descriptions are consistent with the sum of Scope 1 and Scope 2, but sometimes some elements of these scopes are not included because they are not climate-material for the activity. • It is important to note that emission calculations are not important in all applications of the Taxonomy, but only when required to determine thresholds. In most cases, it is required to verify that the activity fits the green category, but not the amber or red categories, which are simpler to define and apply.

Manufacturing Specifics: Measures-Based Amber

- Amber (measures) have been proposed to provide additional options for users for activities for which establishing a threshold – boundary between amber and green, is difficult or less efficient because:
  - the data is not available and/or
  - the starting point is less important than actual progress towards green - by acknowledging individual decarbonisation efforts rather than end-effects, it could help fast-track emissions reduction from hard-to-abate sectors
- For the measures-based approach, the requirement of the Paris Agreement-aligned transition plan has been introduced.
- TSC require that measures are implemented by 2040, limiting the timeframe for enabling meaningful, but nevertheless insufficient, from the net-zero perspective, improvements

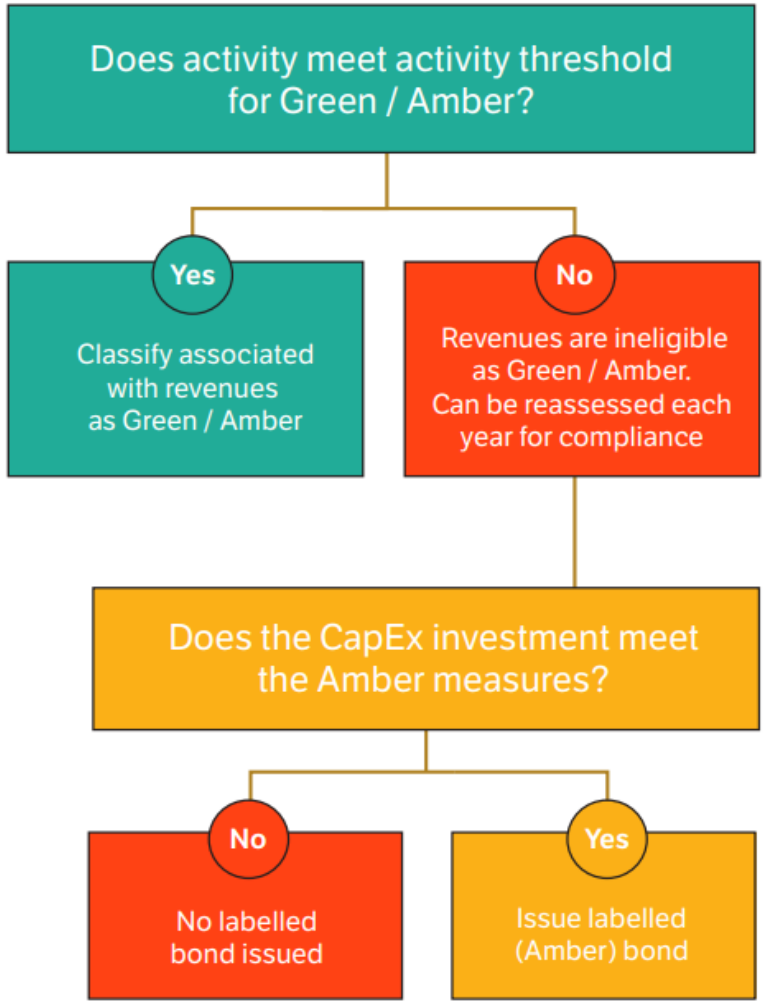


Manufacturing Specifics: Criteria Application Scheme

The criteria for manufacturing cover a heterogeneous group of activities in nature and technological structure, which will be specifically defined in the respective subchapter. Eligible expenditure also covers the costs of the facilities and supporting infrastructure associated with the production process. In practice, this means that not only revenues associated with the production of low-carbon cement, or upgrades of facilities are considered aligned with the Taxonomy, but also a project to construct a new cement plant that will produce low-carbon cement is eligible.

What can be aligned with the Taxonomy?

- Revenue from the sale of goods produced from taxonomy-compatible activities (e.g. green steel, green cement)
- Capital expenditures on the construction of new enterprises that comply with the Taxonomy thresholds (green category)
- Capital expenditures of modernisation projects for all production facilities eligible under the specific category



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Manufacturing Specifics: Criteria Application Scheme

	Green	Measures-based amber	Activity-based ("traditional") amber
Taxonomy is used to define the alignment of CapEx	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 the transition plan/CapEx plan)	Financing of specific measures (each of them might have additional measure-specific criteria) is eligible as amber	CapEx is eligible if a given activity currently meets the amber criteria, and the measure will help to achieve green criteria (so assume the need to assess transition plan/CapEx plan)
Taxonomy is used to define the alignment of revenues associated with activities.	Revenue is eligible if the activity meets green criteria	Not available	Revenue is eligible if the activity meets the Amber criteria

Manufacturing Sector Technical Screening Criteria

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Hard-to-abate activities: Manufacture of basic chemicals

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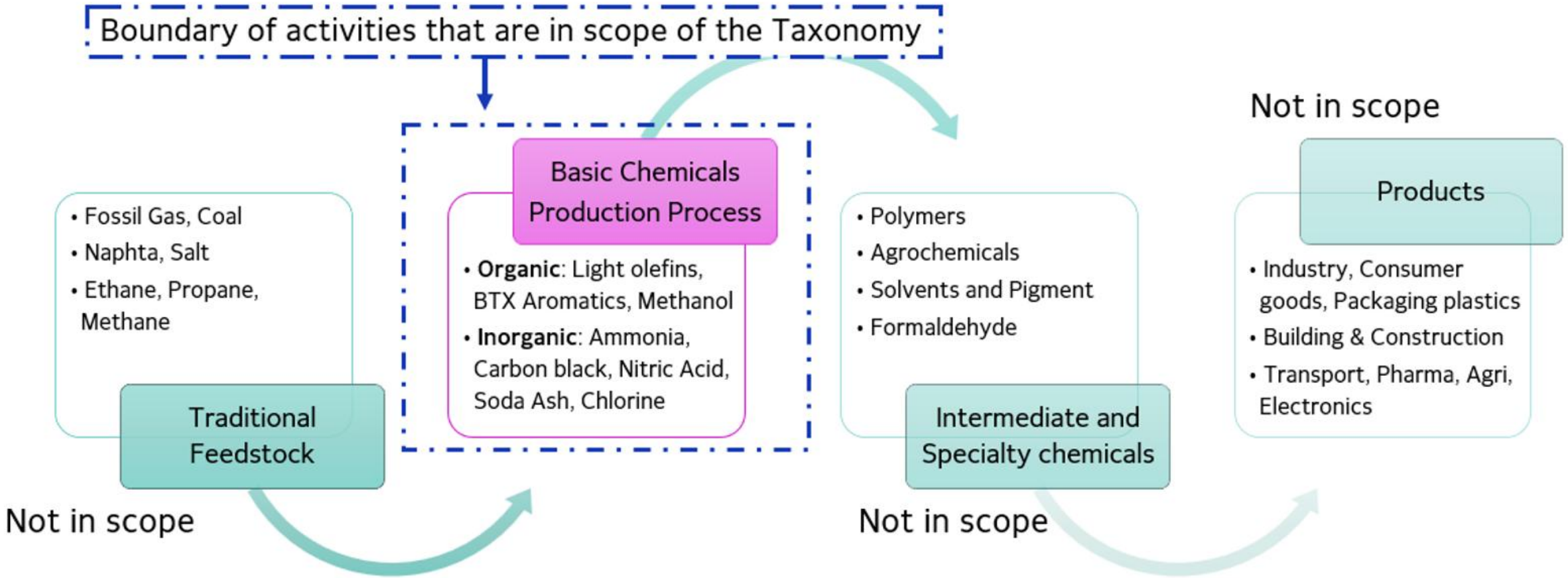
1. Manufacture of basic chemicals

Eligible basic chemicals under the scope of Thailand Taxonomy

Chemical groups	Eligible assets
Inorganic basic chemicals	• Ammonia • Chlorine • Disodium carbonate/Soda ash • Nitric acid • Carbon black
Organic basic chemicals	• High-value chemicals (ethylene, propylene, butadiene) • Aromatics BTX (acetylene, benzene, toluene and xylene) • Methanol

1. Manufacture of basic chemicals

Basic Chemicals production value chain and activities within the scope of the Taxonomy criteria



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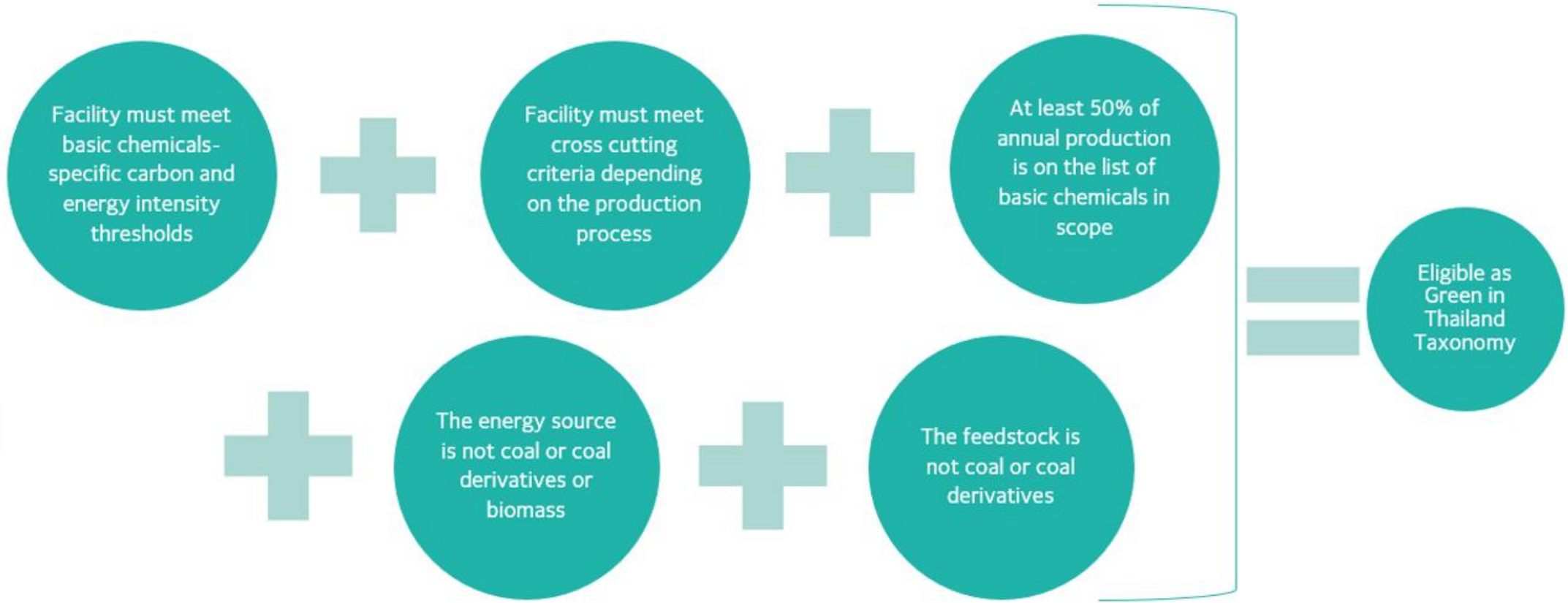
1. Manufacture of basic chemicals

Green criteria overview for manufacture of basic chemicals



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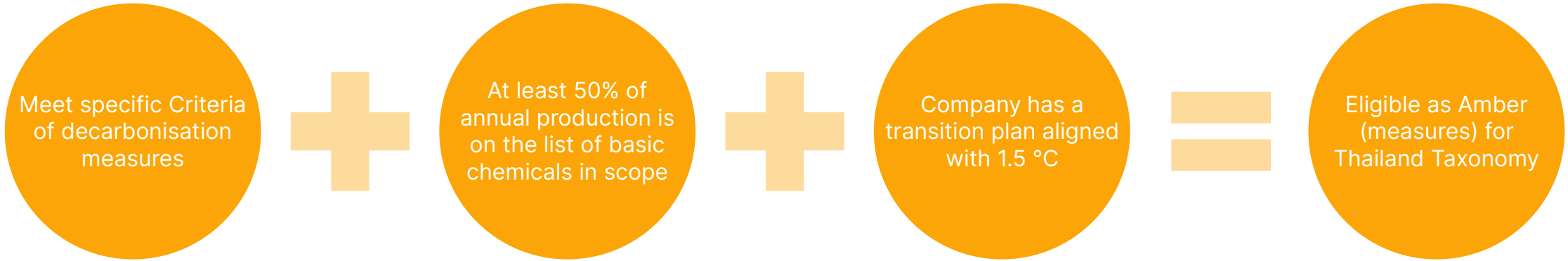
1. Manufacture of basic chemicals

Amber criteria framework for manufacture of basic chemicals



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1. Manufacture of basic chemicals

Sector	Manufacturing
Activity	Manufacture of basic chemicals
ISIC code	C201
Description	Production of carbon black, soda ash, chlorine, anhydrous ammonia, nitric acid, ethylene, propylene, butadiene, benzene, acetylene, xylene, toluene, methanol
Objective	Climate change mitigation; Resource resilience and circular economy promotion
Green	For the activity of production of a certain listed chemical or a facility as a whole to be aligned with the green category of Thailand Taxonomy, it must comply with the following requirements: • More than 50% of the facility's production (by volume) is made up of chemicals included in the scope of the present article (listed in the "Description" line under manufacture of basic chemicals criteria and thresholds; • All activities carried out on the facility that fall within the scope of the present article need to meet specific carbon or energy intensity thresholds defined in Table Basic chemicals decarbonisation pathways. • Facility operators must check whether Additional requirement 1 or Additional requirement 2 listed below apply to their activities. If yes, these requirements must be further fulfilled. ○ Additional requirement 1: applicable if the facility is using fossil gas, naphtha, hydrogen, CO_2, or biomass as feedstock. These facilities are eligible only if they meet the following criteria: ▪ Fossil gas or naphtha: only eligible for existing unabated GHG facilities prior to 2040; ▪ If facilities use biomass or hydrogen as a feedstock source, they should meet Taxonomy's green criteria of these activities; ▪ CO_2: satisfies the criteria described in Table 4 (e.g., CO2 from ammonia production should not be used for urea production). ○ Additional requirement 2: applicable if the facility uses fossil gas, naphtha, hydrogen, biomass, or heat supplied from alternative sources as a fuel source. These facilities are eligible only if they meet the following criteria: ▪ Fossil gas or naphtha: Only eligible for existing unabated industrial facilities prior to 2040; ▪ If facilities use biomass or hydrogen as a fuel source, they should meet green criteria of these activities. ▪ Facilities using heat supplied from alternative sources, such as geothermal, solar thermal, and waste heat recovery: The heat source must comply with the green category of the Taxonomy's most up-to-date criteria for each source of energy
Amber	In order to be aligned with the amber category, the manager of the facility must implement at least one of the measures mentioned in Table *Decarbonisation measures for the chemical industry*. By implementing this measure, the manager of the activity must, as a minimum, achieve the result indicated in the "Mitigation criteria" column of Table *Decarbonisation measures for the chemical industry*. If the application of the listed measure does not lead to the result indicated in the column, the application of this measure cannot be considered eligible. In addition: • Eligible decarbonisation measures or retrofitting activities (CapEx) should be implemented prior to the designated sunset date (2040). • More than 50% of the facility's production is made up of chemicals included in the scope of the present article (listed in the "Description" line under Manufacture of basic chemicals criteria and thresholds); • A company that owns the facility should have a transition plan aligned with the commitments under the Paris Agreement and/or net zero GHG emissions target of Thailand.
Red	Activities that do not comply with the green or amber category are harmful to the objective of climate change mitigation.
Criteria reference	Climate Bonds Basic Chemicals Criteria

Note: Unabated industrial facilities refer to industrial facilities that continue to emit greenhouse gases without any significant mitigation measures, such as carbon capture, utilization, and storage or other emissions-reduction technologies.

1. Manufacture of basic chemicals

Basic chemicals decarbonisation pathways					
Asset type	2025	2030	2035	2040	2050
Production of ammonia	● Uses hydrogen as feedstock that meets the Taxonomy criteria for hydrogen production (green category) OR Ammonia is recovered from wastewater. AND ● CO_2 from ammonia production should not be used for urea production.				
Production of nitric acid (tCO_2e /t nitric acid)	0.527	0.263	0.131	0.007	0
Production of chlorine	2.45 MWh electricity/t chlorine OR carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)	1.85 MWh electricity/t chlorine OR carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)	Carbon intensity of electricity used meets the Taxonomy criteria for electricity generation (green category)		
Production of carbon black (tCO_2e/t carbon black)	1.141	0.63	0.34	0.20	0
Production of disodium carbonate/soda ash	0.789 t CO_2e/t disodium carbonate/ soda ash AND carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)	0.44 t CO_2e/t disodium carbonate/ soda ash AND carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)	0.23 t CO_2e/t disodium carbonate/ soda ash AND carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation green category)	0.14 t CO_2e/t disodium carbonate/ soda ash AND carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)	0 t CO_2e/t disodium carbonate/ soda ash AND carbon intensity of the electricity used meets the Taxonomy criteria for electricity generation (green category)
Production of high-value chemicals (ethylene, propylene, butadiene)	0.77	0.68	0.60	0.43 in 2040 and 0.26 in 2045	0.09
Production of aromatics BTX (acetylene, benzene, xylene, and toluene) (tCO_2e/t aromatics BTX)	0.348	0.174	0.087	0.0012	0
Production of methanol	Uses hydrogen as feedstock that meets the Taxonomy criteria for hydrogen production (green category)				

Note:
- Modelled proxy data is used here instead of real data due to limited availability. The number will be updated in the future.
- The data and decarbonization pathway on the production of high-value chemicals (ethylene, propylene, butadiene) have been obtained from the Petrochemical Industry Club, the Federation of Thai Industries. As the data is sample data from Thai producers, the pathway will be considered once more comprehensive data becomes available and/or significant technological advancements.
- The current GHG data on the production of aromatics BTX (only benzene, xylene, and toluene) has been obtained from the Petrochemical Industry Club, the Federation of Thai Industries. Due to the data limitation of Thai manufacturers in specific product categories, proxy data is used for pathway calculations. A data review will be considered once more comprehensive data becomes available and/or significant technological advancements.

Source: CBI, "Basic Chemicals Criteria", April 2023 https://www.climatebonds.net/files/files/standards/Chemicals%20-%20Basic/Sector%20Criteria%20-%20Basic%20Chemicals%20%28April%202023%29.pdf

1. Manufacture of basic chemicals

Decarbonisation measures for the chemical industry		
Area	Activity	Mitigation criteria
General measures		
Energy efficiency measures	Revamps, modifications, or acquisition of equipment (boilers, furnaces, reactors, heat exchanger, distillation columns and other separation units, etc.)	At least a 30 % improvement in energy efficiency.
Switching to low-carbon process technologies	Revamps, modification and acquisition of equipment and other infrastructure needed for the implementation and operation of low carbon process technologies.	The technology does not release direct process CO_2 emissions, e.g., methane pyrolysis catalytic partial oxidation of methane to methanol.
Carbon Capture and Storage	Infrastructure related to CO_2 capture of emissions from the basic chemicals production, transportation, and storage	• The minimum capture rate from the entire facility should be 90% (capture only, without transportation or storage). • There is evidence that demonstrates the CO_2 will be suitably transported and stored in line with the Taxonomy criteria (green category)

1. Manufacture of basic chemicals

Decarbonisation measures for the chemical industry		
Area	Activity	Mitigation criteria
Relating to the feedstock used		
Using hydrogen as a feedstock	Infrastructure for production using hydrogen that is aligned with the Thailand Taxonomy (green category) OR Refurbishment and retrofitting of facilities to use hydrogen that is aligned with the Thailand Taxonomy (green category) OR Acquisition of equipment to produce basic chemicals using hydrogen that is aligned with the Thailand Taxonomy (green category)	Hydrogen used as a feedstock meets the thresholds set out in the Taxonomy for green category (green category)
Using biomass as a feedstock	Infrastructure for production using biomass OR Refurbishment and retrofitting of facilities to use biomass OR Acquisition of equipment to produce basic chemicals using biomass	The biomass used complies with the criteria applicable for biomass sourcing set out in the Taxonomy Bio-energy criteria (green category)
Using CO_2 as a feedstock	Infrastructure for production using CO2 as a feedstock OR Refurbishment and retrofitting of facilities to use CO_2 as a feedstock OR Acquisition of equipment to produce basic chemicals using CO_2 as a feedstock	1. The source of CO_2 sources is either: • Direct emissions from chemical production; OR • Direct emissions from other industrial activities 2. The basic chemical produced is used for the manufacture of durable products (e.g. construction materials stored in buildings or recyclable products, e.g. PET). 3. If the basic chemical produced is used for products that release CO2 immediately when the products are used (such as in urea, carbonated beverages, or fuels), the capital investment is not eligible. 4. CO_2 is not used for enhanced oil recovery, and the production of other forms of fossil energy sources. 5. This measure may involve the need for electricity when electrochemical processes are used, and also the need for hydrogen as a feedstock. If so, that hydrogen must comply with the Taxonomy criteria (green category)
Use of recycled material as feedstock (e.g. using olefins recovered from plastics chemical recycling processes)	Infrastructure for the production using recycled feedstock OR Refurbishment and retrofitting of facilities using recycled feedstock OR Acquisition of equipment to produce basic chemicals using recycled feedstock	Recycled material should: • represent at least 20% of the feedstock in regions without local recycling regulations or with lower recycled content requirements. • represent more than 20% of the feedstock in regions with local recycling regulations. If the region has a higher recycled content percentage, it should prevail. • have lower cradle-to-gate emissions than the virgin material OR • Recycled feedstock is certified by International Sustainability and Carbon Certification (ISCC)

1. Manufacture of basic chemicals

Decarbonisation measures for the chemical industry		
Area	Activity	Mitigation criteria
Relating to energy used		
Electrification of the processes	Revamps, modifications, and acquisition of equipment (furnaces, reactors, separators, etc.) and other infrastructure necessary for electrification of the processes	Electricity must be low-carbon and comply with the most up-to-date Taxonomy criteria for electricity grids (green category)
Heat supplied from geothermal, solar thermal or waste heat recovery systems	New heat exchange equipment, such as evaporators, furnaces, boilers, etc., OR Revamps or modifications to heating-related equipment in the existing process	Heat supply complies with the most up-to-date Taxonomy criteria for the relevant source of energy (green category)
Using hydrogen as an energy source	Revamps or modifications to equipment (boilers, furnaces, burners, etc.) in existing utility systems required for the use of hydrogen as fuel OR Infrastructure for the production of a basic chemical in scope using hydrogen as an energy source	The hydrogen to be used meets the Taxonomy criteria for hydrogen production (green category)
Using biomass or biogas as an energy source	Revamps or modifications to equipment (boilers, furnaces, burners, etc.) in existing utility systems required for the use of biomass as fuel OR Infrastructure for the production of a basic chemical in scope using biomass as an energy source	The bioenergy complies with the Taxonomy Bio-energy criteria (green category). Primary organic streams are only eligible if certified as sustainable by Roundtable on Sustainable Biomaterials or International Sustainability and Carbon Certification. Wood is eligible only if produced on a sustainable plantation as defined by the Thailand Taxonomy's Forestry Criteria when using biomass as a reducing agent and/or for energy generation.

Hard-to-abate activities: Manufacture of cement

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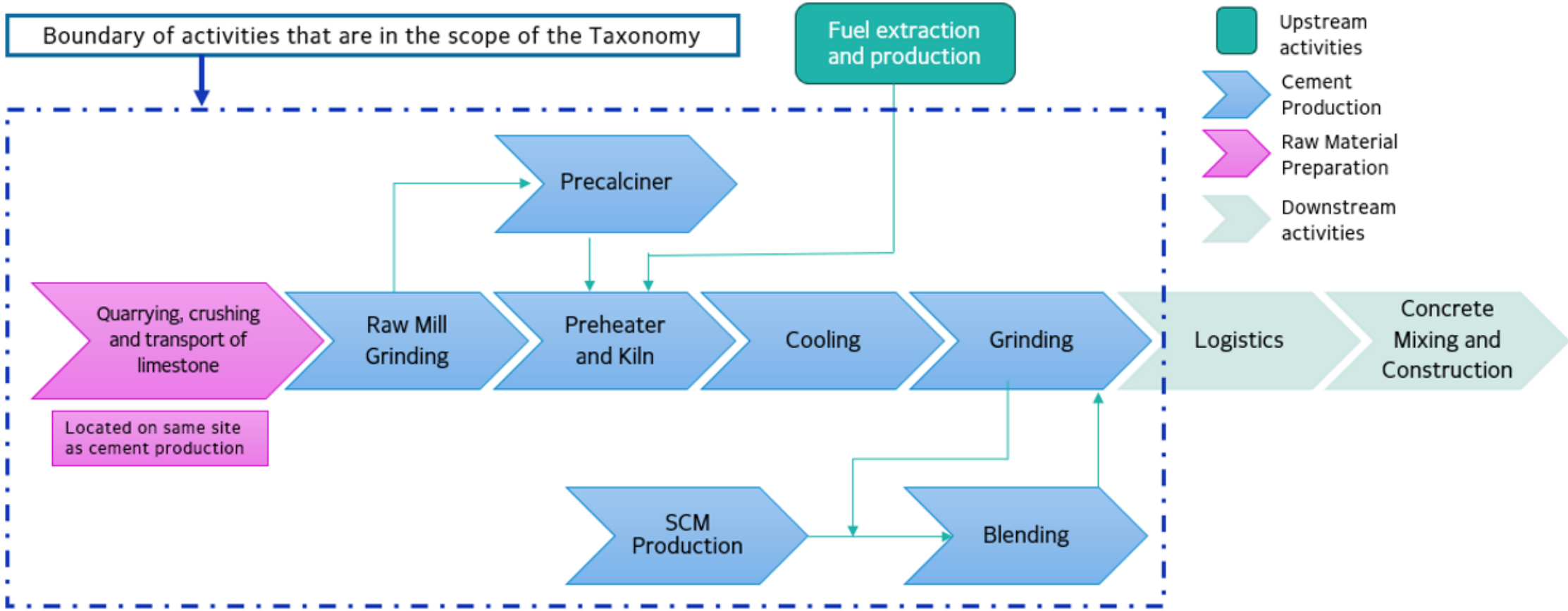
2. Manufacture of cement

Cement production activities within the scope of the Taxonomy criteria



2. Manufacture of cement

Green criteria framework for manufacture of cement

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2. Manufacture of cement

Sector	Manufacturing
Activity	Manufacture of cement
ISIC code	2394
Description	Production of cementitious products
Objective	Climate change mitigation
Green	For the cement production activity to be aligned with the Taxonomy, the activities need to meet specific emissions intensity thresholds for cementitious products defined in Table: Cementitious products decarbonisation pathway. Additional requirement to align with other activities in Thailand Taxonomy: • If facilities use biomass or hydrogen as a fuel source, they should meet the green criteria for these activities. • If facilities use waste as a fuel source, including municipal solid waste, they should meet the following criteria: - Align with the green criteria in waste management sector - Maximum of waste of recycling potential must be removed prior to burning; - Municipal solid waste will not be eligible as a fuel type after 2050. • If the plant uses CCS/CCUS equipment on site, it should meet the green criteria of CCS/CCUS.
Amber	Eligible decarbonisation measures or retrofitting activities (capital investments) must: • Be implemented prior to 2040 (sunset date); • Constitute one or more of the following actions: - Installation, upgrade, and operation of pre-calciners; - 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 (but not limited to): ▪ Automated X-ray diffractometer 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 lifespan of the debt instrument; - Installation, upgrade, and operation of carbon capture and storage equipment that is aligned with Taxonomy criteria for CCS/CCUS: Point-source capture of CO_2 (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). • The facility must have net-zero plan aligned with the commitments under the Paris Agreement.
Red	Activities that do not comply with the green or amber category are harmful to the objective of climate change mitigation.
Criteria reference	Climate Bonds Cement Criteria

2. Manufacture of cement

Clinker decarbonisation pathways						
	2025	2030	2035	2040	2045	2050
Carbon intensity (tCO_2/ t cementitious or t cementitious product)	0.654	0.543	0.418	0.293	0.147	0

Hard-to-abate activities: Manufacture of basic iron and steel

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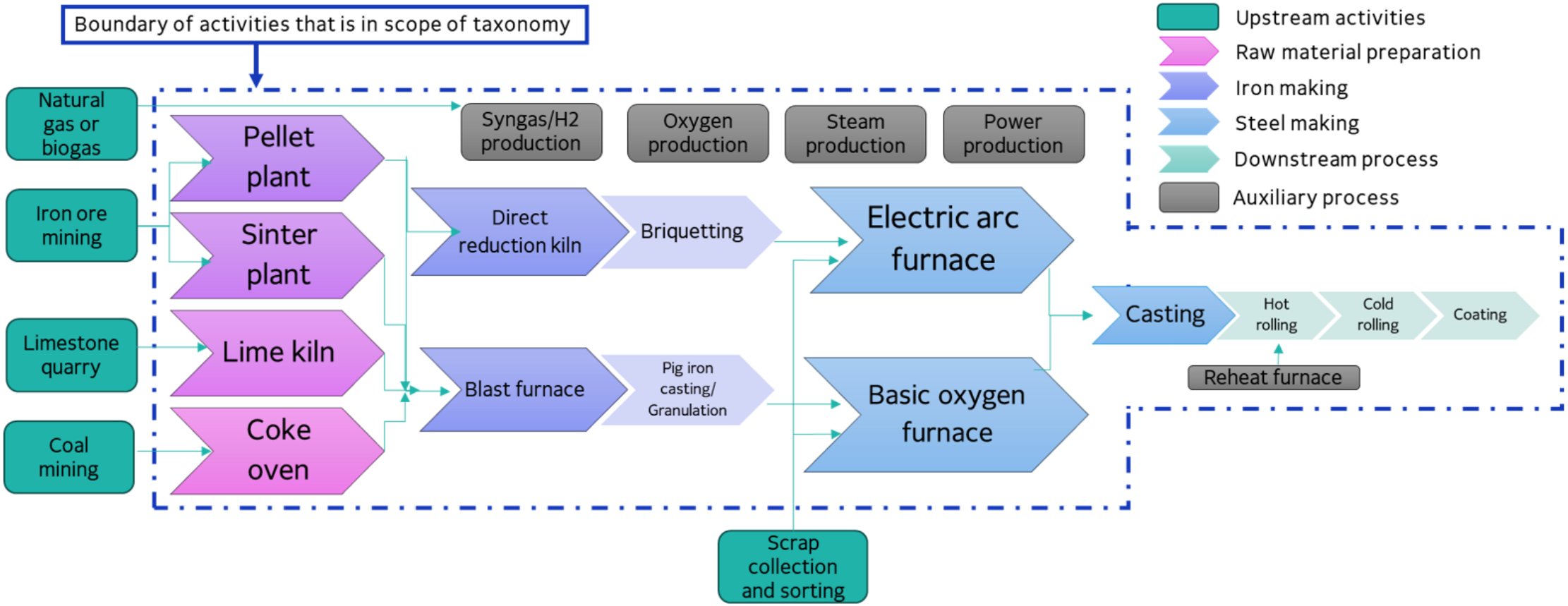
3. Manufacture of basic iron and steel

Steel production value chain and activities within the scope of the Taxonomy criteria



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3. Manufacture of basic iron and steel

Sector	Manufacturing
Activity	Manufacture of basic iron and steel
ISIC code	2410
Description	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
Objective	Climate change mitigation
Green	In order to be eligible as green, activities and facilities where they take place must comply with all of the following: • Applicable facility-specific mitigation criteria (Table *Eligible basic iron and steel production facilities*) • Applicable cross-cutting criteria (Table *Cross-cutting criteria for basic iron and steel*) Facilities using hydrogen as a fuel or reductive agent are eligible only if hydrogen complies with Taxonomy criteria for hydrogen (green category)
Amber	Option 1 Eligible facilities and assets that are mentioned in Table *Eligible basic iron and steel production facilities* but do not meet the criteria identified in this table can be classified as amber only if (must comply with all criteria): • The facility has been designed to and is implementing all necessary actions to meet the criteria for the green category by 2040 at the latest; • The facility, from the onset of its operations, is using CCS/CCUS, which operates to capture at least 20% of emissions; • A facility has a transition plan aligned with the commitments under the Paris Agreement.
	Option 2 Specific technological measures can be implemented to decarbonise steel and iron production if they: • are implemented prior to the sunset date (2040); • enable the eligible assets to meet the criteria identified in Table *Eligible basic iron and steel production facilities* (examples of compliant measures are listed in Table *Cross-cutting criteria for basic iron and steel*); • comply with applicable cross-cutting criteria listed in Table *Cross-cutting criteria for basic iron and steel*.
Red	Activities that do not comply with the green or amber category are harmful to the objective of climate change mitigation. CCUS for the production of products that release CO_2 immediately when these are used (such as in urea, carbonated beverages, or fuels), for enhanced oil recovery, and the production of other forms of fossil energy sources is harmful to the objective of climate change mitigation.
Criteria reference	Climate Bonds Steel Criteria

3. Manufacture of basic iron and steel

Eligible basic iron and steel production facilities	
Facility technology type (eligible assets)	Facility-specific mitigation criteria
BF-BOF (Blast Furnace – Basic Oxygen Furnace)	• Has to have CCS/CCUS meeting taxonomy criteria for CCS/CCUS; • CCS/CCUS should capture at least 70% of all emissions.
Smelting reduction	• Has to have CCS/CCUS meeting Taxonomy criteria for CCS/CCUS; • CCS/CCUS should capture at least 70% of all emissions.
Direct Reduced Iron (DRI)	If fossil gas-based: • Has to have CCS/CCUS meeting Taxonomy criteria for CCS/CCUS; • CCS/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).
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's total annual inputs.
DRI – EAF	If fossil gas-based: • Has to have CCS/CCUS meeting Taxonomy criteria for CCS/CCUS; • CCS/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).

3. Manufacture of basic iron and steel

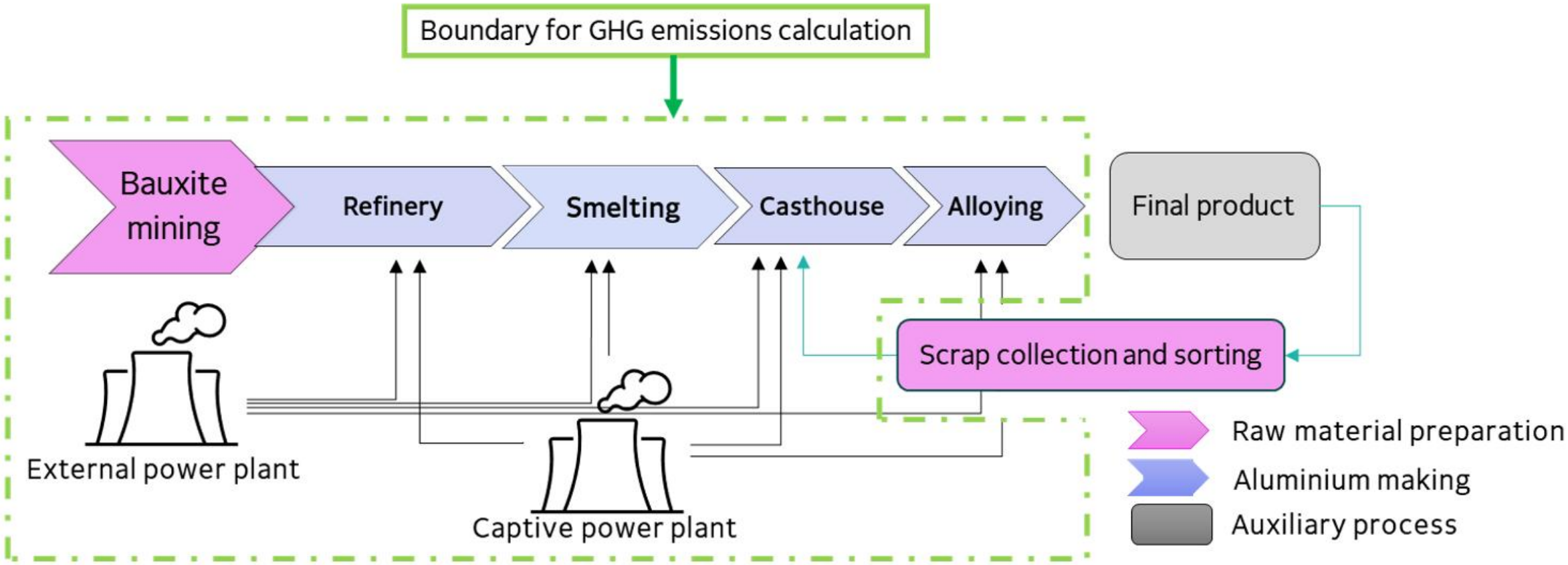
Cross-cutting criteria for basic iron and steel	
Facility technology type (eligible assets)	Facility-specific mitigation criteria
Facilities that use fossil gas as a reducing agent and/or for energy generation	Using fossil gas both as a reducing agent and for energy generation is only eligible for existing facilities prior to 2040. To qualify after 2040, such facilities would have to use fossil gas combined with CCS/CCUS measures that meet the Taxonomy criteria for CCS/CCUS 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 fossil gas (even if) combined with CCS/CCUS should demonstrate that on-site activities: MRV (Monitoring, Reporting and Verification), and mitigation measures for methane leaks as per the best practice recommended. 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 for in the GHG assessment. • Projects using fossil gas (even if) combined with CCS/CCUS should demonstrate that upstream activities provide evidence of having MRV (Monitoring, Reporting and Verification) and mitigation measures for methane leaks as per the best practice recommended.
Facilities that use coal as a reducing agent and/or for energy generation	Using coal, both as a reducing agent and fuel in the steelmaking process, is only eligible for existing facilities prior to 2040. After 2040, facilities would have to use coal combined with CCS/CCUS measures that meet the Taxonomy criteria for CCS/CCUS and utilisation of direct CO2 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 the following: • Upstream activities: Provide evidence of having MRV (Monitoring, Reporting and Verification) in place, as well as mitigation measures for methane leaks as per the best practice recommended.
Facilities that use biomass as a reducing agent	Facilities using biomass as a reducing agent are only eligible if they use the following sources of biomass: • Food or feed crops: If food crops are used, they must be certified as a renewable feedstock (defined as feedstock certified by Roundtable on Sustainable Biomaterials or International Sustainability and Carbon Certification) • Plantation wood: the wood plantation shall demonstrate to meet the requirements set out for “Forestry plantation” activities of the Taxonomy. • Industrial crops. AND Primary organic streams are only eligible as fuel if certified as sustainable by Roundtable on Sustainable Biomaterials or International Sustainability and Carbon Certification. Wood is eligible only if produced on a sustainable plantation as defined by the Thailand Taxonomy’s Forestry Criteria
Facilities using CCS/CCUS	Facilities using CCS/CCUS are only eligible if the CCS/CCUS meets Taxonomy criteria for CCS/CCUS 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). CO2 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.

Hard-to-abate activities: Manufacture of aluminium

THAILAND TAXONOMY

4. Manufacture of aluminium

Scope of activities covered by the manufacture of aluminium criteria (primary aluminium)



THAILAND TAXONOMY

4. Manufacture of aluminium

Sector	Manufacturing
Activity	Manufacture of aluminium
ISIC code	2420
Description	Manufacture of aluminium through primary alumina (bauxite) process or secondary aluminium recycling.
Objective	Climate change mitigation; Resource resilience and circular economy promotion
Green	Primary aluminium production where the economic activity complies with all of the following criteria is aligned with the taxonomy if all of the following requirements are met: • the GHG emission intensity does not exceed thresholds presented in Table *Aluminium decarbonisation pathway*; • the average carbon intensity for the consumed electricity does not exceed parameters established for green electricity production as defined by Thailand Taxonomy; • the electricity consumption for the manufacturing process does not exceed 14.86MWh/t Al. Secondary aluminium production is automatically eligible.
Amber	Specific technological measures can be implemented to bring aluminium production emission and energy intensity in line with the requirements of the green category if: • They are implemented before the established sunset date (2040); • They decrease either emission intensity or electricity consumption intensity of the production process; • The facility has a transition plan aligned with the commitments under the Paris Agreement.
Red	Activities that do not comply with the green or amber category are harmful to the objective of climate change mitigation.
Criteria reference	EU Manufacture of Aluminium Criteria; Singaporean Taxonomy

4. Manufacture of aluminium

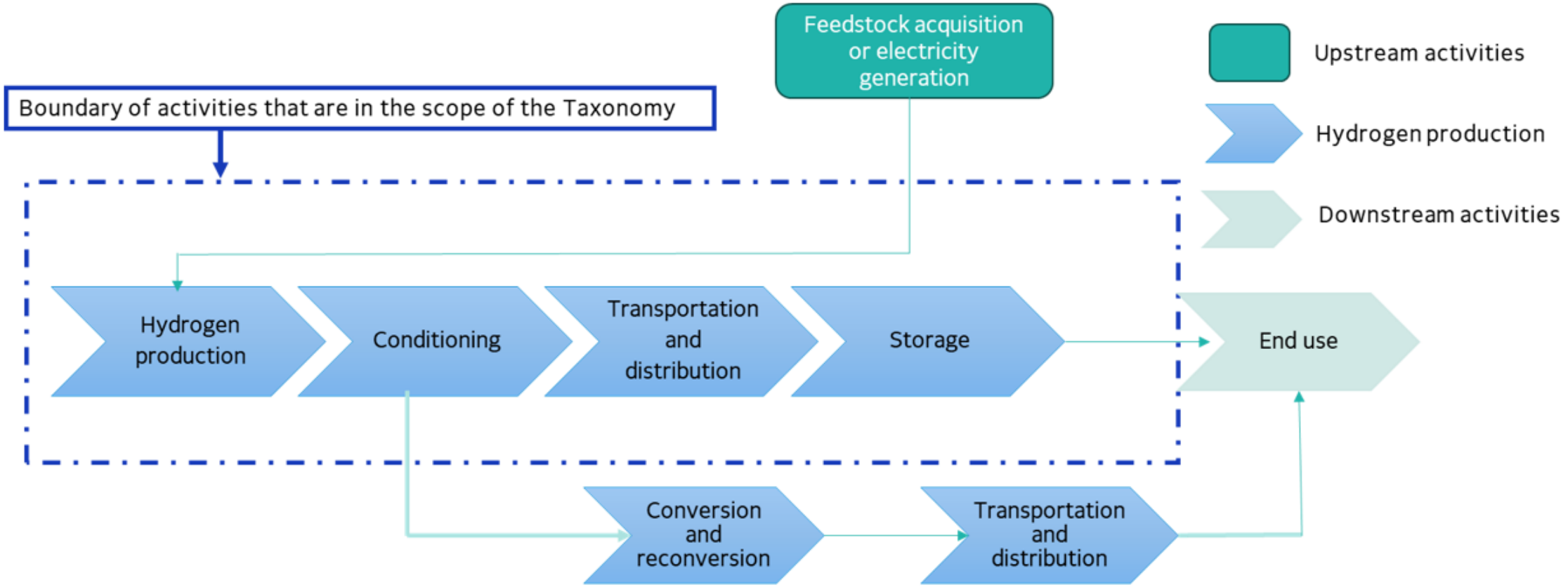
Aluminium decarbonisation pathway					
Asset Type	CO_2e emissions intensity (tonnes CO_2e per tonne of aluminium manufactured)				
	2025	2030	2035	2040	2050
Production of primary aluminium through electrolysis	1.484	1.185	0.826	0.520	0.311

Hard-to-abate activities: Manufacture of hydrogen

THAILAND TAXONOMY

5. Manufacture of hydrogen

Hydrogen production value chain and activities within the scope of the Taxonomy criteria



THAILAND TAXONOMY

5. Manufacture of hydrogen

Sector	Manufacturing
Activity	Manufacture of hydrogen
ISIC code	2011
Description	Manufacture of low-carbon hydrogen
Objective	Climate change mitigation
Green	The facility must comply with all of the following requirements: • Hydrogen production must meet specific carbon intensity thresholds (Table Hydrogen carbon intensity thresholds); • Facilities must meet relevant requirements listed in Table in the Annex depending on the feedstock, electricity source and application of CCS/CCUS; • Facilities that meet the specific intensity thresholds presented in Table in the Annex do not have to meet the following requirements associated with CCS/CCUS listed in Table in the Annex: 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%. Note: The use of fossil gas as a feedstock by facilities following 2040 is not recommended but given substantial uncertainty regarding the availability of hydrogen that is aligned with the Thailand Taxonomy (green category), it is not a criterion at this stage. This should be re-evaluated in future iterations.
Amber	Specific technological measures can be implemented to decarbonise hydrogen production if: • They are implemented before the established sunset date (2040); • They are included in the list and comply with the criteria stipulated in Table in the Annex; • A facility has a transition plan aligned with the commitments under the Paris Agreement.
Red	Facilities or measures for which: • The energy source is oil, coal, or coal derivatives; • The feedstock is coal or coal derivatives; • The energy source is biomass from primary sources; • The use of wood and other dedicated crops is enabled; are harmful to the objective of climate change mitigation.
Criteria reference	Climate Bonds Hydrogen Criteria; Singapore Taxonomy

5. Manufacture of hydrogen

Hydrogen carbon intensity thresholds				
Asset Type	2025	2030	2040	2050
Production of hydrogen ($kgCO_2e/kgH2$)	3	1.5	0.6	0

Interim activities: Manufacture of plastics in primary form

THAILAND TAXONOMY

6. Manufacture of plastics in primary form

Sector	Manufacturing
Activity	Manufacture of plastics in primary form
ISIC code	2013
Description	Manufacture of resins, plastics materials and non-vulcanisable thermoplastic elastomers, the mixing and blending of resins on a custom basis, as well as the manufacture of non-customised synthetic resins.
Objective	Climate change mitigation; Resource resilience and circular economy promotion
Green	The activity must comply with at least one of the following: • production of primary plastics from post-consumer recycled (PCR) plastic waste using mechanical recycling methods; • In cases where primary plastic cannot be processed through mechanical recycling or is not economically viable, all primary plastic must be produced through environmentally sound chemical recycling. Additionally, it must have a lower life-cycle greenhouse gas (GHG) emission compared to production using fossil-based raw materials. • Primary plastic produced partially or entirely from renewable raw materials must be certified (or domestic/international certification equivalent) by: - Roundtable on Sustainable Biomaterials (RSB) or - International Sustainability and Carbon Certification (ISCC) Additionally, it must have a lower life-cycle GHG emission than production using fossil-based raw materials. Life-cycle greenhouse gas emissions must be calculated using ISO 14067:2018, ISO 14064-1:2018 or comparable. The activity must comply with both of the following: • The activity does not use food or feed crops from the land that was converted from high-carbon stock land after 01.01.2010. • Wood biomass must come from plantations that comply with “Forestry Plantation” criteria of the Thailand Taxonomy
Amber	N/A
Red	• Primary plastic polymer production is harmful to the objective of climate change mitigation. • Activities that do not comply with the green or amber category are harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Manufacture of Plastics in Primary Form Criteria

Enabling activities

- Manufacture of batteries
- Manufacture of renewable energy technologies and products
- Manufacture of low carbon technologies for transport
- Manufacture of energy efficiency equipment for buildings
- Manufacture of other low-carbon technologies

THAILAND TAXONOMY

Manufacture of batteries

Sector	Manufacturing
Activity	Manufacture of batteries
ISIC code	2720
Description	Manufacture or recycling of rechargeable batteries, battery packs and accumulators for transport, stationary and off-grid energy storage, and other industrial applications; Manufacture of respective components (battery active materials, battery cells, casings, and electronic components).
Objective	Climate change mitigation; Resource resilience and circular economy promotion
Green	The activity complies with one of the following criteria: • The economic activity manufactures rechargeable batteries, battery packs and accumulators (and their respective components), including from secondary raw materials. • The activity repurposes batteries that have been produced • Recycling of end-of-life batteries
Amber	N/A
Red	N/A
Criteria reference	EU Taxonomy Manufacture of Batteries Criteria

Manufacture of renewable energy technologies

Sector	Manufacturing
Activity	Manufacture of renewable energy technologies
ISIC code	Various codes
Description	Production of technologies, components and parts that are necessary for functioning of low-carbon or renewable energy technologies as defined by the Energy section of Thailand Taxonomy.
Objective	Climate change mitigation; climate change adaptation; sustainable use and protection of marine and water resources; pollution prevention and control
Green	The economic activity manufactures renewable energy technologies that meet the green criteria set out in Thailand Taxonomy (green category)
Amber	N/A
Red	Manufacture of components, machinery and equipment used solely for the extraction, production, or distribution of fossil fuels is harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Manufacture of Renewable Energy Technologies Criteria

Manufacture of low-carbon technologies for transport

Sector	Manufacturing
Activity	Manufacture of low-carbon technologies for transport
ISIC code	Various codes
Description	Manufacturing, repair, maintenance, retrofitting, repurposing, and upgrade of low carbon transport vehicles, rolling stock and vessels, as well as components that help vessels to transition from amber to the green category
Objective	Climate change mitigation
Green	Manufacture of low-carbon transport vehicles and their respective key components, fleets and vessels meeting the criteria set out in Thailand Taxonomy (Green and Amber categories) are eligible.
Amber	N/A
Red	Manufacture of internal combustion engines-based vehicles is harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Manufacture of Low-Carbon Technologies for Transport Criteria

Manufacture of energy efficiency equipment for buildings

Sector	Manufacturing
Activity	Manufacture of energy efficiency equipment for buildings
ISIC code	Various codes
Description	Manufacture of energy efficiency equipment for buildings
Objective	Climate change mitigation; Climate change adaptation (depending on whether manufactured equipment supports mitigation or adaptation efforts)
Green	The economic activity manufactures one or more of the following products and their key components necessary to support activity “Installation, maintenance and repair of special-purpose building equipment” from Thailand Taxonomy, including (but not limited to): • light sources rated in the highest class of energy efficiency in accordance with local market standards ; • space heating and domestic hot water systems rated in the highest two populated classes of energy efficiency in accordance with local market standards; • cooling and ventilation systems rated in the highest two populated classes of energy efficiency in accordance with local market standards; • presence and daylight controls for lighting systems; • heat pumps compliant with the technical screening criteria set out in the Taxonomy (green category); • facade and roofing elements with a solar shading or solar control function, including those that support the growing of vegetation; • energy-efficient building automation and control systems for residential and non-residential buildings; • zoned thermostats and devices for the smart monitoring of the main electricity loads or heat loads for buildings and censoring equipment; • 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; • district heating exchangers and substations compliant with the district heating/cooling distribution activity set out in the Taxonomy (green category); • products for smart monitoring and regulating of heating systems and censoring equipment.
Amber	N/A
Red	Manufacture of building equipment that facilitates the utilisation of fossil fuels is harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Manufacture of Energy Efficiency Equipment for Buildings

Manufacture of other low-carbon technologies

Sector	Manufacturing
Activity	Manufacture of other low-carbon technologies
ISIC code	Various codes
Description	Manufacture of household goods that fall into the highest class of national energy efficiency scheme and manufacture of technologies aimed at substantial GHG emission reductions in other sectors of the economy
Objective	Climate change mitigation
Green	The activity manufactures one of the following: • Household goods that meet the highest performance level for a given good according to the Energy Label No.5 rating system or Energy Saving Label rating system . • Technologies that are aimed at and demonstrate substantial life cycle GHG emission savings compared to the best performing alternative technology/product/solution available on the market (including technologies and equipment needed to make substantial contribution to the objectives of the Thailand Taxonomy). • Equipment for waste treatment in line with the Taxonomy criteria for Waste management sector
Amber	N/A
Red	N/A
Criteria reference	EU Taxonomy Manufacture of Other Low-Carbon Technology Criteria

CCS/CCUS-related activities

THAILAND TAXONOMY

CCS/CCUS: Point-source capture of CO_2

Sector	CCS/CCUS
Activity	Point-source capture of CO_2
ISIC code	No code
Description	Capture of CO_2 from a point source in an industrial or power generation facility
Objective	Climate change mitigation
Green	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 Taxonomy (for example, in the Manufacturing section) • 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. The applicability of this option to each individual sector can be found in a specific activity article (relevant to sections related to the production of cement, basic iron and steel, aluminium, hydrogen and basic chemicals).
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 Thailand Taxonomy (for example, in the Manufacturing section) • 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, basic iron and steel, aluminium, hydrogen, and basic chemicals as well as energy generation from fossil gas).
Red	N/A
Criteria reference	Singaporean Taxonomy

Transportation of captured CO_2

Sector	CCS/CCUS
Activity	Transportation of captured CO_2
ISIC code	No code
Description	Captured CO_2 transportation via pipelines, ships, railroad cisterns or trucks
Objective	Climate change mitigation
Green	The activity complies with all of the following criteria: • The CO_2 transported from the installation where it is captured to the injection point leads to: ○ If transported by sea: CO_2 leakages are less than 3% of the mass of CO_2 transported regardless of the distance and less than 2% after 2040 OR ○ If transported via pipeline: CO_2 leakages are 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 the activity «Permanent sequestration of captured CO_2» article; • 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.
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 «Permanent sequestration of captured CO_2»; • 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. • The sunset date for this activity is designated as 2040.
Red	Transportation or retrofitting of transportation systems that do not comply with relevant green and amber criteria are harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Transport of CO2 Criteria; Singaporean Taxonomy

Permanent sequestration of captured CO_2

Sector	CCS/CCUS
Activity	Permanent sequestration of captured CO_2
ISIC code	No code
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
Green	Construction or operation of a permanent CO_2 storage facility is eligible if the facility complies with requirements and recommendations of ISO 27914:2017 (or any other comparable national or international standard) for geological storage of CO_2.
Amber	N/A
Red	Construction of new facilities that fail to comply with ISO 27914:2017 (or any other comparable national or international standard) is harmful to the objective of climate change mitigation.
Criteria reference	EU Taxonomy Underground Permanent Geological Storage of CO2 Criteria; Singaporean Taxonomy

Utilisation of captured CO_2

Sector	CCS/CCUS
Activity	Utilisation of captured CO_2
ISIC code	No code
Description	Utilisation of carbon captured by point-source capture or direct air capture of CO_2
Objective	Climate change mitigation
Green	Captured CO_2 can be used for the manufacture of durable products (e.g., construction materials stored in buildings, polymers or recyclable products that will not be incinerated as a final disposal alternative) or for implementing other Taxonomy-aligned activities (e.g. mixing it with cement or adding it to chemicals).
Amber	N/A
Red	• Use of CO_2 for products that release the CO_2 immediately when the products are used (such as in urea, carbonated beverages, or fuels) is harmful to the objective of climate change mitigation. • Use of CO_2 for enhanced oil recovery, and the production of other forms of fossil energy sources is harmful to the objective of climate change mitigation.
Criteria reference	Activity card is created for Thailand Taxonomy

Auxiliary transitional activity

THAILAND TAXONOMY

Introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy

Sector	Manufacturing
Activity	Introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy
ISIC code	Various codes
Description	Introduction of energy efficiency or electrification measures and change of energy sources in manufacturing activities that lead to substantial reduction of emission
Objective	Climate change mitigation
Green	Activities whose emission intensity figures are on the trajectory developed using the latest version of the SBTi methodology for this type of activity are compliant with the green category of Thailand Taxonomy. This option is only available for activities in the manufacturing sector that do not have their own activity card in this Taxonomy.
Amber	Measures to improve energy efficiency within the manufacturing sector (as defined by the last version of ISIC system) can be recognised as transitional (amber) under Thailand Taxonomy if the activity does not have specific criteria included in the taxonomy, and: Option 1 (must comply with all three): • The applied measures increase energy efficiency (energy input per unit of output) by at least 40% relative to the energy efficiency of facility baseline before the measures were applied. Final reduction of the emission intensity must be achieved no later than the Taxonomy sunset date for amber activities (2040). • If the production facility where the activity takes place uses hydrocarbons in any form (fuel or feedstock), the application of measures shall lead to a reduction in the use of hydrocarbons. • The facility has a transition plan that is consistent with the Paris Agreement commitments. Option 2 (must comply with both): • Measures taken lead to electrification of the main production processes; • Measures implemented lead to change the type of electricity consumed by the enterprise from non-renewable to renewable (compliant with the green category of the Thai Taxonomy). Acquisition of PPA certificate does not count for this criterion, the manager of the facility must provide proof of direct connection to a renewable energy source or proof of in situ renewable installation. Any % of replacement of non-renewable electricity with renewable one is considered compliant with this criterion.
Red	Application of energy efficiency measures for the activities associated with: • Manufacture of equipment for the extraction of oil, gas, and coal; • Manufacture of equipment for transportation, storage, and processing of any hydrocarbons; • Manufacture of vehicles, ships, planes with internal combustion engines. • Manufacture of weapons and weapon systems (ISIC Code 2520) is harmful to the objective of climate change mitigation.
Criteria reference	Designed for Thailand Taxonomy, target is based on Draft Energy Efficiency Plan 2024

Application of DNSH criteria to Thailand taxonomy activities

No.	Activity	Climate change mitigation	Climate change adaptation	Sustainable use and protection of marine and water resources	Promotion of resource resilience and transition to a circular economy	Pollution prevention and control	Protection and restoration of biodiversity and ecosystems
1.	Manufacture of basic chemicals	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
2.	Manufacture of cement	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
3.	Manufacture of basic iron and steel	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
4.	Manufacture of aluminium	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
5.	Manufacture of hydrogen	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
6.	Manufacture of plastics in primary form	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
7.	Manufacture of batteries	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
8.	Manufacture of renewable energy technologies	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
9.	Manufacture of low-carbon technologies for transport	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
10.	Manufacture of energy efficiency equipment for buildings	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
11.	Manufacture of other low-carbon technologies	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
12.	CCS: Point-source capture of CO2	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
13.	Transportation of captured CO2	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
14.	Permanent sequestration of captured CO2	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
15.	Utilisation of captured CO2	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic
16.	Introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy	Generic	Generic	Generic	Generic + Specific	Generic + Specific	Generic

Do No Significant Harm (DNSH)

Generic DNSH Requirements	
Objective	Description
Climate change mitigation	For an activity to demonstrate that it will do no significant harm with respect to factors related to climate change mitigation, the following must be implemented: • The manager should calculate Scope 1 and Scope 2 emissions related to the activity as well as Scope 3 emissions if material to the sector in question. Estimation of emissions referring to credible international or national proxies such as Intergovernmental Panel on Climate Change (IPCC) and Thailand Greenhouse Gas Management Organization (TGO) may be used.; • The manager should identify potential risk to other people or assets to directly increase their GHG emissions as the result of the activity's implementation.; • The manager should take actions to minimise GHG emissions associated with the implementation of the activity, including, but not limited to installation of monitoring and leak prevention measures (if applicable).
Climate change adaptation	• Any activity seeking to demonstrate its compliance with DNSH related to climate change adaptation must conduct a Climate Risk and Vulnerability Assessment (CRVA) in accordance with the guidance provided in Annex III: Climate Risk and Vulnerability Assessment (CRVA). • The manager of the activity should strive to minimise adaptation risks revealed throughout the CRVA. Adaptation solutions should support system adaptation that takes into consideration regional and national adaptation strategies and plans.
Sustainable use and protection of marine and water resources	• Risks associated with water consumption and water quality must be identified, assessed and mitigated to the biggest possible extent. Water risk analysis tools must be used for this purpose (e.g. risk assessments by national environmental authorities, water footprint, WWF Water Risk Filter, WRI Aqueduct or comparable). • If assets or activities are located in water-stressed areas, may be affected by floods or water quality issues, ensure that water use and conservation management plans, developed in consultation with relevant stakeholders, have been implemented. • Ensure that water use/conservation management plans (including monitoring, reporting and verification methodology), developed in consultation with relevant stakeholders, have been developed and implemented as per international standards and guidelines. (e.g., UNEP Framework for Freshwater Ecosystem Management; ISO 13.060: Water Quality or comparable).

Do No Significant Harm (DNSH)

Generic DNSH Requirements	
Objective	Description
Promotion of resource resilience and transition to a circular economy	• In order to assess whether the activity in question is doing significant harm to this objective, a lifecycle assessment inline with ISO 14040 and ISO 14044 (or any comparable international methodology) should be conducted on the products, material, process, or other measurable activities. • The activity manager should implement concrete demonstrable measures to maximise the efficient use, reduction, repair, recycling and reuse of materials during the activity operational life cycle (e.g. through contractual agreements with recycling companies and integration of the cost of recycling), proper treatment and waste disposal (e.g. proper end-of-life management of batteries) and compliance, as a producer, with Extended Producer Responsibility standards must be demonstrated. • New installations must be designed and manufactured for high durability, easy to dismantle, refurbishment and recycling to the extent possible. Potential of repair of facilities and equipment, and the accessibility and interchangeability of the activity's equipment components must be ensured. • The activity shall apply relevant national regulations and international guidelines associated with retirement and dismantlement plans for plants and infrastructure related to the activity.

Specific DNSH Requirements	
Objective	Description
Promotion of resource resilience and transition to a circular economy	The activity manager must strive to minimise and manage waste and material use, especially hazardous manufacturing waste as per international standards and guidelines (e.g., 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 or comparable).

Do No Significant Harm (DNSH)

Generic DNSH Requirements	
Objective	Description
Pollution prevention and control	• A recognised environmental management system (ISO 14001, EMAS, or comparable) should be adopted for the enterprise where the activity takes place. • Ensure the activity undergoes screening to assess whether it leads to the manufacture, placing on the market, or use of dangerous substances (as defined by relevant Thailand laws and regulations), whether on their own, in mixtures, or in articles, and causes significant harm to the environment. • Integrated Environmental Assessment in line with the UN Environment Programme's Guidelines for Conducting Integrated Environmental Assessments5 must be conducted for the activity to specifically identify and manage environmental detrimental risks related to the emission of pollutants, heat, light or noise to the environment. • It must be demonstrated that neither the construction nor operation of the activity is emitting dangerous substances, noise, light or heat in excess of those allowed by relevant national or international regulations. Furthermore, the achievement of applicable air, water and soil quality targets should not be hampered due to the activity. • In the case that the construction and/or operation of the activity is known to cause significant harm to the environment, the activity must identify risk-based measures to prevent the pollution, and safely remediate any contamination caused by the activity. • Based on the EIA, ensure that management plans are developed for every pollutant causing significant harm. Management plans are to be drafted in consultation with relevant stakeholders. Furthermore, Monitoring, Reporting and Verification strategies are to be implemented to monitor the compliance and effectiveness of the mitigation measures.

Do No Significant Harm (DNSH)

Specific DNSH Requirements	
Objective	Description
Pollution prevention and control	• A recognised environmental management system (ISO 14001, EMAS, or comparable) must be adopted for the enterprise where the activity takes place. • Production of steel: ensure emissions to air, water and soil are prevented / minimised as per international standards and guidelines (e.g. for pH, total suspended solids (TSS), chemical oxygen demand (COD), chromium (total) and heavy metals, for sulphur dioxide – SO2, nitrogen oxide – NOx, particulate matter, polychlorinated dibenzo-dioxins/furans, mercury (Hg), hydrogen chloride (HCL) and hydrogen fluoride (HF). These guidelines may include 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 or any other comparable and applicable guidelines. • Production of cement: a waste management plan must be implemented to minimise and manage waste and material use as per international standards and guidelines (e.g., 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); ETP Clean Energy Technology Guide). • Production of chemicals, hydrogen and plastics in primary form: ensure emissions to air, water and soil are prevented/minimised as per international and national standards, e.g. 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. • Production of aluminium: ensure emissions to air (e.g. sulphur dioxide - SO2, 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 (e.g., 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). • Manufacture of plastics in primary form: Plastic producers should implement and maintain a certified Extended Producer Responsibility (EPR) scheme. Upon the enactment of relevant legislation, producers are required to comply with all applicable regulatory provisions. This scheme must ensure that producers bear financial and/or operational responsibility for the collection, sorting, treatment, and recycling of plastic products and packaging at the post-consumer stage of their lifecycle. • CCS-related activities: 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. Release of CO2 during operation must be prevented by implementing permanent leakage detection systems.

Do No Significant Harm (DNSH)

Generic DNSH Requirements	
Objective	Description
Protection and restoration of biodiversity and ecosystems	• The determination of whether a biodiversity related environmental impact assessment (EIA) is required for a particular activity or not is made through a case-by-case examination of the activity6. If applicable, an Integrated Environmental Assessment (EIA) in line with the UN Environment Programme's Guidelines for Conducting Integrated Environmental Assessments must be conducted for the activity. • The activity manager must mitigate all potential risks for biodiversity and ecosystems associated with activity implementation that were identified throughout the EIA. • Ensure the Biodiversity and Ecosystem Management Plans are developed in consultation with relevant stakeholders. Furthermore, ensure that the Monitoring, Reporting and Verification strategies are implemented to monitor the compliance and effectiveness of the mitigation measures. • New financed facilities and infrastructure should not be located in ecosystems that are strategic for food security, rich in biodiversity, or that serve as habitat for endangered species (flora and fauna) that are in the Thailand lists of nationally protected areas or on the IUCN Red List. Museums or technical facilities (specifically electronic communications network equipment and facilities used to originate, process, transfer, transmit or receive electronic communications calls and information signals) necessary for their functioning are exempt from this requirement. • For sites and operations located in or near biodiversity sensitive areas (defined as areas included into, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment must be carried out in line with the criteria set by IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources9. For these sites, a long-term biodiversity monitoring and assessment programme must be adopted.

Minimum Social Safeguards (MSS)

The eligible asset or activity must ensure that it does not generate a negative social impact and observe minimum social safeguards (MSS). For this, the owner of the activity must adhere to the relevant local regulatory framework and policies, relevant internationally recognised principles and conventions, and have a social management system in place. The minimum number of laws, standards and regulations that should be observed by the owner includes (including, but not limited to):

- United Nations Guiding Principles on Business and Human Rights (2011)

International Labour Organisation core conventions:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
- Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol)
- Abolition of Forced Labour Convention, 1957 (No. 105)
- Minimum Age Convention, 1973 (No. 138)
- Worst Forms of Child Labour Convention, 1999 (No. 182)
- Equal Remuneration Convention, 1951 (No. 100)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)

International Bill of Human Rights conventions:

- Universal Declaration of Human Rights (1948)
- International Covenant on Civil and Political Rights (1966)
- International Covenant on Economic, Social and Cultural Rights (1966)

The practices of activity owner must also be in line with the following IFC Performance Standards, where applicable:

1. Performance Standard 1: Assessment and management of environmental and social risks and impacts.
2. Performance Standard 2: Labour and working conditions
3. Performance Standard 3: Resource efficiency and pollution prevention
   (in parts where it does not contradict to the DNSH requirements of the present Taxonomy)
4. Performance Standard 4: Community Health and Safety
5. Performance Standard 5: Land Acquisition and Involuntary Resettlement
6. Performance Standard 6: Biodiversity Conservation
7. Performance Standard 7: Indigenous Peoples
8. Performance Standard 8: Cultural Heritage

Example of User Application

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Examples of a wide range of Thailand Taxonomy applications

Corporate Reporting & Strategy

- Sustainability Reporting: Companies can report the percentage of their economic activities (e.g. CapEx, revenue) that meet the taxonomy criteria.
- Strategic Planning: Identifying areas for green investment and transition within the company to improve taxonomy alignment over time.
- Supply Chain Management: Encouraging suppliers to adopt more sustainable practices that align with taxonomy criteria.

Financial Products

- Structuring Green Bonds/Loans: Defining eligible projects and activities for which proceeds can be used.
- Creating Sustainable Investment Funds: Setting criteria for portfolio selection.
- Benchmarking: Comparing the sustainability level of different financial products.

Investment Decisions

- Screening: Identifying investments that meet specific environmental criteria.
- Due Diligence: Assessing the environmental performance and risks of potential investments or loans.
- Portfolio Allocation: Shifting capital towards taxonomy-aligned assets.

Policymaking

- Developing Green Standards and Incentives: Using the taxonomy as a basis for official green labels for financial products or services.
- Informing Public Spending: Guiding government investments and public procurement towards sustainable options.
- Monitoring National Progress: Tracking the growth of the green economy.

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5 Steps to Use Thailand Taxonomy

1. List your activities Break the entity/project into activities.	Manufacture of batteries	Manufacture of hydrogen (with coal as feedstock)	Manufacture of Cement	**Consulting services**
2. Check the coverage Define activities from the breakdown, use the Section 4 of the Thailand Taxonomy.	**Covered** under section Enabling Activities	**Covered** in Red List Hard-to-Abate Activities	**Covered** under section Hard-to-Abate Activities	**Not Covered**
3. Color your activities Categorize the activities, see if they are in line with green / amber criteria defined in the Taxonomy.		 Fossil fuel-based activities		
4. 'Do no harm' to others? Define whether activities that meet green or amber criteria also meet DNSH and MSS requirements.	**Meet both DNSH and MSS requirements**		**Does not meet DNSH/MSS requirements.** *Adopt a plan to remediate in 3 years*	
5. Conclude the evaluation Prepare a final conclusion and Supplementary reports.	 **Eligible as Green**	 **Eligible as Red**	 **Eligible as Amber** Harm should be remediated within the timeframe in the plan. If not, the status will be revoked.	 Out of scope Thailand Taxonomy
Example of adopting in the financial tool	can apply for Green loan or bond according to the criteria set by financial regulators	cannot apply for sustainable finance instrument	can apply for transition loan or bond according to the criteria set by financial regulators	

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Case Study: Sugarcane and sugar factory

Business profile	Core Business: A medium-sized factory in a key sugarcane-growing province of Thailand, the company oversees the full sugar production process — from cultivating its own cane and sourcing from local farmers to processing, energy generation from bagasse, wastewater management, packaging, and factory maintenance.
GHG emissions hotspots	Scope 1: Emissions from on-site farming (fertiliser use, machinery), bagasse combustion, internal transport, and wastewater treatment. Scope 2: Purchased electricity for factory operations, mainly during off-season or when cogeneration is limited. Scope 3: Emissions from contract farming, cane transport, packaging production, and sugar distribution.

Existing operations of sugar manufacturing business

- Production of sugarcane in own farmland
- Operation of sugar manufacturing factory
- Operation of wastewater treatment plant

Planned Activities

1. Install drones and precision agriculture equipment to improve the practice of sugarcane production
2. Acquisition and Replacement of Freight Transport with Electric Vehicles (EVs)
3. Improve and upgrade equipment/machines in the factory to save energy
4. Construction a cogeneration of heat and power plant using baggage residual from the factory
5. Upgrade the wastewater treatment plant to be able to reuse the effluent in the factory

Future operations of sugar manufacturing business

- Greener Plantation and cultivation of sugarcane in own farm
- Greener Operation of sugar manufacturing factory
- Greener Operation of wastewater treatment plant
- New Operation of a biomass cogeneration of heat and power plant

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Case Study: Sugarcane and sugar factory

Defining taxonomy alignment

1. Install drones and precision agriculture equipment to decrease inefficiencies and save resources	Relevant Sector under Thailand Taxonomy: Agriculture
	Relevant Activity under Thailand Taxonomy: Sustainable production of sugar cane
	Relevant Environmental Objective under Thailand Taxonomy: • EO1: Climate Change Mitigation • E02 Climate Change Adaptation
	Taxonomy-aligned assessment: the farm prepares a list of documents that needs to prove that the transformation project that they want to implement is compliant with the Taxonomy. First, the farm checks whether it complies with all relevant national laws and regulations regarding the type of production. The farm provides a statement of compliance with them, listing all relevant laws for the accepting party to review. After that, the farm selects the practice from the relevant activity table (Table 3 of the Agricultural annex), provides its description and reference to the Taxonomy document. After that, the farm prepares an Integrated Farm Management Plan (IFMP) which includes a statement of compliance with all relevant DNSH requirements and a statement of substantial contribution to the taxonomy objectives prepared in line with the examples provided in the Taxonomy. All these documents are submitted to the accepting party.
	Reporting: Inputs required to implement this transformation such as drones, auxiliary equipment, precision agriculture equipment and training can be procured, and the funds that were used to procure them can be labeled as "Taxonomy-aligned CAPEX." Ongoing operating expenses related to these specific practices can be reported as Taxonomy-aligned OpEx. Revenues coming from selling the farm production (sugarcane in this case) after the transformation project is completed can be reported as Taxonomy-aligned Revenue. However, only revenues from farm products that were transformed throughout the transformation project are considered aligned. This product-level alignment lasts for two years after project completion, after which the farm must repeat or implement new practices to maintain the status. If the farm grows other crops, only the revenue from the compliant sugarcane would be aligned.

Case Study: Sugarcane and sugar factory

Defining taxonomy alignment

2. Acquisition and Replacement of Freight Transport with Electric Vehicles (EVs)	Relevant Sector under Thailand Taxonomy: Transportation
	Relevant Activity under Thailand Taxonomy: Freight transport by road
	Relevant Environmental Objective under Thailand Taxonomy: • EO1: Climate Change Mitigation
	Taxonomy-aligned assessment: This activity can be classified as "Green" if it complies with the following criteria: direct (tailpipe) CO2 emissions of vehicles are zero AND vehicles are not dedicated to fossil fuel transport, which is likely to be the case. To be taxonomy-aligned, the owner must also comply with Do No Significant Harm (DNSH) criteria and Minimum Social Safeguards (MSS).
	Reporting: The expenditure for acquiring and replacing the freight transport vehicles with compliant EVs can be reported as Taxonomy-aligned CapEx. Operating expenses for these specific compliant EVs (e.g., maintenance) can be reported as Taxonomy-aligned OpEx. If the activity of providing freight transport using these compliant EVs is considered Taxonomy-aligned (Green), then a proportion of the net turnover derived from this specific aligned activity can be reported as Taxonomy-aligned Revenue.

Case Study: Sugarcane and sugar factory

Defining taxonomy alignment

3. Improve and upgrade equipment/machines in the factory to save energy	Relevant Sector under Thailand Taxonomy: Manufacturing
	Relevant Activity under Thailand Taxonomy: Auxiliary transition activity
	Relevant Environmental Objective under Thailand Taxonomy: • EO1: Climate Change Mitigation
	Taxonomy-aligned assessment: This activity can be classified as "Green" or “Amber” if it complies with the following criteria under the activity card in that Taxonomy: Introduction of energy efficiency and decarbonisation measures in manufacturing activities not specified in the Thailand Taxonomy. To be taxonomy-aligned, the owner must also comply with Do No Significant Harm (DNSH) criteria and Minimum Social Safeguards (MSS).
	Reporting: Expenditures for these energy-saving equipment upgrades can be reported as “Taxonomy-aligned CapEx” if they contribute to meeting the Green or Amber criteria for this auxiliary activity and comply with DNSH/MSS. Operating expenses associated with these upgraded machines and the relevant operational changes can be reported as Taxonomy-aligned OpEx. *Revenue reporting* is linked to the overall sugar manufacturing business. The Taxonomy-aligned revenue is the proportion of turnover from aligned activities. If these energy efficiency improvements, combined with other potential measures, lead to the entire sugar manufacturing activity being assessed as Taxonomy-aligned (SBTi trajectory for Green, OR one of the two options for Amber) under this auxiliary activity, then a proportion of the total revenue from the sugar manufacturing business could be reported as Taxonomy-aligned.

Case Study: Sugarcane and sugar factory

Defining taxonomy alignment

4. Construction a cogeneration of heat and power plant using baggage residual from the factory	Relevant Sector under Thailand Taxonomy: Energy
	Relevant Activity under Thailand Taxonomy: Cogeneration of heating/cooling and power using renewable sources of energy
	Relevant Environmental Objective under Thailand Taxonomy: • EO1: Climate Change Mitigation
	Taxonomy-aligned assessment: To be aligned, this plant must meet the specific TSC defined for this type of energy generation. *Status Potential:* Aligned (potentially Green or Amber depending on the specific TSC defined for this activity) if relevant TSC and DNSH/MSS are met or planned for remediation.
	Reporting: The expenditure for the construction of this cogeneration plant can be reported as Taxonomy-aligned CapEx if the completed plant meets the Green criteria for this activity and complies with DNSH/MSS. Ongoing operating expenses for running the compliant cogeneration plant are eligible as Taxonomy-aligned OpEx. The revenue generated by this activity (e.g., selling excess power/heat back to the grid) can be reported as Taxonomy-aligned Revenue if the activity is assessed as Green.

Case Study: Sugarcane and sugar factory

Defining taxonomy alignment

5. Upgrade the wastewater treatment plant to be able to reuse the effluent A in the factory	Relevant Sector under Thailand Taxonomy: Waste Management
	Relevant Activity under Thailand Taxonomy: Construction, extension, upgrade, operation and renewal of decentralised wastewater collection and treatment
	Relevant Environmental Objective under Thailand Taxonomy: • EO4: Resource Resilience and Transition to a Circular Economy
	Taxonomy-aligned assessment: This activity can be classified as "Green" if it complies with the following criteria: 1. Water is for purposes other than human consumption; 2. Water is suitable for reuse after proper treatment depending on the level of contamination and subsequent reuse purposes in accordance with national regulations. For this activity to be considered aligned with the Taxonomy, it must also comply with Do No Significant Harm (DNSH) criteria and Minimum Social Safeguards (MSS).
	Reporting: The expenditure for upgrading the wastewater treatment plant can be reported as Taxonomy-aligned CapEx if the completed, upgraded plant meets the criteria for the relevant wastewater activity and complies with DNSH/MSS. Operating expenses for running the compliant, upgraded wastewater treatment plant are eligible as Taxonomy-aligned OpEx. Reusing treated effluent primarily results in cost savings (reduced water procurement) rather than direct revenue generation. While the activity itself (treating and reusing water) might be Taxonomy-aligned, the revenue alignment would typically depend on the alignment status of the overall entity's primary revenue-generating activity (sugar manufacturing). Therefore, there is no taxonomy-aligned revenue to be reported for this activity.

Q&A

Please submit your question using the Q&A feature.

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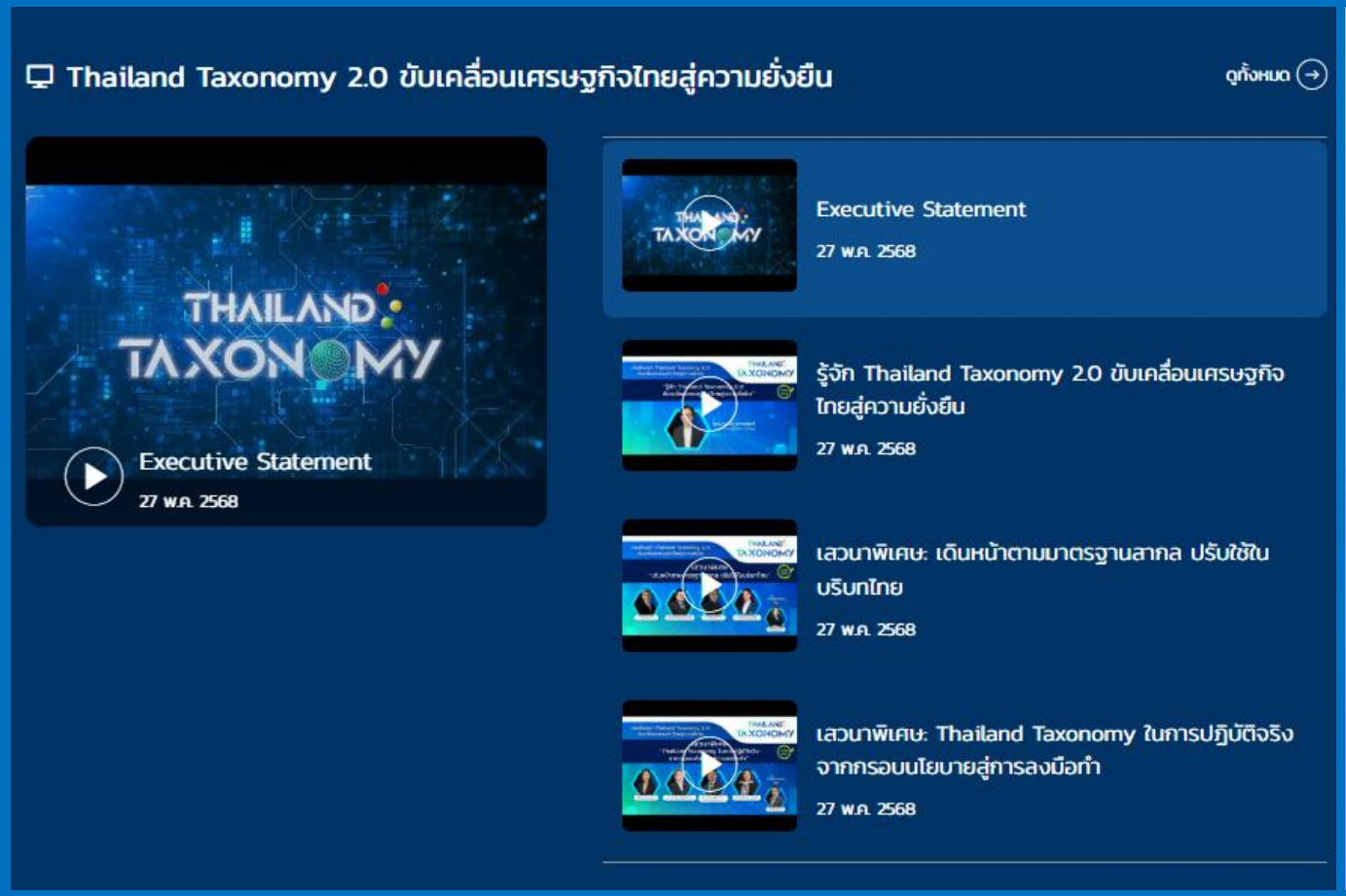
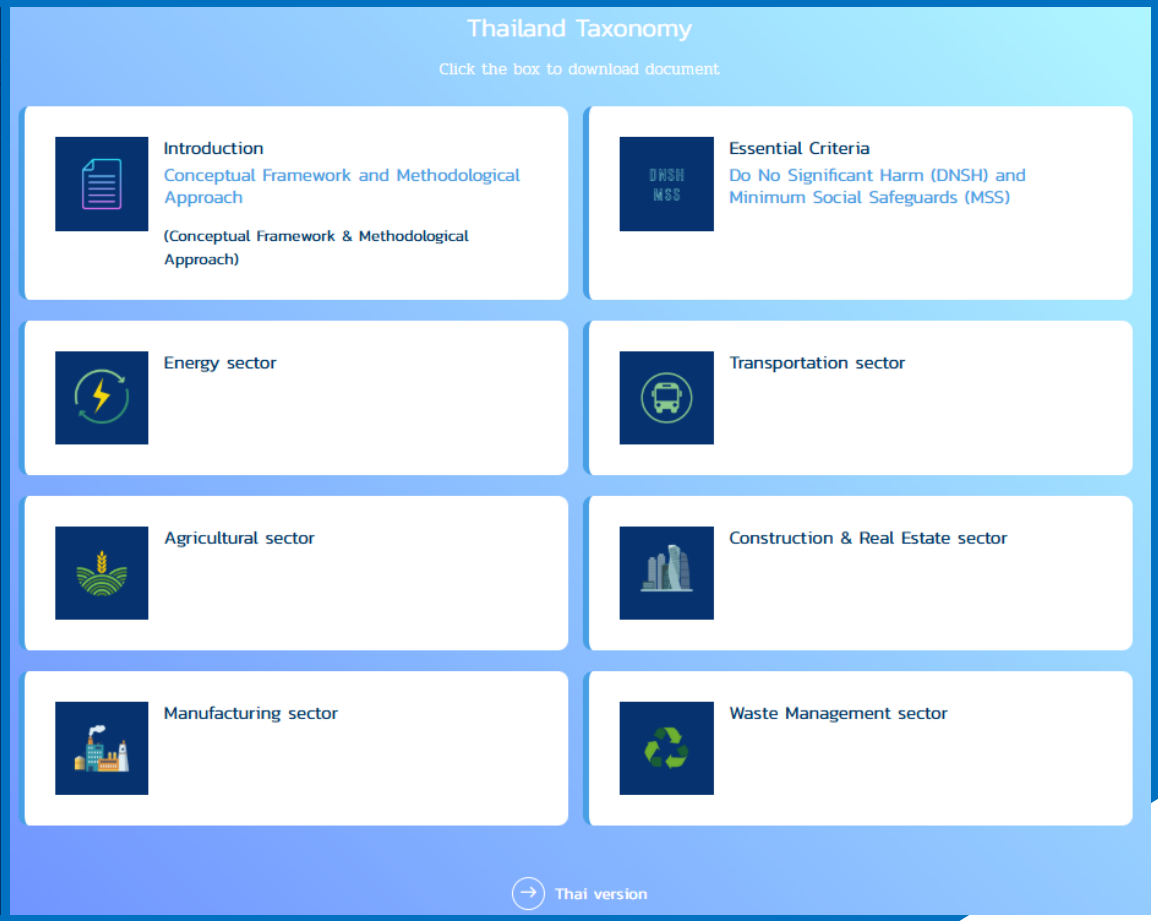
For more resources, please visit the official websites of the organisations under the Thailand Taxonomy Working Group.





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Coming up...

Online Webinar		
27 June 2025	10:30-12:00 ICT	Agriculture
	13:30-15:00 ICT	Waste management
30 June 2025	13:30-16:00 ICT	Construction and Real Estate

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ผู้จัดทำ

ที่ปรึกษา

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