THAILAND TAXONOMY

# Energy Sector

July 2025

THAILAND TAXONOMY BOARD

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## Thailand Taxonomy Board

### Energy sector

1. Department of Climate Change and Environment, Ministry of Natural Resources and Environment
2. Bank of Thailand
3. The Securities and Exchange Commission, Thailand
4. Stock Exchange of Thailand
5. Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resource and Environment
6. Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy
7. Energy Policy and Planning Office (EPPO), Ministry of Energy
8. Office of Transport and Traffic Policy and Planning (OTP), Ministry of Transport
9. Thailand Greenhouse Gas Management Organization (Public Organization) (TGO)
10. Federation of Thai Industries (FTI)
11. Renewable Energy Industry Club, Federation of Thai Industries (RE-FTI)
12. Thai Chamber of Commerce and Board of Trade of Thailand
13. The Thai Bankers' Association (TBA)
14. Association of International Bank (Thailand) (AIB)
15. Government Financial Institutions Association (GFA)

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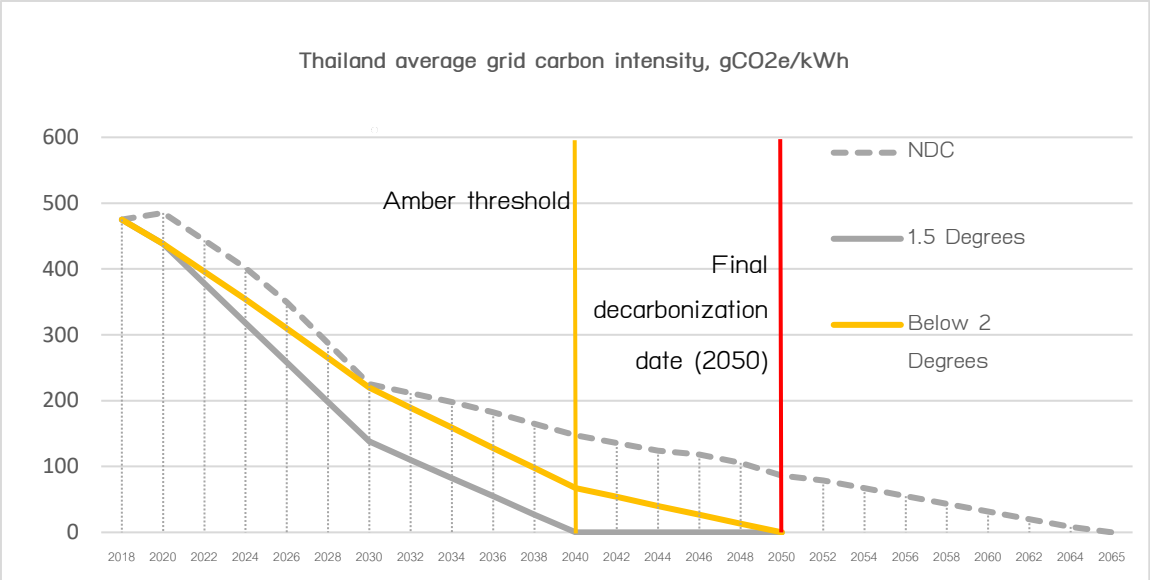
# 1. Energy sector background

Energy activities in the present taxonomy can be divided into two parts: those associated with the production of energy (wind, solar, ocean energy-based generation etc.) and those that are not about production but are related activities (energy storage, energy transmission etc.). Eligibility criteria for the first group usually (but not always) include adherence to the decarbonisation pathway presented below (Figure 1). Criteria for the second group are usually unique for every activity and are based on characteristics of each individual activity.

Electricity generation is a key part of energy production in any country. As a sector, its carbon emission reduction is at the core of decarbonisation efforts worldwide. In the Figure 1 below, thresholds for alignment with the 1.5 and 2 degrees are calculated based on science-based and country-neutral decarbonisation pathways provided by the Transition Pathway Initiative; green thresholds in this Taxonomy are set to align with the 1.5-degree scenario. The dotted line corresponds to the NDC-based pathway of Thailand and is meant to provide data for the building of an amber thresholds. Thailand's Updated NDC presumes lowering the overall volume of emitted carbon by 40% by 2030 from a baseline of 2005 (that is 555 $MtCO_2$) and then achieving Net-Zero emissions by 2065.

**Figure 1 Thailand grid carbon intensity modelling 2018-2050**




**Source**: TPI, Calculated from Thailand's Long-term Low Greenhouse Gas Emission Development Strategy (Revised Version – November 2022)

As it is seen from the modelling above, for Thailand to be able to go along the 1.5-degree pathway green carbon intensity must reach on average 138 grams $CO_2$ per kilowatt-hour by 2030 and net-zero by 2040. For a minimal 2-degree scenario the corresponding figures are 220 grams $CO_2$ per kilowatt-hour by 2030 and net-zero by 2050. Achieving this will require major changes to electricity production, including the use of renewable technologies, adoption of the CCS and the reconfiguring of existing fossil fuel facilities to increase renewable uptake.

The **green threshold** in the Thailand Taxonomy will be established as 100 g$CO_2$e/kWh until 2040 with the emission of 50 gCO2e/kWh afterwards. This threshold is justifiable from the point of view of international compatibility as both EU and Climate Bonds taxonomies consider it appropriate. It is an ambitious threshold that allows the state and the market to bring emissions down rapidly.

For **amber threshold** is defined following the NDC-based pathway. This is applicable for existing activities only – which means that the activity/asset is in existing before 1 January 2024. 2040 is established as a sunset date for the amber threshold. After this date only green thresholds and criteria are applicable for all activities. It is noted that the sunset date may be subject to change based on new technologies or evolving scientific views.

**Red activities** can under no circumstances be considered contributing to climate change mitigation. In some cases, there are no such circumstances (for example, if the activity is unequivocally green and there are no old installations that may be too emitting to retrofit), and in this case the activity is marked as N/A.

**Table 1. Thresholds for certain energy sector activities, gCO2e/kWh**

| | 2022-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045* | 2046-2050* |
|---|---|---|---|---|---|---|
| ***Green Activities*** | 100 | 100 | 100 | 100 | 50 | |
| ***Amber Activities*** | 381 | 225 | 191 | 148 | N/A | N/A |
| ***Red Activities*** | >381g | >225g | >191g | >148g | >50g | >50g |

**Note**: All thresholds are subject to review every three to five years in accordance with new data and technological development.

* post-sunset dates, amber certification is no longer available

** Energy efficiency measures are covered under these energy sector criteria by the very means of establishing thresholds using emission intensity ($gCO_2$ per unit of production). In order to achieve a certain threshold, the activity must reduce its emission intensity, including by implementing measures to improve efficiency as an option.

To clarify, amber thresholds are necessary to facilitate the transition to low carbon economy, but an activity cannot be 'in transition' indefinitely. By the sunset date all new installations must be compliant with the green threshold, or they lose their alignment with the Taxonomy.

## 1.1. Bioenergy

While many energy activities in Section 2 below will refer to the above table for sectoral energy thresholds (

Table 1. Thresholds for certain energy **sector activities**), it should be noted that bioenergy (see bioenergy definition in the Definitions Annex), due to its unique characteristics, has its own screening thresholds that do not follow Table 1. The screening table on Bioenergy in Section 2 will refer to the specific Bioenergy Thresholds presented here.

Bioenergy green thresholds have been calculated separately according to the CBI Biomass criteria[1] build up to the latest scientific and technological data. These Criteria apply to assets and projects relating to:

- Facilities producing biomass/biofuel
- Heating/cooling, and co-generation facilities using biofuel/biomass
- Bio-refinery facilities
- Supporting infrastructure associated with the above

For facilities producing biomass/biofuel as a final product, including liquid biofuel, solid and gaseous biomass for heating and co-generation, and biofuel for transport, the biomass/biofuel produced needs to meet specific GHG emissions thresholds in terms of gCO2e/kWh (converted from the original gCO2e/MJ (primary energy) for compatibility purposes).

For heating/cooling, and co-generation (combined heat and power – CHP) facilities using biofuel/biomass, the biofuel/biomass being used needs to meet specific GHG emissions thresholds in terms of gCO2e/kWh, and the facilities are required to achieve energy conversion efficiency of 80%. Note that CHP facilities need to meet requirements when they are in CHP

[1] Climate Bonds Initiative. (2022). Bioenergy Criteria under the Climate Bonds Standard

mode. In addition, CHP is required to follow the requirements in 5. Bioenergy generation and production (including SAF)

Table 2 provides the summary of these thresholds. The rationale of determining these specific thresholds can be found in the Climate Bonds Bioenergy Criteria Background Paper. [2]

**Table 2. Bioenergy criteria**

| Asset type | Thresholds for biofuel/biomass produced/used (primary energy) | Energy efficiency thresholds |
|---|---|---|
| **Facilities producing liquid biofuel, solid and gaseous biomass for heating and co-generation** | 57.6g CO2e/ kWh | N/A |
| **Facilities producing biofuel for transport** | 67.7g CO2e/ kWh | N/A |
| **Heating/cooling, and co-generation facilities using biofuel/biomass** | 57.6g CO2e/kWh | 80% |

***Source**: CBI*

To demonstrate they meet this threshold, issuers are required to conduct a life cycle assessment (LCA) of GHG emissions from their bioenergy.

The scope of the LCA should include:

- Feedstock production
- Feedstock processing
- Biofuel/bioenergy production
- Biofuel storage and blending
- Intermediate and final transport steps: transportation of feedstock to processing facilities to fuel production facilities, and transportation of fuel to the point of consumption

For facilities producing both biomass-based products for energy purpose (power and heat), and for non-energy use (such as food and feed ingredients, pharmaceuticals, chemicals,

[2] Climate Bonds Initiative. Bioenergy Criteria under the Climate Bonds Standard: Non-Wood Feedstocks Background Paper

materials and minerals), issuers are required to allocate GHG emissions to the biomass for energy purpose based on energy content of the biomass-based products. For such facilities, only the biomass for energy purposes need to meet the GHG emissions thresholds detailed in

**Table 2** above. That is, currently no additional GHG emissions thresholds for biomass products for non-energy use. However, users of these Criteria are reminded that if biomass products for energy use accounts for less than 50% of feedstock inputs then the facility is not aligned with this Taxonomy.

To check the compliance with the threshold it is required to use RSB GHG Calculator Tool for GHG emissions calculation.

**Compliant feedstock**

Under the present Criteria, all types of feedstocks are eligible with these exceptions:

- Wood (and all woody biomass) except for those produced in line with Forestry Criteria of the Taxonomy
- Third generation biofuels (algae)
- Biodegradable Municipal Solid Waste (MSW), including sewage sludge and food waste

  Feedstock used for production of bioenergy should comply with one of the following:

  - Forest Stewardship Council (FSC);
  - Biomass Biofuels voluntary scheme (2BSvs);
  - Bonsucro; International Sustainability and Carbon Certification (ISCC Plus);
  - Roundtable of Sustainable Biomaterials (RSB)
  - Round Table on Responsible Soy (RTRS)

Bioenergy facilities must also either:

- Be certified under the RSB low indirect land use change (iLUC) optional module14 to demonstrate that they have low indirect land use impact; or
- Provide evidence and documentation to demonstrate that they meet low iLUC risk biomass criteria and compliance indicators under the RSB optional module, i.e.:
  - Yield increase: issuers demonstrate that source feedstock for the facility is produced through an increase in yield compared to a reference date, without any additional land conversion. The biomass that is produced above the baseline scenario is eligible.

- Unused/degraded land: issuers demonstrate that source feedstock for the facility is produced from land that was not previously cultivated or was not considered arable land.
- Use of waste / residues: issuers demonstrate that the raw material used is derived from existing supply chains and does not require dedicated production out of arable land

## 1.2. Hydropower

Projects in hydropower have a potential of causing massive damage to the environment by their scale and operation. Thus, in order to be eligible for the construction of a new hydropower plant under the current Taxonomy the executor of the project must additionally (to the criteria indicated in the activity card 3) adhere to the following rules:

- All technically feasible and ecologically relevant mitigation measures have been implemented to reduce adverse impacts on water as well as on protected habitats and species directly dependent on water. Measures include, where relevant and depending on the ecosystems naturally present in the affected water bodies:
  - measures to ensure downstream and upstream fish migration (such as fish friendly turbines, fish guidance structures, state-of-the-art fully functional fish passes, measures to stop or minimise operation and discharges during migration or spawning);
  - measures to ensure minimum ecological flow (including mitigation of rapid, short-term variations in flow or hydro-peaking operations) and sediment flow;
  - measures to protect or enhance habitats
- The effectiveness of those measures is monitored in the context of the authorisation or permit setting out the conditions aimed at achieving good status or potential of the affected water body.
- For new power plants, it must be established on the basis of that impact assessment, that the plant is conceived, by design and location and by mitigation measures, so that it complies with one of the following requirements:
  - the plant does not entail any deterioration nor compromises the achievement of good status or potential of the specific water body it relates to;
  - where the plant risks to deteriorate or compromise the achievement of good status/potential of the specific water body it relates to, such deterioration is not

significant, and is justified by a detailed cost-benefit assessment demonstrating both of the following:

- the reasons of overriding public interest or the fact that benefits expected from the planned hydropower plant outweigh the costs from deteriorating the status of water that is accruing to the environment and to society;
- the fact that the overriding public interest or the benefits expected from the plant cannot, for reasons of technical feasibility or disproportionate cost, be achieved by alternative means that would lead to a better environmental outcome (such as refurbishing of existing hydropower plants or use of technologies not disrupting river continuity).

- A new plant should not permanently compromise the achievement of good status/potential in any of the water bodies in the same river basin district.
- Compensatory measures must be implemented to ensure that the project does not increase the fragmentation of water bodies in the same river basin district. This is achieved by restoring continuity within the same river basin district to an extent that compensates the disruption of continuity, which the planned hydropower plant may cause. Compensation starts prior to the execution of the project.

## 2. Activities thresholds and criteria

While the previous section presented general Sectoral thresholds and criteria for the energy sectors, this section presents specific thresholds and criteria for each individual activity within energy sectors. It should be noted that for some individual activities (such as solar energy generation, hydropower generation etc.), their own screening tables below will contain complete information on eligibility criteria for green and amber activities and can thus be used independently without having to refer back to the table of sectoral thresholds and criteria (**Table 1**) in the previous section. But for other activities, such as natural gas and bioenergy, their screening tables will contain information which needs to be used in conjunction with the table of sectoral thresholds and criteria in the previous section.

A note on scoping:

A user of the Taxonomy can use it to establish compliance with it for a variety of activity-related operations, including the construction of new structures and facilities, operations on existing facilities and retrofitting them to better meet the Taxonomy criteria. The user can read a detailed description of all eligible operations in the "Description" section of each activity card. Additionally, for orientation purposes, a "Scope" line has been added to the activity cards, which contains fundamentally important information about what is allowed within a given activity:

- **Operations**: only operations on existing objects (e.g. managing a fleet of vehicles or repairing them) are aligned with the Taxonomy. All cash flows associated with these operations (including profits, costs and credits) are also Taxonomy compliant and can be recognised as such in the documents. The specific list of Taxonomy-compliant operations can be seen in the "Description" line of the activity card.

- **Construction**: this activity involves the construction of new facilities (power plants, factories and other facilities) that will host Taxonomy-compatible activities (e.g. solar power plants or low-carbon transport infrastructure). All cash flows directed towards the construction of these facilities (including loans taken out, bonds issued, etc.) are considered compatible with the Taxonomy.

- **Retrofitting**: this activity is limited to the modernisation of existing facilities to a level approaching the requirements of the Taxonomy. The funds spent on such an activity are also Taxonomy compliant.

This report will reference ISIC codes from National Statistical Office Thailand (TSIC).

### 2.1. Energy sector activities: an overview

Based on the most recent data, Thailand's total installed generation capacity was 47 GW in 2019, with peak electricity demand around 30 GW.[3] Thailand has achieved near complete

[3] EA. (2021). Thailand Power System Flexibility Study

access to energy, with 99.21% of Thai households having access to electricity in 2020. This results from the country's efforts to promote local energy generation in far off areas and to increase the efficiency of energy generation throughout the energy chain. In 2020, energy intensity (EI) in Thailand also significantly improved, with a decrease to 7.53 KOTE/bn baht from 8.54 KOTE/bn in 2010.[4]

During the development of Thailand Taxonomy, the setting of threshold has been calculated based on the revised version of Thailand LT-LEDS which is likely to be aligned with the (draft) NEP 2024, revised version of PDP (as a part of the draft NEP 2024), and other plans in the draft NEP 2024.

The following sections present the screening criteria and thresholds for the different activities within the energy sector.

### 1. Solar energy generation

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Solar energy generation |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating and cooling from Solar Photovoltaic, Concentrated Solar Power (CSP) or any other types of solar energy-based technologies |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | All solar-related energy generation is aligned with Taxonomy objectives |
| **Amber** | N/A |
| **Red** | Power plants dedicated to support fossil fuel infrastructure[5] are harmful to the objective of climate change mitigation |
| Criteria reference[6] | Climate Bonds Initiative Solar Energy Background paper |

[4] Department of Alternative Energy Development and Efficiency, Ministry of Energy. (2021). Energy Balance of Thailand 2020.

[5] E.g., solar panels installed on the petrol stations.

[6] Hereinafter "criteria reference" is provided for information only and are not a part of eligibility requirements. Only major reference sources are provided. All criteria are adapted for local context.

## 2. Wind energy generation

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Wind energy generation |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating and cooling using wind power |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | All electricity generation activities from onshore and offshore wind power plants are aligned with Taxonomy objectives |
| **Amber** | N/A |
| **Red** | Power plants dedicated to support fossil fuel infrastructure[7] are harmful to the objective of climate change mitigation |
| Criteria reference | Climate Bonds Initiative Wind Energy Background Paper |

## 3. Hydropower generation

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Hydropower generation |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating, and cooling from Hydropower |
| **Scope** | Construction, operations, and retrofitting |
| **Objective** | Mitigation |
| | |
| **Green** | A hydropower facility in operation before 1 January 2024 is aligned with Taxonomy objectives if it has either:<br>• A power density > 5W/m2<br>OR<br>• GHG emissions intensity < 100g CO2e/kWh during the life cycle of the powerplant.<br>A hydropower facility commencing operation on 1 January 2024 or after this date is aligned with Taxonomy objectives if it has either: |

[7] E.g., when wind power installations are paired with fossil gas peaker plants.

| | |
|---|---|
| | • A power density > 10W/m2<br>OR<br>• GHG emissions intensity < 50g CO2e/kWh during the life cycle of the powerplant.<br>In addition, pumped storage facilities must also meet one of the following criteria:<br>• The facility is demonstrably purposefully built in conjunction with intermittent renewables<br>AND / OR<br>• The facility is contributing to a grid which already has a share of intermittent renewables deployment of at least 20% or has credible evidence of programmes in place that increase the share of intermittent renewables to this level within the next 10 years.<br>Evidence of such programmes might be the current development of renewable energy facilities that are due to come online in the near term, or the auction of PPAs for renewables.<br>AND / OR<br>• The facility can credibly demonstrate that the pumped storage will not be charged with an off-peak grid intensity that is higher than the intensity of the electricity that it will displace when it is discharged. For example, demonstrating that there is no combination of the following in the merit order: (1) mid-merit coal and (2) gas used at times of peak demand.<br>For any new project the executor must also follow additional criteria outlined in Section 1.2 |
| **Amber** | Retrofitting that improves either power density or decreases emission intensity of the existing hydropower plant by at least 15% is aligned with Taxonomy objectives |
| **Red** | • The activities that are not compliant with green or amber criteria are harmful to the objective of climate change mitigation<br>• Power plants dedicated to support fossil fuel infrastructure[8] are harmful to the objective of climate change mitigation |
| Criteria reference | Climate Bonds Initiative Hydropower Criteria Document and Background Paper<br>In this current version, the existing facility refers to the facility that is operating or receives the construction permit from the relevant authorities before 1 January |

[8] E.g., in mixed hydropower-coal generation.

| | |
|---|---|
| | 2024. The new facility refers to the facility that receives the construction permit after 31 December 2023. |

## 4. Geothermal power generation

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Geothermal power generation |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating, and cooling from geothermal power |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | New facilities meeting declining green threshold for the Energy Sector (Table 1) are aligned with Taxonomy objectives |
| **Amber** | Existing facilities meeting declining amber threshold for Energy Sector with a prescribed sunset date (Table 1) are aligned with Taxonomy objectives |
| **Red** | • The activities that are not compliant with green or amber criteria are harmful to the objective of climate change mitigation<br>• Power plants dedicated to support fossil fuel infrastructure are harmful to the objective of climate change mitigation |
| Criteria reference | Climate Bonds Initiative Geothermal Energy Background Paper<br>In this current version, the existing facility refers to the facility that is operating or receives the construction permit from the relevant authorities before 1 January 2024. The new facility refers to the facility that receives the construction permit after 31 December 2023. |

## 5. Bioenergy generation and production (including SAF)

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Bioenergy generation and production (including SAF) |
| **ISIC code** | 3510, 2011, 1920 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating and cooling from bioenergy (biomass, biogas and biofuels); construction and operation of facilities producing bioenergy, including sustainable aviation fuels (SAF) |

| | |
|---|---|
| **Scope** | Construction, operations, and retrofitting. These Criteria apply to assets and projects relating to:<br>• Facilities producing biogas/biomass/biofuel/SAF<br>• Heating/cooling, and co-generation facilities using biofuel/biomass<br>• Bio-refinery facilities<br>Supporting infrastructure associated with the above |
| **Objective** | Mitigation |
| | |
| **Green** | • **For all types except SAF:** New and existing facilities meeting the criteria for Bioenergy **(1.1 Bioenergy)** are aligned with Taxonomy objectives<br>• **For all types except SAF**: All types of feedstocks are aligned with Taxonomy objectives, including residues, energy crops and lignocellulosic biomass such as straw, **with three exceptions**:<br>- Wood (and all woody biomass) except for those produced in line with Forestry Criteria of the Taxonomy;<br>- Algae<br>- Biodegradable Municipal Solid Waste (MSW), including sewage sludge and food waste<br>• **For all types except SAF:** Feedstocks used for production of bioenergy should comply with the guidelines from one of the following bodies[9]:<br>- Program for the Endorsement of Forest Certification Scheme (PEFC)<br>- Forest Stewardship Council (FSC);<br>- Biomass Biofuels voluntary scheme (2BSvs);<br>- Bonsucro;<br>- International Sustainability and Carbon Certification (ISCC Plus);<br>- Roundtable of Sustainable Biomaterials (RSB)<br>- Round Table on Responsible Soy (RTRS)<br>- Roundtable on Sustainable Biomaterials (RTSB)<br>- International Sustainability and Carbon Certification (ISCC) |

[9] Currently these certifications include only international labels, but in the future it may also include relevant Thai labels if they are developed and adopted.

| | |
|---|---|
| | • **For SAF only**: resulting product should comply with CORSIA Sustainability Certification schemes<br>or<br>• **For all types of bioenergy:** the resulting product should comply with the relevant national standards that align with the CORSIA Sustainability Certification Schemes. |
| **Amber** | Only existing facilities are aligned with Taxonomy objectives<br>• **For all types except SAF:** Lifecycle emission intensity[10] meets amber thresholds for Energy Sector (<br>• **Table 1**).<br>• **For all types except SAF:** All types of feedstocks used for production of bioenergy are eligible, including residues, energy crops and lignocellulosic biomass such as straw, with three exceptions:<br>- Wood (and all woody biomass) except for those produced in line with Forestry Criteria of the Taxonomy;<br>- Algae<br>- Biodegradable Municipal Solid Waste (MSW), including sewage sludge and food waste<br>• **For all types except SAF:** Feedstock used for production of bioenergy should comply with one of the following:<br>- Forest Stewardship Council (FSC);<br>- Biomass Biofuels voluntary scheme (2BSvs);<br>- Bonsucro;<br>- International Sustainability and Carbon Certification (ISCC Plus);<br>- Roundtable of Sustainable Biomaterials (RSB)<br>- Round Table on Responsible Soy (RTRS)<br>• **For SAF only**: retrofitting of SAF production facilities or other production facilities enabling them to produce CORSIA Certification Schemes-compliant biofuels is aligned with Taxonomy objectives. |
| **Red** | The activities that are not compliant with green or amber criteria are harmful to the objective of climate change mitigation |

[10] Life-cycle GHG emissions are calculated based on project-specific data using ISO 14067:2018 or:2018 or ISO 14064-2:2019 or equivalent

| | |
|---|---|
| Criteria reference | Climate Bonds Initiative Bioenergy Background Paper<br>In this current version, the existing facility refers to the facility that is operating or receives the construction permit from the relevant authorities before 1 January 2024. The new facility refers to the facility that receives the construction permit after 31 December 2023. |

## 6. Energy production from natural gas

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Energy production from natural gas |
| **ISIC code** | 3510 |
| **Description** | Retrofitting of facilities that produce energy from natural gas |
| **Scope** | Conversion and retrofitting projects only |
| **Objective** | Mitigation |
| | |
| **Green** | Conversion of existing natural gas power plants to use low-carbon hydrogen leading to an emission intensity of the plant of less than indicated in the Table 1 is aligned with Taxonomy objectives |
| **Amber** | • Retrofit of existing natural gas plants that leads to life cycle emission intensity meets declining amber thresholds for the Energy Sector with a prescribed sunset date (<br>• **Table 1**) is aligned with Taxonomy objectives<br>• Life-cycle GHG emissions are calculated based on project-specific data using ISO 14067:2018 or:2018 or ISO 14064-2:2019 or equivalent<br>• At retrofitting, measurement equipment for monitoring of physical emissions, such as those from methane leakage, is installed or a leak detection and repair program is introduced<br>• At operation, physical measurement of emissions is reported and leak is eliminated.<br>Compliance with the current Amber criteria is verified by an independent third party and must be published for public assessment |
| **Red** | New natural gas-based power plants (where the project got construction permit after 31 December 2023) are harmful to the objective of climate change mitigation |
| Criteria reference | European Commission Delegated Regulation (EU) 2022/1214 of 9 March 2022<br>In this current version, the existing facility refers to the facility that is operating or receives the construction permit from the relevant authorities before 1 January |

| | |
|---|---|
| | 2024. The new facility refers to the facility that receives the construction permit after 31 December 2023. |

## 7. Marine energy generation

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Marine energy generation |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity, heating, and cooling from marine energy |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | All energy generation activities from marine energy are aligned with Taxonomy objectives |
| **Amber** | N/A |
| **Red** | N/A |
| Criteria reference | Climate Bonds Initiative Marine Renewable Energy Background Paper |

## 8. Electricity generation from renewable non-fossil gaseous and liquid fuels, including low-carbon hydrogen and its derivatives

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Electricity generation from renewable non-fossil gaseous and liquid fuels, including low-carbon hydrogen and its derivatives |
| **ISIC code** | 3510 |
| **Description** | Construction and operation of electricity generation facilities that produce electricity using gaseous and liquid fuels of renewable origin, including low-carbon hydrogen and its derivatives. This activity does not include electricity generation from the exclusive use of biogas and bioliquid fuels (for this see activity 5) |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | • Life-cycle GHG emissions from the generation of electricity using renewable gaseous and liquid fuels must meet declining green threshold (Table 1) to align with Taxonomy objectives |

| | |
|---|---|
| | • Life-cycle GHG emissions must be calculated based on project-specific data, where available, using ISO 14067:2018 or ISO 14064-1:2018 or ISO 14064-2:2019 or equivalents<br>• Quantified life-cycle GHG emissions must be verified by an independent third party. |
| **Amber** | Lifecycle emission intensity meets declining amber thresholds for the Energy Sector with a prescribed sunset date (Table 1) |
| **Red** | The activities that are not compliant with green or amber criteria are harmful to the objective of climate change mitigation |
| Criteria reference | Climate Bonds Initiative Hydrogen Background Paper and Bioenergy Paper |

## 9. Cogeneration of heating/cooling and power using renewable sources of energy

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Cogeneration of heating/cooling and power using renewable sources of energy |
| **ISIC code** | 3510, 3530 |
| **Description** | Construction and operation of installations used for cogeneration of heat/cool and power exclusively from renewable sources of energy, indicated in the present taxonomy (solar, wind, geothermal, bioenergy, ocean energy, renewable liquid and gaseous fuels, including low-carbon hydrogen) |
| **Scope** | Construction, operations, and retrofitting |
| **Objective** | Mitigation |
| | |
| **Green** | • The life-cycle GHG emissions from the co-generation of heat/cool and power from renewable energy sources must meet declining green threshold (Table 1) to align with Taxonomy objectives<br>• The underlying renewable source of cool/heat and energy (solar, wind, bioenergy etc.) must comply with the green criteria for the respective source of energy from the present Taxonomy to align with Taxonomy objectives<br>• Life-cycle GHG emissions must be calculated based on project-specific data, where available, using ISO 14064-1:2018 or ISO 14064-2:2019 or equivalent<br>• Where facilities incorporate any form of abatement (including carbon capture and storage or use of decarbonised fuels) that abatement activity must comply with the relevant section under Thailand Taxonomy (e.g. CCS/CCUS related activities under manufacturing sector) |

| | |
|---|---|
| **Amber** | • Retrofit of existing cogeneration power plants that leads to life cycle emission intensity meeting declining amber thresholds for the Energy Sector with a prescribed sunset date (Table 1) is aligned with Taxonomy objectives.<br>• Where facilities incorporate any form of abatement (including carbon capture and storage or use of decarbonised fuels) that abatement activity must comply with the relevant section under Thailand Taxonomy (e.g. CCS/CCUS related activities under manufacturing sector) |
| **Red** | Cogeneration of heating/cooling and energy from non-renewable sources, such as fossil fuels and fossil fuels derivatives (like fossil fuels-based hydrogen) is harmful to the objective of climate change mitigation |
| Criteria reference | European Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 |

### 10. Production of heating and cooling using waste heat

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Production of heating or cooling using waste heat |
| **ISIC code** | 3530 |
| **Description** | Production of heating and cooling using waste heat |
| **Scope** | Operations only |
| **Objective** | Mitigation |
| | |
| **Green** | The activity that produces heating/cooling from waste heat is aligned with Taxonomy objectives |
| **Amber** | N/A |
| **Red** | N/A |
| Criteria reference | European Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 |

### 11. Installation and operation of electric heat pumps

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Installation and operation of electric heat pumps |
| **ISIC code** | 3530 |
| **Description** | Installation and operation of electric heat pumps |
| **Scope** | Installation and operations |
| **Objective** | Mitigation |
| | |

| | |
|---|---|
| **Green** | To be aligned with Taxonomy objectives, heat pumps must have the following parameters:<br>• Refrigerant GWP ≤ 675;<br>AND<br>• Adherence to a recognised environmental management system (ISO 14001 or equivalent) |
| **Amber** | N/A |
| **Red** | N/A |
| Criteria reference | European Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 |

### 12. Heating and cooling distribution

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Heating and cooling distribution |
| **ISIC code** | 3530 |
| **Description** | Operation of pipelines and associated infrastructure for distribution of heating and cooling, ending at the sub-station or heat exchanger. |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | The system must use at least 50% renewable energy or 50% waste heat or 75% cogenerated heat or 50% of a combination of such energy and heat to be aligned with Taxonomy objectives |
| **Amber** | N/A |
| **Red** | N/A |
| Criteria reference | European Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 |

### 13. Transmission and distribution networks for renewable and low-carbon gases, including low-carbon hydrogen and its derivatives

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Transmission and distribution networks for renewable and low-carbon gases, including low-carbon hydrogen and its derivatives |
| **ISIC code** | 3520 , 4930, 4940 |

| | |
|---|---|
| **Description** | • Repurposing of gas networks for the distribution of gaseous fuels through a system of mains<br>• Repurposing of gas networks for long-distance transport of renewable and low-carbon gases by pipelines<br>• Construction or operation of transmission and distribution pipelines dedicated to the transport of hydrogen or other low-carbon gases<br>• Operation of such networks, including delivery to the final consumer |
| **Scope** | Construction, operations, and retrofitting |
| **Objective** | Mitigation |
| | |
| **Green** | • Transmission and distribution networks for low-carbon gases, low-carbon hydrogen and its derivatives are aligned with Taxonomy objectives.<br>• Retrofit of natural gas distribution lines to allow 100% low-carbon hydrogen and its derivatives or other low carbon gases is aligned with Taxonomy objectives. Low-emission gases are gases whose emissions when used to generate electricity must not exceed the limits specified for the green category in the Table 1<br>• The activity must include leak detection and repair of existing gas pipelines and other network elements to reduce methane leakage.<br>Noted: Low carbon gases are the gases whose life-cycle GHG emissions from the generation of electricity are lower than Green Activities threshold from the Table 1<br>**Table 1** |
| **Amber** | N/A |
| **Red** | • Transmission and distribution of gases whose emission exceeds green category threshold in the Table 1 is harmful to the objective of climate change mitigation<br>• Retrofitting of gas networks for the transmission of gases whose emission exceeds the green category threshold from the Table 1 is harmful to the objective of climate change mitigation |
| Criteria reference | Synthetic criteria, more than three sources |

## 14. Storage of electricity, thermal energy and low-carbon hydrogen and its derivatives

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Storage of electricity, thermal energy and low-carbon hydrogen and its derivatives |

| | |
|---|---|
| **ISIC code** | No specific ISIC Code |
| **Description** | Construction and operation of facilities that store electricity, thermal energy, low-carbon hydrogen and its derivatives, with the capability to release the stored energy later. |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | • All electricity and low-carbon hydrogen and its derivatives storage systems are aligned with Taxonomy objectives. This includes battery energy storage systems (BESS), among others.<br>• All thermal energy storage systems where the generated energy falls below 100 g CO2e/kWh measured on life cycle emission basis are aligned with Taxonomy objectives (including geothermal energy storage) |
| **Amber** | N/A |
| **Red** | N/A |
| Criteria reference | Climate Bonds Electrical Grids and Storage Background Paper, European Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 |

### 15. Transmission and distribution of electricity

| | |
|---|---|
| **Sector** | Energy |
| **Activity** | Transmission and distribution of electricity |
| **ISIC code** | 3510 |
| **Description** | • Construction and operation of transmission systems that transport the electricity on the extra high-voltage and high-voltage interconnected System.<br>• Construction and operation of distribution Systems that transport electricity on high-voltage, medium-voltage and low-voltage distribution Systems.<br>• Construction and operation of interconnections that transport electricity between separate systems. |
| **Scope** | Construction and operation |
| **Objective** | Mitigation |
| | |
| **Green** | • Transmission and distribution infrastructure dedicated to a direct connection or an expansion of connection between power plants with energy intensities less than 100 g CO2e/kWh (life cycle emissions) is aligned with Taxonomy objectives |

| | |
|---|---|
| | OR<br>• 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 100 gCO2e/kWh measured on a Product Carbon Footprint (PCF) basis, over a rolling five-year period is aligned with Taxonomy objectives<br>OR<br>• the average system grid emissions factor must be below the threshold value of 100gCO2e/kWh measured on a PCF basis, over a rolling five-year average period<br>Includes all enabling ICT systems and smart management systems[11] for the eligible infrastructure. |
| **Amber** | N/A |
| **Red** | Construction and operation of transmission and distribution infrastructure where the share of non-compliant electricity is higher than 33% is harmful to the objective of climate change mitigation. Non-compliant electricity is electricity produced with emission intensity above defined in the green category of the Table 1 |
| Criteria reference | Climate Bonds Electrical Grids and Storage Background Paper |

## 2.2. Red list of activities

Activities that are clearly inconsistent with goals of the present taxonomy are outlined in the table below with their corresponding ISIC codes. Only activities that are outlined in the table are considered non-compliant, not the whole code (if it's not stated explicitly). The activities that are neither green, nor amber, no red **are not considered non-compliant**. They are considered **out of the scope** of the present taxonomy. The taxonomy does not define of cover them.

This table outlines, clarifies and complements, not replaces red categories in all activity cards in Section 2.

**Table 3 List of activities not in compliance with the present taxonomy**

[11] International Energy Agency. "Smart Grids." Accessed March 14, 2025. https://www.iea.org/energy-system/electricity/smart-grids

| ISIC Code | Activity |
|---|---|
| **3510 - Electric power generation, transmission and distribution** | • Production of electricity or thermal energy using any fossil fuels (coal, oil, gas, and their derivatives, including fossil-based hydrogen, **but excluding byproducts like waste heat**) is considered non-compliant (except the activities that comply with thresholds and conditions in the amber category)<br>• Construction of any new facilities (including fossil gas powered) than produce electricity and thermal energy using fossil fuels is considered non-compliant<br>• Construction and operation of any renewable power plants that are fully or partially intended to support any operations related to fossil fuels and their derivatives, including, but not limited to their extraction, processing, transportation, or storage is considered non-compliant<br>• Generation of electricity from renewable gaseous and liquid fuels where GHG emissions from the generation of electricity are higher than 100 g CO2e/kWh is considered non-compliant (except the activities that comply with thresholds and conditions in amber category in activity 8) |
| **3520 - Manufacture of gas; distribution of gaseous fuels through mains** | • Production of fossil fuel gas and its derivatives is considered non-compliant<br>• Production of gas from biofuel where feedstock is not compliant with requirements from activity 5 is considered non-compliant |
| **4940 - Transport via pipeline** | • Transmission and distribution of gases whose emission exceeds green category threshold in the energy sector table<br>• Retrofitting of gas networks for the transmission of gases whose emission when used to generate electricity is above the green category threshold from the energy sector table |

## Annex Terms and definitions

The present taxonomy utilises a lot of terms that don't have an agreed definition. In order to avoid confusion, the table is intended to provide all necessary terms and definitions for utility of its users.

| Term | Definition |
|---|---|
| **Low-carbon hydrogen** | Low-carbon hydrogen is hydrogen compliant with green criteria for manufacturing of hydrogen of the Thailand Taxonomy. |
| **Life-cycle assessment** | Systematic analysis of the potential environmental impacts of products or services during their entire life cycle. For the purposes of the present Taxonomy life cycle assessment should follow the latest releases of ISO std (ISO 14040, ISO 14044). |
| **Scope 1 emission** | Direct emissions that a company causes by operating the things that it owns or controls. These can be a result of running machinery to make products, driving vehicles, heating buildings and powering computers. |
| **Scope 2 emission** | Indirect emissions created by the production of the energy that an organisation buys. Installing solar panels or sourcing renewable energy rather than using electricity generated using fossil fuels would cut a company's Scope 2 emissions. |
| **Scope 3 emission** | Indirect emissions that cover those produced by customers using the company's products (downstream Scope 3 emissions emissions) or those produced by suppliers making products that the company uses (upstream Scope 3 emissions). |
| **Bioenergy** | Energy generated from the conversion of solid, liquid and gaseous products derived from biomass. |
| **Biofuel** | Liquid fuels derived from biomass. They include ethanol, a liquid produced from fermenting any biomass type high in carbohydrates, and biodiesel, a diesel-equivalent processed fuel made from both vegetable oil and animal fats. |
| **New and existing facilities** | For the purpose of the present taxonomy, existing facilities are the facilities that were operational or acquired the authorities' approval |

| Term | Definition |
|---|---|
| | for construction of the facility before 1 January 2024. New facilities are the facilities where the authorities' approval for construction of the facility is acquired by its operator after 31 December 2023. |
| **Waste heat** | Heat from process outputs at high temperature. Waste heat may be extracted from sources such as hot flue gases from a diesel generator, steam from cooling towers, or even wastewater from cooling processes such as in steel cooling. Waste heat is never a direct product of an activity, but rather a byproduct that can be utilised. More on waste heat can be found in the article "Waste heat generations: a comprehensive review" |
| **Waste-to-Energy (WtE)** | WtE or energy-from-waste (EfW) is the process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source. Most WtE processes generate electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuels. |
| **Product carbon footprint (PCF)** | The PCF sums up the total greenhouse gas emissions generated by a product over the different stages of its life cycle. A cradle-to-grave PCF (i.e. PCF mentioned in the present Taxonomy) covers the complete life cycle of the product, including the emissions from the use phase and end-of-life of the product. |
| **Marine energy** | Marine energy, also known as marine and hydrokinetic energy or marine renewable energy, is a renewable power source that is harnessed from the natural movement of water, including waves, tides, and river and ocean currents. |

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