Electrical Grids and Storage Criteria

The Electrical Grids and Storage Eligibility Criteria of the Climate Bonds Standard & Certification Scheme

Document version and notable changes	Date
Public release of Criteria (version 1)	August 2021
Addition of criteria text for Advanced Metering Infrastructure to align with EU Taxonomy	November 2021
Criteria text refined for capacity addition data and smart meter infrastructure definitions	March 2022

Definitions

Climate Bonds Initiative (CBI): An investor-focused not-for-profit organisation, promoting large-scale investments that will deliver a global low carbon and climate resilient economy. The Initiative seeks to develop mechanisms to better align the interests of investors, industry and government so as to catalyse investments at a speed and scale sufficient to avoid dangerous climate change.

Climate Bond: A climate bond is a bond used to finance – or re-finance - projects needed to address climate change. They range from wind farms and hydropower plants, to rail transport and building sea walls in cities threatened by rising sea levels. Only a small portion of these bonds have been labelled as green or climate bonds by their issuers.

Certified Climate Bond: A Climate Bond that is certified by the Climate Bonds Standard Board as meeting the requirements of the Climate Bonds Standard, as attested through independent verification.

Climate Bonds Standard (CBS): A screening tool for investors and governments that allows them to identify green bonds where they can be confident that the funds are being used to deliver climate change solutions. This may be through climate mitigation impact and/ or climate adaptation or resilience. The CBS is made up of two parts: the parent standard (Climate Bonds Standard V3) and a suite of sector specific eligibility Criteria. The parent standard covers the certification process and pre- and post-issuance requirements for all certified bonds, regardless of the nature of the capital projects. The Sector Criteria detail specific requirements for assets identified as falling under that specific sector. The latest version of the CBS is published on the Climate Bonds Initiative website.

Climate Bonds Standard Board (CBSB): A board of independent members that collectively represents $34 trillion of assets under management. The CBSB is responsible for approving i) Revisions to the Climate Bonds Standard, including the adoption of additional sector Criteria, ii) Approved verifiers, and iii) Applications for Certification of a bond under the Climate Bonds Standard. The CBSB is constituted, appointed and supported in line with the governance arrangements and processes as published on the Climate Bonds Initiative website.

Climate Bond Certification: allows the issuer to use the Climate Bond Certification Mark in relation to that bond. Climate Bond Certification is provided once the independent Climate Bonds Standard Board is satisfied the bond conforms with the Climate Bonds Standard.

Green Bond: A Green Bond is where proceeds are allocated to environmental projects. The term generally refers to bonds that have been marketed as “Green”. In theory, Green Bonds proceeds could be used for a wide variety of environmental projects, but in practice they have mostly been the same as Climate Bonds, with proceeds going to climate change projects.

Grid assets and projects: Assets and projects relating to the transmission and distribution, and storage of electricity.

Technical Working Group (TWG): A group of key experts from academia, international agencies, industry and NGOs convened by the Climate Bonds Initiative. The TWG develops the Sector Criteria - detailed technical criteria for the eligibility of projects and assets as well as guidance on the tracking of eligibility status during the term of the bond. Their draft recommendations are refined through engagement with finance industry experts in convened Industry Working Groups and through public consultation. Final approval of Sector Criteria is given by the CBSB.

Industry Working Group (IWG): A group of key organisations that are potential issuers, verifiers and investors convened by the Climate Bonds Initiative. The IWG provides feedback on the draft sector Criteria developed by the TWG before they are released for public consultation.

The Climate Bonds Initiative gratefully acknowledges the Technical and Industry Working Group members who supported the development of these Criteria. Members are listed in Appendix 1. Special thanks are given to Ian Walker, the lead specialist coordinating the development of the Criteria through the Technical Working Group, and Arna Sigurdardottir and Foaad Tahir, also providing support.

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1 Introduction

1.1 Overview

This Criteria Document provides all the requirements that must be met for grid related assets and projects to be awarded Climate Bonds Certification. The purpose is to provide instruction to issuers and verifiers about the requirements of the Grids and Storage. The Criteria Document is supported by a Background Document that captures the various dialogues and inputs and substantiates the reasoning behind the requirements set in the Grids and Storage.

The Criteria are developed through a consultative process with Technical Working Groups (TWGs) and Industry Working Groups (IWGs), and through public consultation. The TWGs comprise academic and research institutions, civil society organizations, multilateral banks and specialist consultancies whereas IWGs are represented by industry experts including potential bond issuers and investors. A period of public consultation offers the opportunity to any member of the public to comment on the Criteria.

Supplementary information available in addition to this document include:

1. Grids and Storage Brochure: a 2-page summary of the Grids and Storage Criteria.
2. Grids and Storage Background Document: the rationale behind the Grids and Storage .
3. Climate Bonds Standard V3: the umbrella document laying out the common requirements that all Certified Climate Bonds need to meet, in addition to the sector-specific Criteria (V3 is the most recent update version).
4. Climate Bonds Standard & Certification Scheme Brochure: an overview of the purpose, context and requirements of the Climate Bonds Standard & Certification Scheme.

For more information on the Climate Bonds Initiative and the Climate Bonds Standard & Certification Scheme, see https://www.climatebonds.net/standard. For the documents listed above, see https://www.climatebonds.net/standard/grids

1.2 The Climate Bonds Standard

Investor demand for Green Bonds and Climate Bonds is strong and will increase in line with the delivery of quality products into the market. However, investor concerns about the credibility of green labelling are also growing. Standards, assurance & certification is essential to improve confidence and transparency, which in turn will enable further strong growth in the market.

The Climate Bonds Standard and Certification Scheme is an easy-to-use screening tool that provides a clear signal to investors and intermediaries on the climate integrity of Certified Climate Bonds.

A key part of the Standard is a suite of sector-specific eligibility Criteria. Each Sector Criteria sets climate change benchmarks for that sector that are used to screen assets and capital projects so that only those that have climate integrity, through their contribution to climate mitigation, and adaptation and resilience to climate change, will be certified. Where a bond encompasses a mixed portfolio of assets across several sectors, each sub-category of assets will be subject to the relevant Sector Criteria for those assets.

The Sector Criteria are determined through a multi-stakeholder engagement process, including a Technical Working Group (TWG) and Industry Working Group (IWG), convened and managed by the Climate Bonds Initiative, and are subject to public consultation. Finally, they are reviewed and approved by the Climate Bonds Standard Board.

The second key part of the Climate Bonds Standard is the overarching Climate Bonds Standard available at https://www.climatebonds.net/standards/standard_download. This gives the common fund management and reporting requirements that all Certified Climate Bonds must meet, in addition to meeting the specific Sector Criteria.

1.3 Key elements to the Criteria

As a general principle, bonds will meet the requirements of the Climate Bonds Standard if the associated use of proceeds:

- Promote GHG mitigation through reduced emissions;
- Address climate resilience, specifically operational resilience in the face of physical climate change risks
- Ensure the climate resilience of the surrounding system (for example, ecosystems, dependent populations) is not compromised; and
- Meet minimum disclosure requirements to raise the level of transparency in green bonds[1].

Complete details of the requirements for the Grids and Storage Criteria are in Chapter 3 of this document.

1.4 This document

This document details:

- The current scope of grid assets and projects eligible for certification under the Climate Bonds Standard – Chapter 2;
- The specific eligibility Criteria under which these assets and projects can be certified – Chapter 3;
- List of Technical Working Group members – Appendix 1
- List of Industry Working Group members – Appendix 2
- Details of the Adaptation and Resilience checklist – Appendix 3

The Grids and Storage Background document provides the additional discussion and rationale that supports these Criteria.

Supporting information is available at https://www.climatebonds.net/standard and https://www.climatebonds.net/standard/grids.

1.5 Revisions to these Criteria

These Criteria will be reviewed three years after launch, or potentially earlier if the need arises, at which point the TWG will take stock of issuances that arise in the early stages and any developments in improved methodologies and data that can increase the climate integrity of future bond issuances. As a result, the Criteria are likely to be refined over time, as more information becomes available. However, certification will not be withdrawn retroactively from bonds certified under earlier versions of the Criteria.

[1] Disclosure requirements are stipulated in the overarching Climate Bonds Standard rather than the Grids and Storage Criteria

2 Assets and Projects in Scope

2.1 Assets in scope

The scope of the Grids Criteria includes the whole network, from highest voltage level of the transmission system to the low voltage (LV) distribution network. All assets within these interconnected systems are in scope. Assets used for the monitoring and control of the networks are also in scope, including field-based devices, communications systems, demand-management systems and control hardware and software systems. The scope of the Storage Criteria includes assets whose sole purpose is to store electrical energy and return it at a later time. Specifically, electrical energy that is converted into a different form, such as chemical energy, in order to convert it back to electrical energy at a point in the future. Assets linking any electricity storage infrastructure to the network to which it connects, falls under the scope of the Grids and Storage Criteria.

To summarise, these Criteria apply to assets and projects relating to the construction, upgrade and operation of:

- Transmission and Distribution system infrastructure that transports electricity at a range of voltages across interconnected or distribution systems.
- Interconnections that transport electricity between separate systems.
- Facilities that store electricity and return it at a later time[2].
- Dedicated supporting infrastructure that is wholly dedicated[3] to eligible assets and projects. For example, buildings for housing maintenance equipment.

The scope of eligible assets and activities is presented in Table 1. To guide the interpretation of the requirements, the table provides signposting as follows:

- A green circle indicates these assets, when fully described and documented, are automatically eligible, with no further disclosure or documentation required.

- An orange square indicates that the eligibility of these assets is conditional on meeting specific Criteria.

- A red triangle indicates that these assets are not eligible for certification under any circumstances.

The first column in Table 1, 'Asset of activity class', gives an exhaustive list of all the activity types that are within scope of the Grids and Storage Criteria. The second column, 'Example use of proceeds', is an illustrative list of the type of projects that may be included in a Certified Climate Bond. It is not possible to include an exhaustive list of all potential use of proceeds due to the breadth of possibilities, but all use of proceeds must fall within one of the specified eligible activity types.

2 This does not include Pumped Hydropower Storage, which instead is covered under the Hydropower Criteria.
3 'Wholly dedicated' in the case of Climate Bonds sector criteria means 100%. The infrastructure cannot be used for anything other than the assets and projects demonstrated to meet these Criteria.

Table 1: scope of eligible projects and assets for Climate Bonds Certification under the Grids and Storage Criteria

Asset or activity class	Example use of proceeds	Mitigation	Adaptation & resilience
Transmission and distribution networks (Grids)	Construction, upgrade and/or operation of general transmission and distribution infrastructure that is not a direct connection to an electricity generation facility. Infrastructure might include: • Overhead lines (conductors and insulators) and pylons • Towers and poles • Transformers, reactors and substations • Underground cables • Circuit breakers and switchgear	■	■
	Construction, upgrade and/or operation of: Wholly dedicated infrastructure directly connecting, or expanding an existing direct connection, between a power generation facility that meets the requirements of the relevant Climate Bonds Standard Sector Criteria, and a substation or network. At the time of writing this includes: • Wind energy • Solar energy • Marine Renewable energy (**including offshore wind**) • Geothermal energy • Hydropower energy This pool may expand in future. Infrastructure might include: • Overhead lines (conductors and insulators) and pylons • Transformers, reactors and substations • Underground cables • Circuit breakers and switchgear	●	■
	Construction, upgrade and/or operation of: Wholly dedicated infrastructure directly connecting, or expanding an existing direct connection, between an electricity production plant not covered by Climate Bonds Standard Sector Criteria, and a substation or network. Infrastructure might include: • Overhead lines (conductors and insulators) and pylons • Transformers, reactors and substations • Underground cables • Circuit breakers and switchgear	■	■
	Construction, upgrade and/or operation of interconnectors that establish electricity flow between separate AC networks, or to link synchronous grids across national borders, for example.	■	■

Asset or activity class	Example use of proceeds	Mitigation	Adaptation & resilience
	Manufacturing, installation, leasing and/or operation of equipment and infrastructure for which the main objective is an increase in generation or use of renewable energy. For example, the installation of technology that reduces the curtailment of renewable energy or increases its capacity factor in the energy system merit order.	●	■
	Manufacturing, installation, leasing and/or operation of equipment to increase the controllability and observability of the electricity system and enable the development and integration of renewable energy sources. This might include: • Sensors and measurement tools (including meteorological sensors for forecasting renewable production). • Communication and control (including advanced software and control rooms, automation of substations or feeders, and voltage control capabilities to adapt to more decentralised renewable infeed).	●	■
	Manufacturing, installation, upgrading, leasing and/or operation of equipment such as, but not limited to, advanced metering infrastructure which meet or correspond to the requirements of Article 20 of Directive (EU) 2019/944, able to carry two-way information to users for remotely acting on consumption, including customer data hubs. For example, two-way communication electric meters which allow consumers to monitor and reduce electricity consumption.	●	■
	Manufacturing, installation, leasing and/or operation of equipment to allow for exchange of renewable electricity between users.	●	■
Electricity Storage facilities	Construction, upgrade and/or operation of: Wholly dedicated battery facilities serving a power generation facility that meets the requirements of the relevant Climate Bonds Standard Sector Criteria. At the time of writing this includes: • Wind energy • Solar energy • Marine Renewable energy (including offshore wind) • Geothermal energy • Hydropower energy This pool may expand in future. Type of batteries might include • Lithium-ion • High temperature sodium-sulphur • Vanadium redox flow • Zinc-bromide hybrid flow • Lead-acid	●	■
	Construction, upgrade and/or operation of:	■	■

Asset or activity class	Example use of proceeds	Mitigation	Adaptation & resilience
	Wholly dedicated battery facilities directly serving an electricity production plant not covered by Climate Bonds Standard Sector Criteria. Type of batteries might include • Lithium-ion • High temperature sodium-sulphur • Vanadium redox flow • Zinc-bromide hybrid flow • Lead-acid		
	Construction, upgrade and/or operation of a battery facility that is not directly serving a single electricity generation facility. Type of batteries might include: • Lithium-ion • High temperature sodium-sulphur • Vanadium redox flow • Zinc-bromide hybrid flow • Lead-acid	■	■
	Construction, upgrade or operation of utility- or small-scale compressed air storage facilities which meet the same criteria as battery storage.	■	■
	Construction, upgrade or operation of utility- or small-scale flywheel or capacitor storage facilities which meet the same criteria as battery storage.	■	■
Dedicated supporting infrastructure – any infrastructure which is demonstrated to be 100% dedicated to eligible T&D and Storage assets and activities	Operation of labour force and equipment for installing or maintaining upkeep and operation of eligible T&D and storage infrastructure	●	●
	Manufacturing, operation and/or leasing of vehicles which monitor performance of the assets and allow maintenance work to be done	●	●
	Construction, leasing and operation of buildings which house maintenance equipment, dedicated staff or vehicles	●	●

2.2 Alignment with other Sector Criteria

Where use-of-proceeds from multiple sectors are bundled into one bond, proof of compliance with multiple sector criteria may be required across the portfolio. For example, if the bond is financing both general T&D activities and wind farms, then the issuer would have to prove compliance with the Grids and Storage Criteria in respect of the former and the Wind Criteria in respect of the latter.

In some cases, it may not immediately be clear whether activities or projects might fall under these criteria or other sector criteria. The most common examples, and appropriate sector criteria to be used, are clarified in Table 2.

Table 2: Assets or projects partially or wholly covered by other sector criteria

Potential use-of-proceeds	Sector Criteria
Electric batteries and charging infrastructure for the electric vehicles	Transport
Vehicles (and vessels) used to exclusively support eligible assets and activities under the Grids and Storage Criteria	Grids and Storage
Vehicles that cannot be demonstrated to exclusively support eligible grid infrastructure	Transport
Energy generation including Solar, Wind, Marine Renewable, Hydropower and Geothermal energy	Relevant corresponding sector criteria
Pumped Hydropower Storage	Hydropower

3 Eligibility Criteria

3.1 Overview

The Grids and Storage Criteria have two components:

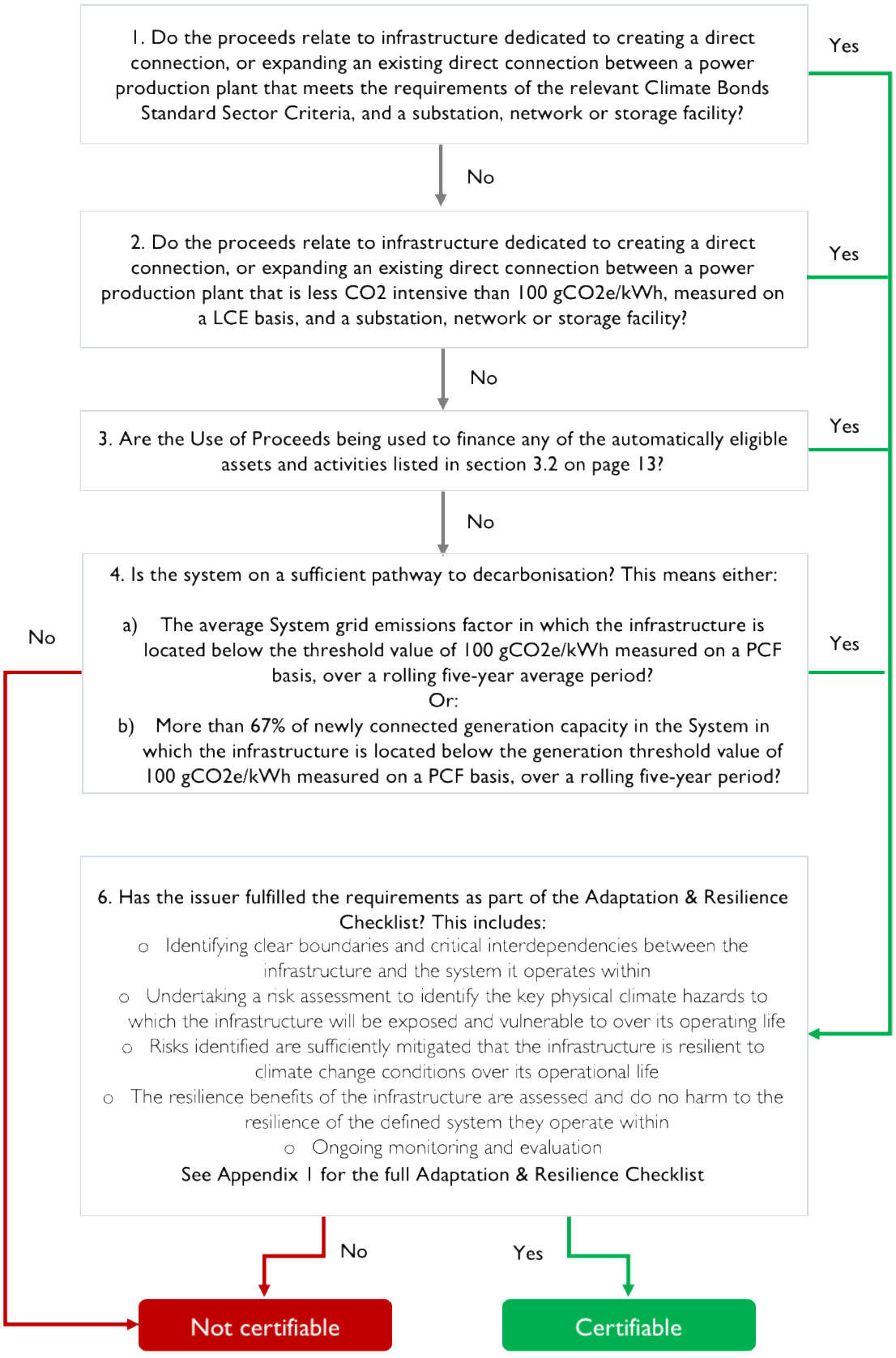
- The Mitigation component
- The Adaptation & Resilience component

Diagram 1 on page 11 illustrates the Criteria relevant for both T&D and Storage assets and activities. It encompasses both the mitigation component and the adaptation & resilience component.

Where the bond portfolio includes several separately identifiable T&D or Storage projects or groups of assets, these conditions must be met for each separately identified project or asset grouping. Bond issuers should determine and justify these project boundaries.

These criteria will be subject to regular review, in line with reviews of generation threshold values and progress to decarbonisation.

Diagram 1. The Grids and Storage Criteria



3.2 Assets and activities which automatically meet the mitigation component

- Installation of T&D transformers that correspond to or comply with the Tier 2 (2021) requirements from EU Regulation 548/2014 on the eco-design of small, medium and large power transformers and, for medium power transformers with highest voltage for equipment not exceeding 36 kV, with AAA0 level requirements on no-load losses set out in standard EN 50588- 1, or equivalent.
- Equipment and infrastructure where the main objective is an increase of the generation or use of renewable electricity generation
- Equipment to increase the controllability and observability of the electricity system and enable the development and integration of renewable energy sources. This includes:
    - Sensors and measurement tools (including meteorological sensors for forecasting renewable production)
    - Communication and control (including advanced software and control rooms, automation of substations or feeders, and voltage control capabilities to adapt to more decentralised renewable infeed)
- Equipment to carry information to users for remotely acting on consumption such as, but not limited to, advanced (also known as smart) metering infrastructure, including customer data hubs. See methodological note 6 for guidance on eligibility.
- Interconnectors between transmission systems are eligible, provided that one of the systems is on a sufficient decarbonisation trajectory per box 4 in diagram 1 on the previous page
- Equipment to allow for exchange of renewable electricity between users

Note, these assets and activities must still meet the requirements for Adaptation & Resilience set out in Appendix 3

3.3 Adaptation and resilience requirements

To meet the requirements for Climate Bonds Certification, bond issuers must address the physical climate risks associated with their investment over the operational lifetime of the assets. This includes taking appropriate measures to identify and mitigate those risks in the face of the uncertain impacts of climate change and undertaking an assessment of the resilience benefits that the investment can provide to the wider system. Furthermore, the assessment should demonstrate that the investment will do no significant harm to the climate resilience of the wider system itself.

Guidance on the requirements of the climate risk and resilience assessment that issuers should undertake to demonstrate compliance with the Climate Bonds Standard is provided in the checklist in Appendix 3.

3.4 Dedicated supporting infrastructure

Assets and activities that can be demonstrated to be wholly dedicated to supporting assets and activities eligible under the above criteria are, by extension, automatically eligible without the need to meet further criteria. Note, in this case, “wholly dedicated” means they are exclusively used for that purpose and nothing else.

For example, vehicles used to survey grid infrastructure or to provide repair or maintenance capabilities are eligible so long as it is proven they serve no alternative purpose, even if they are not low or zero emissions. Infrastructure that are not

wholly dedicated must meet the relevant Sector Criteria, if it is an asset class which falls within scope of another Sector Criteria (see Table 2).

3.5 Methodological notes

3.5.1 Methodological note 1 – determining system eligibility using average grid emission factor

The grid emission factor reflects the total annual emissions from power generation divided by the total annual net electricity production. Issuers with direct ownership or access to official electricity generation data and power generation emissions data for their system can use these to demonstrate its eligibility in this regard.

To determine eligibility, it is possible to consider a System covering multiple control areas which are interconnected and with significant energy exchanges between them. In such a case, the weighted average emissions factor across all included control areas is used to determine eligibility, and individual subordinated transmission or distribution systems within this System will not be required to demonstrate compliance separately.

Issuers without access to such data can otherwise demonstrate this by referencing several reputable sources for grid emissions factors. For example:

- International Energy Agency (IEA) data on national grid emission factors
- International Finance Institutions' dataset on grid factor (if data for the previous 5 years can be provided)
- Reputable government sources or analyses which demonstrate the grid factor.

Note that the first two bullets provide national grid emission factors. If the system being evaluated is at a sub-national level (for example, part of a non-synchronous grid within the same country), national grid emission factors may not reflect the emission factor of the system being evaluated. In such cases, issuers should use the methods described at the start of this section or defer to the third bullet option.

3.5.2 Methodological note 2 – determining system eligibility using added generation capacity

Data from the US Energy Information Administration (EIA) should be used, by source and by year, for the system being considered. The issuer can then demonstrate what proportion of that energy capacity meets the threshold on a PCF (Product Carbon Footprint) basis. PCF measures the total greenhouse gas emissions generated by a product (energy generation) – from extraction of raw-materials to end-of-life[4].

It is accepted that not all issuers will be able to calculate the PCF of all electricity generated on a system, particularly on large, interconnected systems. In lieu of this more complete picture, issuers can instead use approximate assumptions of lifecycle CO_2 emissions by energy source. According to the IPCC[5,6], certain energy generation technologies generally fall below the threshold of 100gCO_2eq/kWh:

- Solar
- Wind
- Geothermal
- Hydropower
- Nuclear

Meanwhile, generation sources such bioenergy and thermal technologies such as coal, oil or petroleum products, and natural gas likely fall above the threshold.

[4] See https://ec.europa.eu/environment/eussd/smgp/pdf/Product_Carbon_Footprint_study.pdf and others on further guidance for PCF

[5] "IPCC Working Group III – Mitigation of Climate Change, Annex III: Technology - specific cost and performance parameters - Table A.III.2 (Emissions of selected electricity supply technologies (gCO 2eq/kWh))" (PDF). *IPCC. 2014. p. 1335.*

[6] "IPCC Working Group III – Mitigation of Climate Change, Annex II Metrics and Methodology - A.II.9.3 (Lifecycle greenhouse gas emissions)" (PDF). pp. 1306–1308.

The proportion is calculated as the sum of new capacity (in MW or GW, for example) of technologies that operate below, installed over a 5-year period, divided by the sum of all generation capacity installed over the same period. It is often not possible to distinguish between capacity changes which result from retired plants or those resulting from newly connected plants. For simplicity, issuers can simply use the net change in capacity as an approximation of added capacity.

In other words, if there were 25,000MW of installed hydropower in 2016, and 30,000MW installed in 2020, the issuer does not need to know what proportion of that change is from newly installed hydropower. The key information is that there is 5,000MW more hydropower over this 5-year period. Below is a worked example:

Units	*Source*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change*
MW	Hydropower	44,189	44,963	45,399	45,399	46,059	1,870
MW	Coal (+lignite)	188,488	193821.5	197,453	204,725	206,405	17,917
MW	Gas	25,329	25150.38	24,937	24,955	24,957	-373
MW	Diesel	838	837.63	638	510	510	-328
MW	Nuclear	5,780	6,780	6,780	6,780	6,780	1,000
MW	Wind	28700.44	32,848	35,138	37,608	38,684	9,983
MW	Solar	9012.69	17,052	25,212	34,036	38,794	29,781
MW	Small hydro	4333.86	4418.15	4517.45	4676.56	4758.46	425
MW	Biofuel	7971.02	8527.88	9213.8	10001.11	10314.56	2,344

Total added in MW is the sum of all generation sources' capacities that have experienced net increase. In this case, Hydropower, Nuclear, Wind, Solar, Small Hydro, and Coal (+lignite).
Total added in MW = 63,319

Of this, 43,059MW is energy capacity which falls below 100gCO_2eq/kWh (indicated by the rows in green).

Percentage of capacity low carbon therefore = (43059/63319) *100 = 68.0032534%

Therefore, this system meets the criteria.

Issuers may retrieve data for demonstrating compliance in the following way:

The US Energy Information Administration provide historic capacity data by source for most countries which can also form the basis for analysis. Issuers should find the country within which the infrastructure will be located and carry out the above calculations.[7]

Note: like methodological note 1, some systems seeking eligibility may be at a sub-national level and not interconnected throughout the country. In these cases, the above datasets would not be applicable, and issuers must retrieve data in alternative ways. The Climate Bonds Initiative do not have guidance on these cases currently.

[7] Available here: https://www.eia.gov/international/data/world/electricity/electricity-capacity?pd=2&p=0000000000000000000007vo7&u=0&f=A&v=mapbubble&a=-&i=none&vo=value&t=C&g=00000000000000000000000000000000000000000000000000001&l=249-ruvvvvvfvtvnvv1vrvvvvfvvvvvvfvvvou20evvvvvvvvvvnvvvs0008&s=315532800000&e=1577836800000&

3.5.3 Methodological note 3 – further general guidance for determining system eligibility

The following applies to using the methodologies in both previous sections (3.5.1 and 3.5.2):

- The rolling five-year (average) period used in determining compliance with the thresholds shall be based on historic data and shall include the year for which the most recent data is available.
- The issuer must demonstrate in the annual reporting that the system continues to meet the eligibility criteria. If a system becomes ineligible, certification can be removed. Moreover, in Systems that become ineligible, no new T&D activities are eligible from that moment onward, until the system is again in compliance with the threshold (except for those activities which are always eligible, see above). Activities in subordinated Systems may still be eligible, if these subordinated Systems meet the criteria of these Criteria.
- However, if thresholds are tightened in line with a transition to net zero, making certain systems ineligible, assets and activities certified under these criteria will not become ineligible as a result. This provided that their system met the appropriate criteria at the time of certification.
- Transmission Systems may include generation capacity connected to subordinated Distribution Systems. Distribution Systems subordinated to a Transmission System that is deemed to be on a trajectory to full decarbonisation may also be deemed to be on a trajectory to full decarbonisation.

3.5.4 Methodological note 4 – eligibility criteria for transformers

Issuers should reference EU Regulation 548/2014[8] in order to demonstrate eligibility for the installation of transformers under the list of automatically eligible assets and projects. Non-EU assets and projects can be eligible by demonstrating that the transformers have corresponding efficiency levels (i.e., they do not . Further guidance is provided in the referenced document.

3.5.5 Methodological note 5 – fuel agnosticism when meeting thresholds

When considering whether a power production plant or entire system is less CO2 intensive than 100g CO2e/kWh, this threshold is agnostic of how the electricity is produced. That is, the fuel source used to produce the electricity is not relevant to determining eligibility. The threshold is the only determinant. This is relevant to the criteria in Boxes 2 and 4 in Diagram 1.

3.5.6 Methodological note 6 – eligibility criteria for metering infrastructure

For manufacture, installation or upgrading of advanced metering infrastructure (for example, so-called smart meter infrastructure), the metering systems must accurately measure actual electricity consumption and be capable of providing to final customers information on actual time of use as well as to the electricity generator (for example, the energy utility company). In other words, the infrastructure must be capable of two-way communication. Full requirements for smart metering infrastructure are as follows:

a) The smart metering systems shall accurately measure actual electricity consumption and shall be capable of providing to final customers information on actual time of use. Validated historical consumption data shall be made easily and securely available and visualised to final customers on request and at no additional cost. Non-validated near real-time consumption data shall also be made easily and securely available to final customers at no additional cost, through a standardised interface or through remote access, in order to support automated energy efficiency programmes, demand response and other services;

b) The security of the systems have due regard of the best available techniques for ensuring the highest level of cybersecurity protection while bearing in mind the costs and the principle of proportionality;

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1783&from=EN

c) Meter operators shall ensure that the meters of active customers who feed electricity into the grid can account for electricity fed into the grid from the active customers' premises;

d) If final customers request it, data on the electricity they fed into the grid and their electricity consumption data shall be made available to them through a standardised communication interface or through remote access, or to a third party acting on their behalf, in an easily understandable format allowing them to compare offers on a like-for-like basis;

e) Appropriate advice and information shall be given to final customers prior to or at the time of installation of smart meters, in particular concerning their full potential with regard to the management of meter reading and the monitoring of energy consumption, and concerning the collection and processing of personal data;

f) Smart metering systems shall enable final customers to be metered and settled at the same time resolution as the imbalance settlement period in the national market.

For infrastructure located within the EU, issuers may demonstrate eligibility through compliance with the requirements of Article 20 of Directive (EU) 2019/944 [9].

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

4 Reporting

In accordance with the Climate Bonds Standard, it is the issuers responsibility to provide to the verifier the information necessary to demonstrate compliance with each component of these Criteria as described below. Verifiers must include this information in the scope of verification.

In accordance with the overarching reporting requirements as laid out in the Climate Bonds Standard V3.0, issuers are required to provide this information as follows:

- Pre-issuance reporting (supported by independent verifiers report): Full disclosure information relating to all nominated assets and projects at time of issuance.
- Post-issuance reporting (supported by independent verifiers report): Any amendments relating to all nominated assets and projects, including any additions or changes to allocated use of proceeds.
- Annual reporting thereafter: Any amendments to the previously provided information should be reported by the issuer by exception as changes arise. If there has been a reallocation of proceeds after post-issuance reporting, the issuer is required to re-engage the verifier to assess whether the newly identified assets and projects meet these Criteria. The issuer must also demonstrate that the system continues to be eligible if this was how eligibility of the assets and projects was determined. Otherwise, the issuer must disclose whether the system has become ineligible.

All requirements for certification must be maintained in compliance for the duration of the bond.

Appendix 1: Technical Working Group members

Members of the Grids Technical Working Group

- Ian Walker, Element Energy, Lead Specialist
- John Sinner, Independent, formerly of the European Investment Bank (EIB)
- Mark Barrett, University College London (UCL)
- Eric Hittinger, Rochester Institute of Technology (RIT)
- Oleg Bulanyi, European Bank of Reconstruction and Development (EBRD)
- Andreas Biermann, Globalfields
- David Gonzalez, EIB
- Claudio Alatorre, InterAmerican Development Bank (IDB)
- Carel Cronenberg, EBRD
- Federico Ferrario, EIB
- Lorcan Lyons, European Commission

Appendix 2: Industry Working Group members

Members of the Grids Industry Working Group

- Cindy Thyfault, Global Biofuture Solutions (USA)
- Enno Dykmann, Alliander (The Netherlands)
- Richard Molke, Wells Fargo (USA)
- Eugene Montoya, Wells Fargo (USA)
- Rajiv Srivastava, Indian Energy Exchange (India)
- Pedro Luiz de Oliveira Jatoba, International Hydropower Association (IHA) / Electrobras (Brazil)
- Jeroen Dicker, TenneT Holdings (The Netherlands)
- Inese Vilcina, Latvenergo As (Latvia)
- Juta Naglina, Latvenergo As (Latvia)
- Timothy Olson, Wells Fargo (USA)
- Evelyn Hartwick, Asian Infrastructure Investment Bank (AIIB) (China)
- Elvis Mendes, Electrobras (Brazil)
- Carla Schuchmann, SITAWI (Brazil)
- Isabella Coutinho, SITAWI (Brazil)
- Kiran Kumaraswamy, Fluence Energy (India)
- Steve Jackman, CTC Global (UK)
- Alexandre Marty, EDF (France)
- Robert Weigert, Eurogrid (Germany)

Appendix 3: Climate Adaptation & Resilience Checklist

To demonstrate compliance with this element of the Criteria, all assets and projects must satisfy the requirements of the checklist detailed below.

The checklist (Table 3) is a tool to verify that the issuer has implemented sufficient processes and plans in the design, planning and decommissioning phases of a project to ensure that the operation and construction of the asset minimises environmental harm and the asset is appropriately adaptive and resilient to climate change and supports the adaptation and resilience of other stakeholders in the environment.

All elements of this checklist must be addressed, and appropriate evidence provided that these requirements are being met or are not applicable in respect of the specific assets and projects linked to the bond. It is expected that their evidence will encompass a range of assessment and impact reports and associated data, including but not limited to those reports required to meet national and local licensing and approval processes. This might include Development Consent Orders, planning regulations adhered to, Environmental Impact Assessments, Vulnerability Assessments and associated Adaptation Plans.

A climate change adaptation assessment may be integrated into a range of appropriate project development steps, which may include, inter alia, strategies and planning, pre-feasibility and feasibility studies, audits, technical assessments, risk assessments, or environmental and social due diligence, e.g. environmental and social impact assessments.

It is the issuers responsibility to provide the relevant information to the verifier. Verifiers must include this information in the scope of verification.

In accordance with the overarching reporting timetable as laid out in the Climate Bond Standard V3, issuers are required to report compliance with these eligibility conditions at all of the following stages:

- Pre-issuance reporting (supported by independent verification)
- Post-issuance reporting (supported by independent verification)
- Annual reporting

Table 3: Full details of the adaptation and resilience checklist for evaluating the performance of grid and storage assets and projects

Adaptation and resilience checklist for grid and storage infrastructure		Submitted
1. Clear boundaries and critical interdependencies between the infrastructure and the system it operates within are identified.		
1.1	Boundaries of the infrastructure are defined using (1) a listing of all infrastructure and assets and activities associated with the use of the bond proceeds, (2) a map of their location, and (3) identification of the expected operational life of the activity, asset or project.	
1.2	Critical interdependencies between the infrastructure and the system within which it operates are identified. Identification of these interdependencies should consider the potential for adverse impacts arising from, but not limited to: (1) the effects of supply disruption or interruption on dependent electricity users or populations; (2) exacerbation of wildfires; (3) relationships of the asset/project to nearby flood zones; (4) reduction in pollinating insects and birds; (5) reduction in biodiversity or High Conservation Value[10] habitat;	

[10] High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvnetwork.org.

	(6) damage or reduction in value of neighbouring property due to boundary structures at risk of falling during storm events; (7) fire and other practices that affect air quality; (8) appropriation of land or economic assets from nearby vulnerable groups[11];	
2. An assessment has been undertaken to identify the key physical climate hazards to which the infrastructure will be exposed and vulnerable to over its operating life.		
2.1	Key physical climate risks and indicators of these risks are identified in line with the following guidelines. • Risks are identified based on (a) a range of climate hazards, and (b) information about risks in the current local context, including reference to any previously identified relevant hazard zones, e.g., flood zones. In order to be confident that assets and activities are robust and flexible in the face of climate change uncertainties, it is essential that the climate risks being assessed and addressed cover those that are of greatest relevance to T&D grids and electrical energy storage. The physical characteristics of climate change that must be considered in the risk assessment include: • Temperature rise o High temperatures can impact on the electrical rating of assets, reducing transmission capacity and potentially reducing the ability of the network to meet demand. o Increasing temperatures can also result in extension of overhead lines, which reduces the clearance above trees. o Increased temperatures may also result in changes to the load on assets, due to increased cooling demands (higher summer peak demands) and less winter heating (reduced winter peak). • Increased heavy rainfall o Heavy rainfall can result in flash pluvial flooding, which could significantly impact electrical assets, particularly ground mounted assets. • Sea-level rises o Potential for flooding of coastal infrastructure and assets at risk from storm surge events. • Increased lightning o Lightning strikes have potential to cause transient outages due to power surges. • Increased winds / gales o Strong winds can cause damage to overhead transmission and distribution lines and supporting infrastructure (pylons and poles). o Up-rooting of trees and vegetation can also have an impact on power lines. • Increased snow, sleet, ice, freezing fog o Ice and snow accretion can make overhead power lines vulnerable to high-winds o Snow and ice can also impede access to sites for repairs in the event of a fault. • Increased coastal / river erosion o Risk to assets in coastal or riverbank locations • Wildfires o Wildfires present a risk to electricity infrastructure in affected areas and can significantly inhibit access to repair damaged infrastructure. o Electricity infrastructure can also be a cause of wildfires. For example, contact between transmission lines and dry vegetation has potential to start fires. • Landslides / ground movement o Potential to risk to both underground and above ground infrastructure from ground movement. o Potential for access to be impeded for repairs.	

11 According to IFC Performance Standards

	Issuers might consider the climate risks posed through specific interdependencies which might include, for example: • Availability of telecommunications for control systems and operational / field staff communications when dealing with extreme weather events, where the telecommunications rely on third party providers and infrastructure. • Flood risk and resilience will likely have interdependencies with local and national agencies, for example related to local flood defences, coastal flood risk management, shoreline management plans etc. Optional guidance for carrying out risk assessments: • Users should apply climate scenarios based on representative concentration pathway (RCP) 4.5 and 8.5 or similar / equivalent to ensure consideration for worst case scenario. • A broad range of models can be used to generate climate scenarios • Time horizons for assessing climate risk in agriculture can be based on annual seasonal forecasts and every ten years for the lifetime of the assets and projects. Where accurate assessments of climate variability for specific locations are not possible, use worst-case scenarios. • Risks can be characterized by the associated annual probability of failure or annual costs of loss or damage • For risk assessment, the TCFD The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities is recommended.	
3. The measures that have or will be taken to address those risks, mitigate them to a level such that the infrastructure is suitable to climate change conditions over its operational life.		
3.1	The following are examples of risk management activities that bond issuers might consider, or that might be adopted as part of regulations (e.g. codes and standards). This list is not exhaustive and bond issuers should fully assess the mitigation measures that are relevant to the climate risks and impacts identified in the risk assessment. Temperature - Design standards that maintain equipment rating over its lifetime performance in the face of all potential ranges of temperature rise - Manage vegetation under power lines to ensure adequate clearance is maintained - Assess changing demand profile (milder winters, increased summer cooling) over equipment lifetime Rainfall: - Design for resilience to pluvial flooding - Assessment of site drainage requirements - Impact of restricted access to sites / lines due to flooding Increased lightning - Design of electrical equipment to withstand lightning impulses, including shielding and surge suppression devices - Redundancy Increased winds / gales - Design to withstand extreme winds - Cut vegetation regularly to safe distance to reduce risk from up-rooting - Invest in storm and hurricane forecasting tools - Consider placing cables underground - Redundancy Increased snow, sleet, ice, freezing fog - Design equipment for ice loading - Suitable vehicles for access to sites in heavy snow / icy conditions Increased flooding - Flood risk assessment and planning. - Site ground installations outside of potentially affected zones - Ensure flood defence systems and coastal management plans are adequate	

	- Consideration of site access during flooding events Increased coastal / river erosion - Shoreline management plans / coastal erosion assessment Wildfires - Management of vegetation around electricity infrastructure to ensure adequate clearance Landslides / ground movement - The potential for ground movement and landslides should be taken into account when assessing sites for installing grid infrastructure. General risk mitigation measures: - Business continuity plans - System restoration plans - Black start - Islanded operation / microgrids - System security standards	
3.2	Risk reduction measures must be tolerant to a range of climate hazards and not lock-in conditions that could result in maladaptation.	
4. The infrastructure enhances the climate resilience of the defined system it operates within, as indicated by the boundaries of and critical interdependencies with that system as identified in item 1 in this checklist.		
4.1	Issuers are to assess the climate resilience benefits of system focused assets and activities and demonstrate they are 'fit for purpose', in the sense that they enhance climate resilience at a systemic level, with the flexibility to take into account the uncertainty around future climate change impacts. The assessment is conducted according to the principle of best available evidence during the investment period taking into account the infrastructure's boundaries and critical interdependencies as defined in Criteria 1. 'Fit for purpose' is defined as measures that mitigate the following effects: (1) the effects of supply disruption or interruption on dependent electricity users or populations; (2) exacerbation of wildfires; (3) relationships of the asset/project to nearby flood zones; (4) reduction in pollinating insects and birds; (5) reduction in biodiversity or High Conservation Value[12] habitat; (6) damage or reduction in value of neighbouring property due to boundary structures at risk of falling during storm events; (7) fire and other practices that affect air quality; (8) appropriation of land or economic assets from nearby vulnerable groups[13];	
5. The issuance is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the risks and resilience measures and related adjustments to those measures will be taken as needed.		
5.1	Indicators for risks identified under item 2 in this checklist are provided.	
5.2	Indicators for risk mitigation measures identified under item 3 in this checklist are provided.	
5.3	Indicators for "fit for purpose" resilience benefit measures identified under item 4 in this checklist are provided.	
5.4	Issuers have a viable plan to annually monitor (a) climate risks linked to the infrastructure, (b) climate resilience performance, (c) appropriateness of climate resilience measure(s) and to adjust as necessary to address evolving climate risks.	
5.5	Where electricity supply has been interrupted, the number of customer interruptions and customer minutes lost (i.e. aggregate duration of supply interruptions) should be measured and reported, together with the cause of the interruption. Any actions taken to reduce the risk of further impacts should also be recorded.	

[12] High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvnetwork.org.

13 According to IFC Performance Standards