Basic Chemicals Criteria

The Basic Chemicals Eligibility Criteria of the Climate Bonds Standard & Certification Scheme

Updated: April 2023

NOTE: These Criteria can be used to certify Use-of-Proceeds Instruments, Sustainability-Linked Debt Instruments, Assets and Entities per the Climate Bonds Standard V4.0

Revision	Date	Summary of Changes
Rev. 1.1	13 April 2023	Minor revisions to framing to reflect release of CBS v4.0
Rev. 1.0	11 October 2022	Final for Issuance
Rev. 0.1	06 April 2022	Issued as draft for Public Consultation

Acknowledgements

Climate Bonds gratefully acknowledges the Technical and Industry Working Group members who supported the development of these Criteria. Members are listed in ***Appendix A***.

Special thanks are given to ***Elias Martinez***, the lead specialist and ***Marian Rodriguez*** for coordinating the development of the Criteria through the Technical Working Group.

The Industry Working Group provided critical and useability focused consultation and feedback on the Criteria, but this does not automatically reflect endorsement of the criteria by all members.

Definitions

Certified Entity: The entity or part thereof which is being certified under the Climate Bonds Standard. Currently, Entity Certification is limited to non-financial Entities or segregated segments thereof, for which the Climate Bonds Initiative has Climate Bonds Standard Sector Criteria for Entity Certification.

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

Climate Bonds Standard (CBS): A screening tool for investors and governments that allows them to identify green bonds the proceeds of which 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 (CBS v4.0) 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 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 CBS, including the adoption of additional sector Criteria, (ii) Approved verifiers, and (iii) Applications for Certification of a bond under the CBS. The CBSB is constituted, appointed, and supported in line with the governance arrangements and processes as published on the Climate Bonds 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 CBSB is satisfied the bond conforms with the CBS.

Critical interdependencies: The asset or activity's boundaries and interdependencies with surrounding infrastructure systems. Interdependencies are specific to local context but are often connected to wider systems through complex relationships that depend on factors 'outside the asset fence' that could cause cascading failures or contribute to collateral system benefits.

Green Bond: A green bond is a bond of which the proceeds are allocated to environmental projects or expenditures. 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 or expenditures, but in practice they have mostly been earmarked for climate change projects.

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

Investment Period: The interval between the bond's issuance and its maturity date. Otherwise known as the bond tenor.

Parent Company/Group: A company is considered a parent company of another entity (a subsidiary) if it exercises control over the subsidiary. The terms "control" and "subsidiary" have the meaning assigned to them under International Financial Reporting Standard 10 (IFRS 10). A Parent Group consists of the Parent Company and all the companies that the Parent Company exercises control over. Where the Applicant does not belong to a group of companies, the term Parent Company applies to the Applicant.

Sustainability-Linked Debt (SLD): Any debt instrument for which the financial and structural characteristics can vary depending on whether the issuer achieves predefined Sustainability/ ESG objectives. Such objectives are measured through predefined KPIs and assessed against predefined performance targets. Proceeds of SLD are intended to be used for general purposes.

Technical Working Group (TWG): A group of key experts from academia, international agencies, industry and NGOs convened by Climate Bonds. 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 (see below) and through public consultation. Final approval of Sector Criteria is given by the CBSB.

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1 Introduction

1.1 The Climate Bonds Standard

Investor demand for climate bonds is strong and is expected to 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 will be essential to improve confidence and transparency, which in turn will enable further strong growth in the market.

Today, 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. Proposals are currently under consultation to also expand certification to entities with climate integrity.

A key part of the Standard is a suite of sector-specific eligibility Criteria. Each sector-specific Criteria sets climate change benchmarks for that sector that are used to screen debt instruments, assets and/ or entities, so that only those that have climate integrity, either through their contribution to climate mitigation, and/or to adaptation and resilience to climate change, will be certified.

These sector-specific Criteria are determined through a multi-stakeholder engagement process, including TWG and IWG, convened and managed by Climate Bonds, and are subject to public consultation. Finally, they are reviewed and approved by the Climate Bonds Standard Board (CBSB).

The second key part of the Climate Bonds Standard (CBS) is the overarching Climate Bonds Standard V4.0. This documents describes the cross-sectoral criteria all certified instruments/ assets/ entities must meet, in addition to meeting the sector specific Criteria.

1.2 Environmental Scope of the Basic Chemicals Criteria

Currently, certification requirements address:

- Climate change mitigation; and
- Climate adaptation and resilience.

1.3 What can be certified under the Basic Chemicals Criteria

Subject to meeting the eligibility criteria in the following sections, the following can be certified under these criteria:

- Use-of-Proceed (UoP)[1] bonds financing decarbonisation measures (e.g., retrofits) - see ***Section 3***
- Use-of-Proceed (UoP) bonds financing basic chemicals production facilities (i.e., assets and activities) - see ***Section 4***
- Assets not linked to any specific financing instrument (basic chemicals production facilities) - see ***Section 4***
- Entities (basic chemicals production companies) and Sustainability Linked Bonds (SLBs) issued by those entities - see ***Section 5***

See also the Climate Bonds Standard v4.0 for any cross sectoral requirements for Use-of-Proceeds, Sustainability-Linked Debt, Asset or Entity Certification. These cross sectoral requirements must be met in addition to the wind-specific requirements described in this document.

To demonstrate compliance with the following Criteria, in accordance with the CBS, it is the applicant's responsibility to provide the information to prove compliance with each component of these Criteria. Verifiers must include this information in the scope of verification.

[1] Use-of-Proceed (UoP) is used as shorthand throughout this document for a variety of targeted finance instruments, including green loans, repos, and asset-backed securities.

Where the bond portfolio includes several separately identifiable projects, expenditures, or groups of assets, these criteria must be met for each separately identified project or asset grouping. Applicants should determine these project boundaries, which may be based on geographical and/or supply chain linkages.

1.4 Documents supporting these criteria

Basic Chemicals-specific information to support Applicants and Verifiers is available at Basic Chemicals | Climate Bonds Initiative as follows:

- Basic Chemicals Background paper: Contains details on why the criteria were chosen
- Basic Chemicals Frequently Asked Questions
- Basic Chemicals public consultation feedback and responses summary

In addition, the following cross cutting information to support Applicants and Verifiers is available as follows:

- The Climate Bonds Standard v4.0: contains the requirements of the overarching CBS
- The Climate Bonds Standard v4.0 Entity and Sustainability-Linked Debt Checklist documents: provides further information on the cross-sectoral requirements for Entity and Sustainability-Linked Debt Certification respectively.

For more information on Climate Bonds and the Climate Bonds Standard and Certification Scheme, see www.climatebonds.net.

1.5 Revisions to these Criteria

These Criteria will be reviewed on a regular basis, at which point the TWG will take stock of the deals that are printed in the early stages and any developments in improved methodologies and data that can increase the climate integrity of future deals. As a result, the Criteria are likely to be refined over time, as more information becomes available. Certification will not be withdrawn retroactively from bonds certified under earlier versions of the Criteria.

2 Basic Chemicals Activities in Scope

2.1 Eligible basic chemicals

The Basic Chemicals Criteria apply to eligible assets and projects and companies relating to the production of a number of eligible organic and inorganic basic chemicals. Figure 1 illustrates the chemicals value chain and the basic chemicals in scope, which are also listed in Table 1.

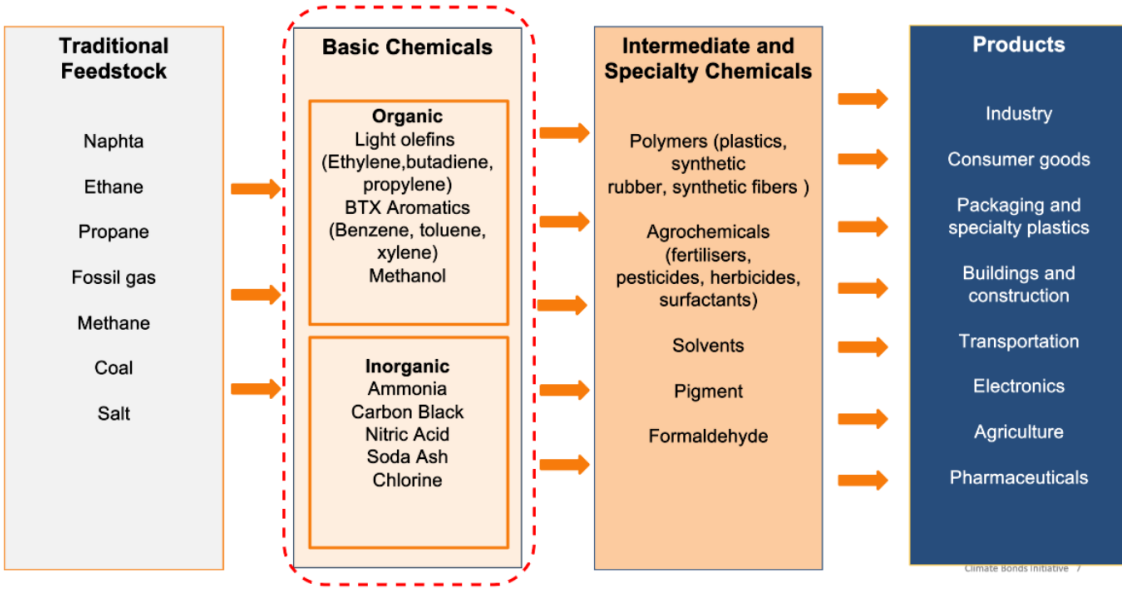

Figure 1: Chemical Industry Value Chain

Table 1: Eligible Basic Chemicals

Chemical Groups	Eligible Assets
Inorganic basic chemicals	• Ammonia • Chlorine • Disodium carbonate/Soda ash • Nitric acid • Carbon black
Organic basic chemicals	• High value chemicals (acetylene, ethylene, propylene, butadiene) • Aromatics (Benzene, Toluene and Xylene (BTX)) • Methanol

2.2 Alignment with other sector criteria

In respect of UoP bond certifications, where the proceeds will be allocated to multiple sectors, proof of compliance with multiple sector criteria may be required across the portfolio. For example, if the UoP bond is financing both basic chemicals activities and bioenergy activities, then the applicant would have to prove compliance with the Basic Chemicals Criteria in respect of the former and the Bioenergy Criteria in respect of the latter.

In respect of SLD and Entity Certifications, where the SLD or entity Performance Targets span multiple activities within the entity, all those activities will need to be assessed against the appropriate sector criteria and an overall 'pass threshold' reached. See the Climate Bonds Standard v4.0 Parts D and C respectively for more information on this.

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

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

Relating to	Sector Criteria
Bio-energy production	Bio-energy
Hydrogen production	Hydrogen
Renewable energy generation including Solar, Wind, Marine Renewable, Hydropower and Geothermal energy	Relevant corresponding energy sector criteria

3 Criteria for Decarbonisation Measures within Facilities Producing Basic Chemicals

These criteria cover measures undertaken within production facilities to reduce the GHG emissions from that facility. For any eligible decarbonisation measure, the costs of that measure are eligible use-of-proceeds under Use-of-Proceeds certification.

3.1 Mitigation Criteria

Table 3 lists potentially eligible decarbonisation measures, and any associated eligibility criteria specific to those investments.

In addition to those specific criteria, the decarbonisation measures must relate to a production facility where:

- At least 50% of annual production is on the list of basic chemicals in scope (per ***Section 2***).
- The energy source is not coal or coal derivatives or biomass.
- The feedstock is not coal or coal derivatives.

Table 3: Criteria for eligible decarbonisation measures or retrofitting activities

Area	Decarbonisation Measure	Mitigation criteria
Various		
Energy efficiency measures	Revamps, modifications or acquisition of equipment (boilers, furnaces, reactors, heat exchanger, distillation columns and other separation units, etc.)	At least a 30 % improvement in energy efficiency.
Switching to low carbon process technologies	Revamps, modification and acquisition of equipment and other infrastructure needed for the implementation and operation of low carbon process technologies.	The alternative processes technology does not release direct process CO2 emissions, e.g., methane pyrolysis, catalytic partial oxidation of methane to methanol.
Carbon Capture and Storage	Infrastructure related to CO2 capture of emissions from the basic chemicals production, transportation and storage	**Capture rate** The minimum capture rate from the entire facility should be 90%. Plus, there is evidence[2] that demonstrates the CO2 will be suitably transported and stored in line with the criteria below: **Transport** 1. The CO2 transported from the installation where it is captured to the injection point does not lead to CO2 leakages above 0.5 % of the mass of CO2 transported. 2. Appropriate leak detection systems are applied and a monitoring plan is in place, with the report verified by an independent third party. **Storage** 1. Characterisation and assessment of the potential storage complex and surrounding area, or exploration[3] is carried out in order to establish whether the geological formation is suitable for use as a CO2 storage site. 2. For operation of underground geological CO2 storage sites, including closure and post-closure obligations: 2.1. Appropriate leakage detection systems are implemented to prevent release during operation;

[2] Either directly from the issuer or through contracts or agreements with a third party

[3] 'Exploration' means the assessment of potential storage complexes for the purposes of geologically storing CO2 by means of activities intruding into the subsurface such as drilling to obtain geological information about strata in the potential storage complex and, as appropriate, carrying out injection tests in order to characterise the storage site

Area	Decarbonisation Measure	Mitigation criteria
		2.2. A monitoring plan of the injection facilities, the storage complex, and, where appropriate, the surrounding environment is in place, with the regular reports checked by the competent national authority. 3. For the exploration and operation of storage sites, the activity complies with ISO 27914:2017225[4] for geological storage of CO2. Furthermore, the use of any certification scheme is encouraged. Examples of certification schemes include the U.S. EPA Class VI well certification, which includes reservoir characterisation[5]. Another example includes the DNV GL certification framework to verify compliance with the ISO 27914:2017 Carbon dioxide capture, transportation and geological storage - Geological storage[6].
Relating to feedstock used		
Using hydrogen as a feedstock	Infrastructure for production using green hydrogen Refurbishment and retrofitting of facilities to use green hydrogen Acquisition of equipment to produce basic chemicals using green hydrogen	Hydrogen used as a feedstock meets the thresholds in ***Table 3***.
Using CO2 as a feedstock	Infrastructure for production using CO_2 as a feedstock Refurbishment and retrofitting of facilities to use CO_2 as a feedstock Acquisition of equipment to produce basic chemicals using CO_2 as a feedstock	1. The source of CO2 sources is either: ● Direct emissions from chemical production; OR ● Direct emissions from other industrial activities 2. The basic chemical produced is used for the manufacture of durable products (e.g. construction materials stored in buildings, or recyclable products e.g. PET). 3. If the basic chemical produced is used for products that release the CO2 immediately when the products are used (such as in urea, carbonated beverages, or fuels), the capital investment is not eligible. 4. CO2 is not used for enhanced oil recovery, and the production of other forms of fossil energy sources. 5. This measure may involve the need for electricity when electrochemical processes are used, and also the need for hydrogen as a feedstock. If so, that hydrogen must comply with the Climate Bonds criteria for hydrogen.

[4] ISO Standard 27914:2017, Carbon dioxide capture, transportation and geological storage - Geological storage (version of www.iso.org/standard/64148.html).

[5] www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-co2

[6] www.dnv.com/news/dnv-gl-launches-certification-framework-and-recommended-practice-for-carbon-capture-and-storage-ccs--108096

Area	Decarbonisation Measure	Mitigation criteria
Using biomass as a feedstock	Infrastructure for production using biomass Refurbishment and retrofitting of facilities to use biomass Acquisition of equipment to produce basic chemicals using biomass	The biomass used complies with the Climate Bonds **Bio-energy criteria** ***Section 3.2.2 Requirement 2: Reducing the risk of indirect land use impact***
Use of recycled material as feedstock (e.g. using olefins recovered from plastics chemical recycling processes)	Infrastructure for the production using recycled feedstock Refurbishment and retrofitting of facilities using recycled feedstock Acquisition of equipment to produce basic chemicals using recycled feedstock	Recycled material should: ● represent at least 20% of the feedstock in regions without local recycling regulations or with lower recycled content requirements. ● represent more than 20% of the feedstock in regions with local recycling regulations. If the region has a higher recycled content percentage, it should prevail. ● have lower cradle-to-gate emissions than the virgin material
Relating to energy used		
Electrification of the processes	Revamps, modifications and acquisition of equipment (furnaces, reactors, separators, etc.) and other infrastructure necessary for electrification of the processes	Automatically eligible
Heat supplied from geothermal, solar thermal or waste heat recovery systems	New heat exchange equipment, such as evaporators, furnaces, boilers, etc., Revamps or modifications to heating related equipment in existing process	Automatically eligible
Using hydrogen as an energy source	Revamps or modifications to equipment (boilers, furnaces, burners, etc.) in existing utilities system required for the use of hydrogen as fuel Infrastructure for the production of a basic chemical in scope using hydrogen as an energy source	Hydrogen used as a feedstock meets the thresholds in ***Table 3***.

Area	Decarbonisation Measure	Mitigation criteria
Using biomass as an energy source	Revamps or modifications to equipment (boilers, furnaces, burners, etc.) in existing utilities system required for the use of biomass as fuel Infrastructure for the production of a basic chemical in scope using biomass as an energy source	Only secondary organic streams are eligible. Wood and other dedicated crops are not eligible. The bio-energy complies with the Climate Bonds Bio-energy criteria: ***Section*** **3.2.1. Requirement 1: Meet the established GHG emissions threshold and conversion efficiency percentage** for heating/cooling, and co-generation (combined heat and power, CHP) facilities using biofuel/biomass; and ***Section 3.2.2 Requirement 2: Reducing the risk of indirect land use impact.***

3.2 Adaptation & Resilience

This section describes the Adaptation & Resilience (A&R) Component of the eligibility Criteria for decarbonisation measures. To demonstrate compliance, all measures must satisfy the requirements of the checklists detailed below in ***Table 4***.

The checklist is a tool to verify that the applicant has implemented sufficient processes and plans in the design, planning and decommissioning phases of a measure 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 surrounding system, if applicable.

All elements of the checklist must be addressed, and appropriate evidence provided that these requirements are being met or are not applicable in respect of the specific measure(s) linked to the bond. It is expected that the applicant's 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.

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

For each question in the scorecard:

- A 'yes' indicates sufficient proof given.
- A 'no' indicates insufficient proof.
- In case of a 'n/a,' please justify why the question is not applicable.

Table 4: Adaptation & Resilience Performance Checklist for Basic Chemicals Decarbonisation Measures

No.	Adaptation and Resilience checklist for Basic Chemicals Decarbonisation Measures	Proof Given	Overall Assessment
		For verifier to complete	
1.	**Section 1:** Clear boundaries and critical interdependencies between the measure and the system it operates within are identified.		
1.1.	Boundaries of the measure are defined using: 1. a listing of all 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 measure(s) 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. relationships of the measure(s) to nearby flood zones; 2. relationships of the measure(s) to surrounding water bodies and water courses; 3. reduction in pollinating insects and birds; 4. reduction in biodiversity or High Conservation Value[7] habitat; 5. dust and other practices that affect air quality; 6. appropriation of land or economic assets from nearby vulnerable groups[8]; 7.		

[7] High Conservation Value (HCV) habitat criteria in accordance with www.hcvnetwork.org.

[8] According to IFC Performance Standards

No.	Adaptation and Resilience checklist for Basic Chemicals Decarbonisation Measures	Proof Given	Overall Assessment
		For verifier to complete	
2.	**Section 2** Clear boundaries and critical interdependencies between the measure and the system it operates within are identified.		
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 measures 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 industrial facilities and infrastructure such as basic chemicals production plants and other infrastructure. The physical characteristics of climate change that must be considered in the risk assessment include: • *Temperature rise* o High temperatures can impact the operation and efficiency of certain types of equipment. • *Increasing intense precipitation events* o Heavy rainfall can result in flash pluvial flooding, which could significantly impact industrial assets[9]. o Drought may alter or reduce availability of water with temperature increase. • *Changes in cloud cover, wind speed or increasing temperature extremes* o Poses risks to the availability of reliable energy, both electrical or thermal. • *Sea-level rises* o Potential for flooding of coastal infrastructure and assets at risk from storm surge events. • *Increased soil erosion* o Risks to the availability of raw materials. o Risk to transport routes for supply chains. **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. • Risk assessments should use both top-down methods and bottom-up methods that look at inherent system vulnerabilities in local context. • A broad range of models can be used to generate climate scenarios. • For risk assessment, the TCFD The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities is recommended.		
3.	**Section 3:** The measure is suitable to climate change conditions over its operational life		
3.1	The equipment must be tolerant to the range of climate hazards identified in item 2 of this checklist and not lock-in conditions that could result in maladaptation.		
3.2.	Risk reduction actions/strategies must be tolerant to a range of climate hazards and not lock-in conditions that could result in maladaptation.		

[9] 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.

No.	Adaptation and Resilience checklist for Basic Chemicals Decarbonisation Measures	Proof Given	Overall Assessment
		For verifier to complete	
4.	**Section 4:** The measure does no harm to 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.		
	The equipment itself does not pose significant risk of harm to the system it is located within or others' natural, social, or financial assets according to the principle of best available evidence during the investment period, taking into account the boundaries and critical interdependencies as defined in item 1 in this checklist. Harm is defined as an adverse effect on any of the following items: 1. Adverse effects on local water bodies and water courses; 2. Air pollution from dust and other pollutants; 3. Relationships of the measure to nearby flood zones; 4. Reduction in pollinating insects and birds; 5. Reduction in biodiversity or High Conservation Value[10] habitat; 6. Appropriation of land or economic assets from nearby vulnerable groups[11].		

[10] High Conservation Value (HCV) habitat criteria in accordance with HCV Network

[11] According to IFC Performance Standards

4 Criteria for Facilities Producing Basic Chemicals

The production facility is eligible if it meets:

a. Basic chemical-specific mitigation criteria (see ***Section 4.1***); AND
b. Cross-cutting mitigation criteria that apply to all facilities regardless of the basic chemical(s) being produced (see ***Section 6***. More details in ***Section 3***, ***Table 3***); AND
c. Adaptation and resilience criteria (see ***Section 4.2***).

In addition to these criteria, the production facility must comply with the following headline requirements:

- At least 50% of annual production is on the list of basic chemicals in scope (per ***Section 2***).
- The energy source is not coal or coal derivatives or biomass.
- The feedstock is not coal or coal derivatives.

If the bond portfolio (e.g. for UoP certification) or the asset portfolio (for Asset certification) includes several production facilities, these criteria must be met by each facility for the portfolio to be eligible. I.e., there is no averaging across the portfolio.

4.1 Basic chemical-specific mitigation criteria

Production from that facility needs to meet specific emissions or energy intensity thresholds or other criteria per ***Table 5***. below.

Table 5: Basic chemical-specific carbon and energy intensity thresholds

Asset Type	Criteria				Criteria applicable in all years
	2022	2030	2040	2050	
Production of ammonia	<3 t CO2e/t H2, for the life cycle emissions of hydrogen used as feedstock **or** ammonia is recovered from wastewater.	1.67 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock **or** ammonia is recovered from wastewater.	1.0 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock **or** ammonia is recovered from wastewater.	0.6 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock **or** ammonia is recovered from wastewater.	CO2 from ammonia production should not be used for urea production.
Production of nitric acid	0.038 t CO2e/t nitric acid	0.021 t CO2e/t nitric acid	0.011 t CO2e/t nitric acid	0.007 t CO2e/t nitric acid	Use electricity that meets the most up to date Climate Bonds criteria for electricity grids.
Production of chlorine	2.45 MWh electricity/t chlorine	1.85 MWh electricity/t chlorine	Uses only electricity produced from renewable sources	Uses only electricity produced from renewable sources	Implement one of the following alternatives: a. Renewable-based[12] captive power generation b. Renewable-based power purchase agreement

[12] Energy produced from renewable sources such as wind, solar, and small hydropower generation

Production of carbon black	1.141 t CO2e/t carbon black	0.63 t CO2e/t carbon black	0.34 t CO2e/t carbon black	0.20 t CO2e/t carbon black	
Production of disodium carbonate/ soda ash	0.789 t CO2e/t disodium carbonate/ soda ash	0.44 t CO2e/t disodium carbonate/ soda ash	0.23 t CO2e/t disodium carbonate/ soda ash	0.14 t CO2e/t disodium carbonate/ soda ash	Implement one of the following alternatives: c. Renewable-based[13] captive power generation d. Renewable-based power purchase agreement
Production of high value chemicals (ethylene, propylene, butadiene)	0.51 t CO2e/t high value chemical	0.28 t CO2e/t high value chemical	0.15 t CO2e/t high value chemical	0.09 t CO2e/t high value chemical	
Production of aromatics BTX[14] (benzene, xylene and toluene)	0.0072 t CO2e/t aromatics BTX	0.0040 t CO2e/t aromatics BTX	0.0021 t CO2e/t aromatics BTX	0.0012 t CO2e/t aromatics BTX	
Production of methanol	<3 t CO2e/t H2, for the life cycle emissions of hydrogen used as feedstock	1.67 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock	1.0 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock	0.6 t CO2e/t H2 for the life cycle emissions of hydrogen used as feedstock	

[13] Energy produced from renewable sources such as wind, solar, and small hydropower generation

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

Box 1: Methodological notes for meeting the emissions intensity threshold

1. In terms of meeting the facility-level emissions intensity thresholds going forward, **applicants issuing a UoP bond for a basic chemical facility** may either:
   a) Calculate the **average** facility-level emissions intensity threshold over the term of certification, and demonstrate that the facility meets that average threshold at the time of certification; or
   b) Meet the threshold **at the time of certification and commit to 3 yearly assessments** by an approved verifier throughout the period of certification to verify that at each 3 yearly check-in, the facility meets the new, lower emissions intensity threshold in place at that time. If on any 3 yearly verification the facility is not demonstrated to meet the emissions intensity threshold then in place, certification will be removed.

A linear trajectory should be assumed for time periods between the dates and thresholds provided in ***Table*** 5. For a production plant producing different basic chemicals, a mass balance must be used to estimate the carbon intensity of each product or group of products.

Example:

Option a. Compliant

A 10-year bond starting in 2025 for HVC production may demonstrate that the plant's emissions intensity at the point of issuance meets the average emissions intensity of the plant pathway between 2025 and 2035:

- 2025 threshold = 0.28
- 2035 threshold = 0.15
- (0.28 + 0.15)/ 2 = 0.215t CO_2/t HVC
- The facility's emissions intensity in 2025 is already 0.20t CO_2/t HVC. **This is lower than the necessary averaged threshold (0.215 t CO2/t HVC) and the facility meets the criterion. No further verification is required for meeting emissions intensity thresholds.**

Option b. Compliant

a) A 10-year bond staring in 2035 would have to show compliance in annual reporting for the thresholds of 2035, 2038, and 2041. A linear trajectory should be assumed for time periods between the dates and thresholds provided in ***Table*** 5.

b) Verification must demonstrate every 3 years that these thresholds are met.

To demonstrate compliance with any of the emissions intensity thresholds set in ***Table 5***, issuers are required to carry out a GHG emissions assessment as described in ***Box 2***.

2. ***A note on interpretation for facilities producing chlorine: Table*** 5 presents quantitative thresholds up to 2039, and qualitative criteria after 2040. In this case, if certification is of a financial instrument whose term extends beyond 2039, issuers are required to present a transition plan to ensure that the shift to renewable electricity is effective after 2040.

The transition plan should include as a minimum the following details:

- A timeframe for the implementation of the project, with a start and a due date
- Main action steps of the transition plan
- Infrastructure or operation modifications required for the implementation
- Estimation of total additional operating and capital costs
- Technical and financial feasibility

3. **Applicants seeking certification of an asset not linked to any financial instrument must:** Meet the facility-level pathway threshold at the time of certification.[15]

[15] As this is a point-in-time certification, there is no need to continuously meet the pathway thereafter.

Box 2: Methodological notes for GHG assessment

The following emissions should be accounted for when comparing to the thresholds in ***Table*** 5.

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

The GHG emissions assessment should follow the latest version of the GHG accounting guidance for scope 1 and 2 emissions provided by the GHG protocol[16]. Results should be verified by an independent third party following the latest version of the GHG protocol standards[17] . Calculation using Regulation (EU) 2019/331 will be acceptable for assets located in the EU.

Life Cycle GHG Assessment for hydrogen: Cradle-to-site boundary includes cradle-to-gate emissions plus any transportation emissions to the site where a product is used. In this case, the life cycle assessment should follow ISO standards[18] (ISO 14040 and ISO 14044). The Recommendation 2013/179/EU will be acceptable for assets located in the EU. Results should be verified by an independent third party.

4.2 Adaptation & Resilience Criteria

4.2.1 The adaptation and resilience checklist

This section describes the Adaptation & Resilience (A&R) Component of the eligibility Criteria for basic chemicals production facilities. To demonstrate compliance, all facilities must satisfy the requirements of the checklists detailed below in ***Table 6***.

The checklists are tools to verify that the applicant has implemented sufficient processes and plans in the design, planning and decommissioning phases of a facility/facilities to ensure that the operation and construction of the facility minimises environmental harm and the facility is appropriately adaptive and resilient to climate change and supports the adaptation and resilience of other stakeholders in the surrounding system, if applicable.

All elements of the checklist must be addressed, and appropriate evidence provided that these requirements are being met or are not applicable in respect of the specific facility linked to certification. It is expected that the applicant's 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.

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

For each question in the scorecard:

- A 'yes' indicates sufficient proof given.
- A 'no' indicates insufficient proof.
- In case of a 'n/a,' please justify why the question is not applicable.

[16] The GHG protocol (2019). GHG accounting guidance for scope 1 and 2 emissions. WBCSD and WRI. https://ghgprotocol.org/sites/default/files/Guidance_Handbook_2019_FINAL.pdf

[17] The GHG protocol (2004). A Corporate Accounting and Reporting Standard. WBCSD and WRI. https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[18] ISO standards available at: www.iso.org/standard/38498.html; www.iso.org/standard/37456.html

Table 6: Adaptation and Resilience Criteria for Basic Chemicals Production Facilities

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
1.	**Section 1:** Clear boundaries and critical interdependencies between the production facility and the system it operates within are identified.		
1.1.	Boundaries of the infrastructure are defined using: 1. a listing of all 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/activity to surrounding water bodies and water courses; 4. Relationships of the asset/project to residential neighbourhoods surrounding the plant; 5. Damage or reduction in value of neighbouring property due to boundary structures at risk of falling during storm events; 6. Reduction in value of neighbourhood property due to pollution caused by the chemical facilities, due to extreme weather events (e.g., release of toxic chemicals due to failure in safety systems in case of extreme weather events); 7. Reduction in biodiversity or High Conservation Value[19] habitat; 8. Relationships of the asset/project to nearby flood zones; 9. Fire and other practices that affect air quality; 10. Appropriation of land or economic assets from nearby vulnerable groups[20];		
2.	**Section 2:** An assessment has been undertaken to identify the key physical climate hazards to which the production facility will be exposed and vulnerable to over its operating life		
2.1.	Key physical climate risks and indicators of these 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 the production of basic chemicals. • Is there a good understanding of the risks facing the facility today? In five years? In ten years? • Are risks defined and detailed? • Are risk areas for hazardous materials[21] identified? • Was a hazard assessment conducted to identify toxic, flammable, volatile and reactive chemicals[22] [23]?		

[19] High Conservation Value (HCV) habitat criteria in accordance with www.hcvnetwork.org

[20] According to IFC Performance Standards

[21] Hazardous materials include Explosive, flammable, combustible, corrosive, oxidising, toxic, infectious, or radioactive materials (Federal Emergency Management Agency)

[22] UCLID (International Uniform Chemical Information Database) software is a recommended source of data on intrinsic and hazard properties of chemical substances

[23] www.openaccessgovernment.org/climate-toxicology-human-health/68647

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
	• Was a Risk management plan (RMP) conducted for the chemicals in the list of regulated substances[24]? • Is there an accident management plan in place? • Time horizon is set according to the severity of the risks. Higher risk locations: shorter time (every 5 years). Lower risk locations: Longer time (every 10 years[25]). See ***Section 5.3*** of the Background Paper for tools and reference guidelines to assess degree of risks. • Where accurate assessments of climate variability for specific locations are not possible, use worst-case scenarios. Optional guidance for carrying out risk assessments is offered in ***Section 5.3*** of the Background Document. The potential impacts that must be considered in the risk assessment include the ones described in the following sections (2.2-2.9)[26]:		
2.2.	**Temperature rise and heat waves** 1. Potential increase in temperature may result in expansion and stress of plant, pipework and fittings. 2. There could be an increase in dust emissions from the site. 3. There could be an increase in odour from the site. 4. Increase in fugitive or diffuse emissions from the site. 5. Increase in pollution 6. Increase in water consumed for cooling purposes. 7. Increase in energy consumption due to added pumping of cooling water around site. 8. Limited cooling, which implies that throughputs could need to be reduced or processes shut down 9. Volatile chemicals can exceed their temperature range during transportation		
2.3. .	**Extreme cold weather** 1. Failure of trace heating systems a. Freezing of cooling water, resulting in blockages - particularly on long pipelines and storage in exposed areas. b. Process failures 2. Pipework ruptures, affecting: 3. Boiler condensate, process water, cooling water, effluent systems, this in turn may lead to process interruption. 4. Failure of pH control due to caustic systems solidifying (such as effluent treatment) 5. Catalytic processes can be affected, reducing performance 6. Freezing of coolant lines, equipment, and chemical reaction vessel resulting in rising reaction temperature and pressure 7. Frozen onsite roadways may restrict access for staff and emergency vehicles. 8. Lack of water for fire suppression 9. Damage to site infrastructure from snow-loading over extended periods.		
2.4.	**Daily extreme rainfall** 1. Flooding could lead to increased site surface water and flash flooding 2. The site may experience reduced access or egress due to site flooding. 3. Stored substances can react with water or be contaminated 4. Uncontrolled chemical reactions, for example due to shut down of refrigeration systems as a consequence of power outages and lack of backup facilities		

[24] EPA - Risk Management Plan Rule (www.epa.gov/rmp/risk-management-program-rmp-rule-overview)

[25] High/low risk areas are not generally provided by any source. It is recommended to look at potential climate hazards and identify which assets are likely to be exposed to those hazards, the likelihood and consequences of the exposure, and then identify how risky those assets are to climate change.

[26] Chemical Industries Association, 2021. Safeguarding chemical businesses in a changing climate. How to prepare a Climate Change Adaptation Plan

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
	5. Emergency relief systems, which work at atmospheric discharge pressure can be affected due to the static head of water. 6. Process equipment running hot materials can be affected by thermal stress		
2.5.	**Season rainfall increase** 1. Overland flow or groundwater flooding. 2. Flooding and associated impacts, as previously identified.		
2.6.	**Sea level rise** If located near the coast a site could experience increased: 1. Risk of flooding and associated impacts, as previously identified 2. Corrosion due to increase in saltwater spray 3. Reduction of useful life of assets due to frequent exposure to salty water		
2.7.	**Drier seasons** 1. Potential increased use or reliance on mains water for dust suppression and cleaning. 2. Potential for increase in dust emissions from the site.		
2.8.	**Decreased river flow** 1. Reduced dilution available in receiving watercourse for discharge of effluent, resulting in increased pollution		
2.9.	**Wildfires** 1. Severe damage on buildings, process equipment and industrial infrastructure 2. Release of toxic pollutants 3. Volatile organic solvents with low flash points can exacerbate the fire risk 4. Explosions 5. Pipelines for transporting oil and gas, fuel storage facilities, external floating roof tanks for combustible liquids can spread the fire 6. Supply chain disruption		
3.	**Section 3:** The measures that have or will be taken to address those risks, mitigate them to a level such that the production plant is suitable to climate change conditions over its operational life.		
3.1.	The following are examples of risk management activities[27] 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. Measures depend on the specific and local conditions of an asset.		
3.2.	**Temperature rise and heat waves** 1. Identify temperature limits that could impact your processes and workers 2. Regular inspection and preventative maintenance of plant and equipment. 3. Regular site cleaning and use of dust suppression systems 4. Appropriate odour abatement is in place and maintained effectively 5. Appropriate odour management plan is in place 6. Make sure an appropriate fugitive or diffuse emissions plan is in place. 7. Water can be cleaned and recirculated for reuse on site 8. Alternative cooling systems. 9. Assess how efficient the current cooling system is, and to propose upgrades or modifications where necessary.		
3.3.	**Extreme cold weather** 1. Identify temperature limits that could impact your processes and workers		

[27] Chemical Industries Association, 2021. Safeguarding chemical businesses in a changing climate. How to prepare a Climate Change Adaptation Plan

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
	2. Regularly inspect and maintain insulation, particularly on pipework and equipment in exposed areas of the site. 3. Consider added insulation on pipework containing water review operating procedures to make sure pipework is not left full of static water when not in use identify any potential dead-legs where static water may be held up 4. Reviewing the capability of caustic systems to remain liquid at expected colder temperatures. 5. Regularly inspect and maintain roadways during winter and remove any standing water 6. Make sure grit is available to treat road surfaces 7. Review the design of structures to withstand increased loadings.		
3.4.	**Daily extreme rainfall** 1. Suitable measures are in place for the management of expected surface water and flood waters a. Drainage systems are inspected and maintained b. External areas where wastes are handled or stored are provided with contained drainage c. The site drainage system and effluent treatment plant has sufficient storage or treatment capacity 2. Make sure there are suitable alternative transport routes to and from the site.		
3.5.	**Season rainfall increase** 1. Make sure suitable measures are in place for the management of anticipated overland flow or groundwater flooding. 2. Prepare flood plan including: a. Risk assessment of process equipment and services at greatest risk from flooding b. Provision of emergency pumps to remove floodwater and identification of lowest risk location for discharge of floodwaters c. Protection of control and electrical systems d. Identification and protection of flat bottom tanks at risk of floating in floodwater 3. Ensure backup power, capable of functioning during extreme weather events and guarantee the stability and safety of the stored chemicals.		
3.6.	**Sea level rise** 1. Prepare flood plan including: a. Risk assessment of process equipment and services at greatest risk from flooding b. Provision of emergency pumps to remove floodwater and identification of lowest risk location for discharge of floodwaters c. Protection of control and electrical systems d. Identification and protection of flat bottom tanks at risk of floating in floodwater 2. Prevent corrosion. Measures could include making sure that plant or equipment prone to corrosion are: a. Protected, such as by being painted with resistant coating b. Regularly inspected and maintained		
3.7.	**Drier seasons** 1. Measures are in place to review and minimise water use and to maximise collection and use of rainfall a. Mains water capacity is adequate, taking into account reduced availability of rainwater for activities such as dust suppression and cleaning		

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
	2. Potential for increase in dust emissions from the site.		
3.8.	**Decreased river flow** 1. Review the environmental risk assessment for discharge to water from on-site effluent treatment 2. Check existing environmental risk assessment to make sure low river flow used in assessment remains valid - if not, discuss with Environment Agency (local site inspector and water quality team) and carry out an updated environmental risk assessment		
3.9.	**Wildfires** 1. Implement active fire prevention measures such as fire detector, gas detector, design of sprinkler systems, use of line detectors, design of deluge systems, design of gaseous extinguishing systems[28] 2. Implement passive fire protection measures, like permanent inertization of warehouses, support for pipe racks, fireproofing cabling, use of fire resistance cable coating, protection of tank farms 3. Storage protection measures such as distancing to avoid fires from spreading within an industrial complex 4. Wildland and vegetation management		
4.	**Section 4:** The facilities do no harm to the climate resilience of the defined system they operate within, as indicated by the boundaries of and critical interdependencies with that system as identified in item 1 in this checklist.		
4.1.	The facilities themselves do not pose significant risk of harm to the system they are located within or others' natural, social, or financial assets according to the principle of best available evidence during the investment period, taking into account the boundaries and critical interdependencies as defined in item 1 in this checklist. Harm is defined as an adverse effect on any of the following items: 1. Adverse effects on local water bodies and water courses; 2. Air pollution from dust and other pollutants; 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[29] habitat; 6. Appropriation of land or economic assets from nearby vulnerable groups[30].		
5.	**Section 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. • Risk thresholds/trigger levels, for which new adaptation actions are set[31], are monitored		
5.2.	Indicators for risk mitigation measures identified under item 3 in this checklist are provided. • Determine whether planned outputs and outcomes from adaptation actions have been achieved[32].		

[28] Wehmeier & Mitropetros (2016). Fire Protection in the Chemical Industry

[29] High Conservation Value (HCV) habitat criteria in accordance with www.hcvnetwork.org

[30] According to IFC Performance Standards

[31] The adaptation process Coastal Climate Adaptation Decision Support (C-CADS), 2018.

[32] National Climate Change Adaptation Research Facility. NCCARF, 2018.

No.	Adaptation and Resilience checklist for Basic Chemical Production Facilities	Proof Given	Overall Assessment
		For verifier to complete	
5.3.	Issuers have a viable plan to annually monitor and evaluate a. climate risks thresholds/triggers, b. climate resilience performance, c. appropriateness of climate resilience measure(s) and to adjust as necessary to address evolving climate risks.		

4.2.2 Other environmental impacts

A thorough Environmental Impact Assessment for the facility and its site consistent with local regulations must be conducted by an independent third-party expert. The risks identified in that assessment have been addressed by implementing mitigation and compensation measures involving key stakeholders. In addition, the following specific requirements apply:

Pollution prevention

- Emissions must be lower than best available techniques emissions levels for the production of large volume organic chemicals[33] or large Volume Inorganic Chemicals-Ammonia, Acids and Fertilisers[34].
- Emissions must be lower than Best Available Techniques emissions levels for the wastewater and waste gas treatment/management systems in the chemical sector[35]
- The activity is not associated with the manufacture, placing on the market or use of: Persistent organic pollutants (POPs)[36] Mercury and mercury compounds, their mixtures and mercury-added products[37], substances that deplete the ozone layer[38], certain hazardous substances in electrical and electronic equipment[39].

4.2.3 Disclosure component

In the interests of transparency and disclosure, the following must be publicly disclosed:

- The planning standards, environmental regulations and other regulations that the facility has been required to comply with.
- The environmental impacts assessment for the facility and the measures taken to address identified risks.

[33] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC109279_LVOC_Bref.pdf

[34] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/lvic_aaf.pdf

[35] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016D0902&from=EN

[36] http://chm.pops.int/TheConvention/ThePOPs/AllPOPs/tabid/2509/Default.aspx

[37] www.mercuryconvention.org/sites/default/files/2021-06/Minamata-Convention-booklet-Sep2019-EN.pdf

[38] https://ozone.unep.org/treaties/montreal-protocol/summary-control-measures-under-montreal-protocol

[39] Annex II: https://ec.europa.eu/environment/topics/waste-and-recycling/rohs-directive_en#:~:text=The%20RoHS%20Directive%20currently%20restricts,and%20diisobutyl%20phthalate%20(DIBP).

5 Criteria for Entities and Sustainability-Linked Debt (SLD)

The following sections detail similar, yet distinct, criteria depending on what is being certified:

- A "Certified Entity" (in this case, a company or business segment producing basic chemicals in the scope of these criteria) - See ***Section 5.1***
- SLD issued by such a company - See ***Section 5.2.***

Section 5.3 contains methodological notes applicable to these requirements.

See also the Climate Bonds Standard v4.0 for the cross sectoral requirements for Entity and SLD Certification relating to Transition Plans and Disclosure for the Certified Entity and requirements in respect of the Parent Group (if any). These cross sectoral requirements must be met in addition to the base chemical production-specific requirements described here.

NOTE: *The Climate Bonds Standard allows for the certification of only part of a company or group of companies, or SLD that relates to only part of a company or group of companies. See the Climate Bonds Standard v4.0 for full details. This flexibility enables the certification of the part of a company or group of companies relating to base chemical production, separate from the certification of other activities of the company or group of companies of which it forms a part, for example a business segment producing base chemicals covered by these Sector Criteria.*

5.1 Base Chemical Criteria for Certified Entities

Two levels of entity certification are available, described in ***Table 7***:

Table 7: Levels of Entity Certification

Certification level	Entity Certification Requirements
Level 1: "Aligned"	**Climate Mitigation Criteria** 1. At the time of certification the Certified Entity's basic chemicals production facilities average emissions intensity and/or energy intensity of each group of chemicals under scope of these criteria meets the entity level pathway threshold and their future Performance Targets to 2050 continue to meet those declining thresholds (see ***Section 4.1, Table 5*** and the methodological notes in ***Section 5.3***); *and* 2. If any of the Certified Entities basic chemicals production facilities use alternative feedstocks or alternative fuels, implement electrification or use CCU or CCS, they must meet the respective cross-cutting criteria in ***Section 6***. More details in ***Section 3***, ***Table 3***. 3. For any plant becoming operational post certification date, that plant will meet the criteria described in ***Section 6*** from day 1 of commencing operation. Details of this to be provided in the Certified Entity's transition plan. **Adaptation and Resilience Criteria:** At the time of certification, all of the Assessed Entity's facilities meet the adaptation and resilience criteria described in ***Section 4.2***.
Level 2: "Transitioning"	The criteria are the same as for Level 1, except: The Certified Entity's basic chemicals production facilities average emissions intensity does not meet the emissions intensity threshold at the time of certification, but the future Performance Targets align with those entity-level emissions thresholds by **2030** and continue to align thereafter through to 2050 (see ***Section 4.1, Table 5*** and the methodological notes in ***Section 5.3***)

5.2 Base Chemicals Criteria for Sustainability-Linked Debt (SLD)

Two levels of SLB certification are available, described in ***Table 8***:

Table 8: Levels of SLD Certification

Certification Level	SLD Certification Requirements
Level 1: "Aligned"	**Climate Mitigation Criteria** 1. At the time of certification the average emissions intensity and/or energy intensity of the basic chemicals production facilities for each eligible base chemical represented by the Performance Targets linked to the SLD meets the entity level pathway threshold and their future Performance Targets to 2050 continue to meet those declining thresholds (see ***Section 4.1, Table 5 and the methodological notes in Section 5.3***); *and* 2. If any of the basic chemicals production facilities represented by those Performance Targets use alternative feedstocks or alternative fuels, implement electrification or use CCU or CCS, they meet the respective cross-cutting criteria in ***Section 6***. More details in ***Section 3***, ***Table*** 3. 3. For any plant represented by those Performance Targets becoming operational post certification date, that plant will meet the criteria described in ***Section 6*** from day 1 of commencing operation. Details of this to be provided in the Applicant's transition plan. **Adaptation and Resilience Criteria:** At the time of certification, all of the company's facilities meet the adaptation and resilience criteria described in ***Section 4.2***, and that is reassessed and reconfirmed every five years during the term of the SLD.
Level 2: "Transitional"	The criteria are the same as for Level 1, except: The average emissions intensity of the basic chemicals production facilities represented by the Performance Targets linked to the debt does not meet the emissions intensity threshold at the time of certification, but the future Performance Targets align with those emissions thresholds by 30 December **2030** and continue to align thereafter through to 2050 (see ***Section 4.1, Table 5 and the methodological notes in Section 5.3***)

5.3 Methodological notes

5.3.1 Assessment at portfolio level - calculating average emissions intensity

Assessment of whether the assessed entity's basic chemicals production activities meet the emissions intensity and energy intensity threshold is determined at a portfolio level. That is, the average emissions intensity and energy intensity across all of the basic chemicals production facilities is calculated and compared to the respective thresholds. The assessment must be conducted separately for each product or group of products under the scope of these criteria. It is not necessary to assess each facility individually.

Box 3: Example:

A chemical company that produces ammonia, chlorine and nitric acid applies for certification:

The **average emissions intensity of the hydrogen used** in all of the ammonia production facilities must comply with the thresholds in ***Table 5***;

The **average emissions intensity** of all nitric acid production facilities must comply with the emissions intensity thresholds in ***Table 5.***

The **average energy intensity** of all chlorine facilities must comply with the energy intensity thresholds in ***Table 5***.

5.3.2 Scope of emissions

The scope of emissions to be included is the same as those for individual production facilities. See ***Section 4.1, Table 5*** for details.

5.3.3 Thresholds to be met every three years

The emissions intensity thresholds over time describe a smooth curve down over time. In reality, decarbonisation may likely result in step changes in emissions levels. To reflect this, the Performance targets should align with the emission intensity threshold every three years as a minimum, but annual alignment is not required.

6 Cross-cutting Criteria

The following criteria apply in any plant, measure or Assessed Entity:

6.1 Additional criteria depending on the age of the facility

Facilities commencing operation in 2022 or after are eligible only if they:

- Implement technologies which avoid or reduce direct process emissions in order to prevent carbon lock-in. (e.g. methane pyrolysis does not generate CO2 in the reaction).
- Do not use virgin fossil feedstock if process emissions are directly released into the atmosphere.
- Do not use fossil fuels (with or without CCS).

6.2 Additional criteria depending on the feedstock used

Facilities or equipment using hydrogen, CO2 or biomass as feedstock are eligible only if they meet the following criteria:

- ***Hydrogen:*** The hydrogen used meets the thresholds in ***Table 5*** for hydrogen production.
- ***Biomass:*** The biomass used complies with the criteria described in ***Table 3***
- ***CO2:*** The CO2 used satisfies the criteria described in ***Table 3***.

6.3 Additional criteria depending on the energy used

Facilities or equipment using fossil gas, CO2 or biomass as feedstock are eligible only if they meet the following criteria:

- ***Fossil gas:*** Only eligible for existing facilities prior to 2030, and then only when combined with CCS or CCU measures that meet the criteria for CCS in ***Table 3***. Projects using fossil gas combined with CCS must demonstrate MRV (monitoring, reporting and verification), and mitigation measures for methane leaks on site and upstream[40]. Methane emissions must be below 0.2%. Any venting or burning to be reported and accounted in the GHG assessment.
- ***Hydrogen:*** The hydrogen used meets the thresholds in ***Table 5*** for hydrogen production.
- ***Biomass:*** The bio-energy complies with the criteria described in ***Table 3***

6.4 Additional criteria to address upstream scope 3 emissions

Applicants must lay out a strategy to address scope 3 emissions, including one of the following alternatives:

- Evidence for low-carbon procurement policies; or
- Partnerships with suppliers with GHG emissions reduction targets that can be measured; or
- Switching from fossil-based raw materials to alternative feedstocks such as biobased and recycled materials.

For alternative feedstocks, results from a life cycle GHG assessment with a cradle-to-site boundary needs to be used to quantify scope 3 upstream emissions.

6.5 Other additional criteria

Facilities using low carbon process technologies do not release direct process CO2 emissions, e.g. methane pyrolysis, catalytic partial oxidation of methane to methanol.

[40] Additional guidance can be found in the report *Best Practice Guidance for Effective Methane Management in the Oil and Gas Sector. Monitoring, Reporting and Verification (MRV) and Mitigation. United Nations Economic Commission for Europe. 2019* https://unece.org/fileadmin/DAM/energy/images/CMM/CMM_CE/Best_Practice_Guidance_for_Effective_Methane_Management_in_the_Oil_and_Gas_Sector__Monitoring__Reporting_and_Verification__MRV__and_Mitigation-_FINAL__with_covers_.pdf

Appendix A: TWG and IWG members

Climate Bonds Coordinator			
Marian Rodriguez Senior Research Analyst	Climate Bonds Initiative		
CBI Technical Lead Advisor:			
Elias Martinez Senior Research Scientist	Biomass Conversion Division, Mexican Institute of Petroleum. Independent consultant.		
TWG Members			
Camilla Oliveira Industry Project Manager	Agora-Energiewende. Latin America. Decarbonisation of industry.	**Jonathan Moncada** Researcher	Energy Transition Studies, The Netherlands organisation of applied scientific research (TNO))
Carina Oliveira Chemical Engineering Specialist	Energy Transition Studies, The Netherlands organisation of applied scientific research (TNO))	**Kok Siew Ng** Research Fellow	Industrial Innovation (Rutherford). Principal Investigator of the project SYNERGORS. Oxford University. UK.
Denny KS Ng Professor	Heriot-Watt University. Malaysia Campus. Head, School of Engineering and Physical Sciences	**Peter Levi**	IEA (International Energy Agency) Industry Lead, Energy Technology Policy Division. France
Fredric Bauer Associate senior lecturer in Technology and society.	Researcher at the division on Environmental and Energy Systems Studies. Contributing author to the IPCC Working Group III AR6 chapter on industry. Lund University. Sweden.	**Robert Adamczyk** Associate Director, Senior Environmental Adviser	EBRD. European Bank of Research and Development. UK
Gbemi Oluleye Research Associate	Department of Chemical Engineering and the Centre for Environmental Policy in the Faculty of Natural Sciences-Imperial College London. UK	**Thomas Rehm** Inaugural Chair	The Climate Solutions Community-American Institute of Chemical Engineers- Institute for Sustainability. USA.
Heriberto Cabezas Professor	Research Institute of Applied Earth Science, University of Miskolc, Miskolc, Hungary, Hungary.		
Adaptation & Resilience (A&R) Group			
Dale Sands Manging Director	Sands Consulting Solutions. Expert and advisor- Sustainability, adaptation and resilience in the industry. USA.	**Kristin Marshall** Lux Research Analyst	Associate Research Director at Lux Research. Expertise assessing climate risk, adaptation and resilience in the chemical industry. USA
Dr Fahim Tonmoy Associate Principal Engineer	BMT Adjunct Research Fellow Griffith University. Australia.	**Rita Ferreira** Sustainable finance Associate	S&P Global Research analyst with experience in extreme weather impacts in the chemical industry. Portugal

IWG Members			
Andrew Mak, Board Member	Carbon Care Asia	**Kristin Marshall,** Lux Research Analyst	Associate Research Director at Lux Research. Expertise assessing climate risk, adaptation and resilience in the chemical industry. USA
Armand Satchian, Associate, Sustainable Finance ESG Consultant	ISS-ESG	**Rita Ferreira** Sustainable finance Associate	S&P Global Research analyst with experience in extreme weather impacts in the chemical industry. Portugal
Isobel Edwards, Green Bonds Analyst	NN Investment Partners	**Mayur Mukati** Manager Sustainable Finance Solutions	Sustainalytics
Jana Hock, Research Manager	ShareAction	**Sothi Selvam** Director General	ICC (Indian Chemical Council)
Frans Stockman, Executive Director of Petrochemicals **Jelena Macura,** Head of Sustainable Finance	CEFIC (European Chemical Industry Council)	**Rakesh Kumar** Officer-Sustainability, Environment & Regulatory Issues **Harsharaj Karangle** Advisor **S Jaikumar** Secretary General	