Bioenergy Criteria under the Climate Bonds Standard

Aug 2022

Revision	Date	Summary of changes
1.3	1 August 2022	Clarification that Bioenergy 'Storage' is within scope as supporting infrastructure – i.e., providing the Bioenergy meets the overarching criteria (with Storage included in LCAs). Addition of Supporting Infrastructure section (section 3.4) which was previously absent.
1.2	23 March 2021	Feedstock certification best practice standards list updated to include CBI Agriculture criteria following analysis that it meets requirements in appendix 2. Removal of indication that a part 2 might be developed (that could have been for woody biomass feedstocks). This will not now be done.
1.1	28 July 2020	Swap 'bioenergy' to 'electricity' in table 2
1	July 2019	Publication of first criteria

Climate Bond Certified

August 2022

Definitions

Bioenergy assets and projects: Assets and projects relating to the acquisition, installation and / or management of bioenergy facilities, which might include: biofuel preparation and pre-treatment facilities, bio-refinery facilities, electricity, heating and cooling facilities using biofuel/biomass. Plus, assets and projects related to dedicated infrastructure and/or the production of dedicated components for these facilities.

Bioenergy: Energy generated from the conversion of solid, liquid and gaseous products derived from biomass.[1]

Biofuel: Liquid fuels derived from biomass. They include ethanol, a liquid produced from fermenting any biomass type high in carbohydrates, and biodiesel, a diesel- equivalent processed fuel made from both vegetable oil and animal fats.[2]

Biogas: A mixture of methane (CH_4) and carbon dioxide (CO_2) used as fuel and produced by bacterial degradation of organic matter or through gasification of biomass.[3]

Biomass: Any organic matter, i.e. biological material, available on a renewable basis. It includes feedstock derived from animals or plants, such as wood and agricultural crops, and organic waste from municipal and industrial sources.[4]

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 to catalyse investments at a speed and scale sufficient to avoid dangerous climate change and cope with unavoidable climate change.

Green Bond: A Green Bond is one in which the proceeds are allocated to green projects and labelled accordingly by the issuer. The vast majority of these green projects are focused on climate change mitigation or adaptation, but there is a small share of the market, which also funds green, non-climate projects, such as green spaces.

Certified Climate Bond: A green 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 impact. The CBS is made up of two parts: the parent standard (Climate Bonds Standard v2.1) and a suite of sector specific eligibility Criteria. The parent standard covers

[1] IEA/FAO (2017). *How 2 Guide for Bioenergy Roadmap Development and Implementation.*
[2] Ibid.
[3] Ibid.
[4] Ibid.

the certification process and pre- and post-issuance requirements for all certified bonds, regardless of the nature of the capital projects. The sector-specific Criteria detail specific requirements for assets identified as falling under that specific sector.

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 Bond Standard, including the adoption of additional sector Criteria, ii) Approved verifiers, and iii) Applications for Certification of a bond under the Climate Bonds Standard.

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 Climate Bonds Standard Board is satisfied the bond conforms with the Climate Bonds Standard.

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 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.

Industry Working Group (IWG): A group made up of potential green bond issuers, potential investors in bioenergy related green bonds, financial intermediaries in the bond issuance process, and Climate Bonds Standard approved verifiers who are responsible for assessing whether bonds meet the Criteria. The purpose of the IWG is to advise and review the Criteria being developed by the TWG, testing the practicality of the Criteria for green bond market participants and providing recommendations for further improvement.

Acknowledgement

We would like to thank all members of the Bioenergy Technical Working Group and Industry Working Group for their time and valuable expertise that helped shape these Criteria. A full list of all TWG and IWG members can be found in Appendix 1 and on our website.

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1. Introduction

1.1 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 questions 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, either through their contribution to climate mitigation, and/or to 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 Technical and Industry Working Groups, 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 appropriate specific Sector Criteria.

1.2 The need for Bioenergy Criteria

Bioenergy has the potential to be a key mitigation technology due to its flexibility as a generation technology as a well as a form of solid, liquid or gaseous fuel. By replacing fossil fuels, the use of biomass/biofuel can reduce GHG emissions in the power, heat and transport sectors, while the bioenergy with carbon capture and storage (BECCS)[5] is considered as a negative emissions technology to achieve 2-degree or below global warming target. However, in some circumstances, bioenergy can have no net positive impact, or even a negative impact on climate change mitigation and/ or on the resilience of ecosystems to climate change through changes to water quality, biodiversity and soil carbon, etc.

To ensure consistency and credibility for those wishing to issue or invest with confidence in credible green bonds linked to bioenergy, it is therefore necessary to determine robust and

[5] BECCS refers to bioenergy facilities combined with carbon capture and storage technologies so that the carbon emissions generated during bioenergy combustion or manufacture of biofuels are separated and then injected into long-term geological storage. Source: IEA (2017). *Energy Technology Perspectives 2017.*

transparent screening Criteria, which will ensure that any bioenergy projects and assets linked to use of proceeds of Certified Climate Bonds are 'climate compatible' (i.e. are sufficiently low carbon and enabling greater climate adaptation and resilience in a world of unavoidable climate change, in line with the goals of the Paris Agreement).

The Bioenergy Criteria are intended to provide such robust and transparent screening Criteria for the green bond market.

1.3 Assets and projects in scope for the Criteria

These Criteria apply to assets and projects relating to:

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

Further details of the scope of the Criteria are in Section 2, Table 1.

1.4 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 low carbon infrastructure;
- Promote adaptation and resilience to climate change both in respect of assets and projects themselves and the systems in which they are located.

Complete details of the requirements in respect of Bioenergy assets and projects are detailed in Section 3 of this document. The reporting requirements associated with these requirements are summarised in Section 4.1.

In addition, in order to promote best practice as regards transparency over use of proceeds, issuers are also encouraged to disclose further information as detailed in Section 4.2 of this document. However, this is not mandatory for certification.

1.5 This document and supplementary information available

This document details:

- The current scope of bioenergy assets and projects eligible for certification under the Climate Bonds Standard – Section 2;
- The Mitigation and Adaptation & Resilience Requirements that these assets and projects must meet to be eligible for inclusion in a Certified Climate Bond – Section 3;
- Mandatory and recommended disclosure – Section 4

Supplementary information available in addition to this document include:

1. Bioenergy Criteria Brochure: a 2-page summary of the Bioenergy Criteria.

2. Bioenergy Criteria Background Paper: full background to the process of determining these Criteria, including issues raised and discussed by the TWG, and arguments and rationale for the approaches and decision taken.
3. Climate Bonds Standard V2.1: the umbrella document laying out the common requirements that all Certified Climate Bonds need to meet, in addition to the sector-specific Criteria (V2.1 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 Bond Standard & Certification Scheme, see https://www.climatebonds.net For the documents listed above, see https://www.climatebonds.net/standard/bioenergy

1.6 Revisions to these Criteria

These Criteria will be reviewed regularly, 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.

2. Potentially eligible bioenergy assets and projects

The Bioenergy Criteria use a feedstock-neutral approach and do not express a preference for certain feedstocks. This means that the Criteria cover bioenergy generated from different types of feedstock, including residues, energy crops and lignocellulosic biomass such as straw, with three exceptions:

- Wood (and all woody biomass)
- Third generation biofuels (algae)[6]
- Biodegradable Municipal Solid Waste (MSW), including sewage sludge and food waste

Therefore, 'eligible feedstock' for the purposes of these Criteria includes all feedstocks except for the three exceptions noted above.

Table 1 presents bioenergy assets and projects that might be included in a Certified Climate Bond, subject to meeting the Criteria described in Section 3. Table 1 is provided for illustrative purposes and is not an exhaustive list of every possible bioenergy asset or project that would be eligible.

The assets in Table 1 are eligible for inclusion in a Certified Climate Bond if they meet:

- The Mitigation requirement (see Section 3.2 for details); and
- The Adaptation and Resilience requirement (see Section 3.3 for details).

That is, bioenergy assets and projects need to meet both Mitigation, and Adaptation & Resilience requirements of the Bioenergy Criteria to be eligible for certification under the Climate Bonds Standard.

Table 1 provides signposting as follows:

- A green circle indicates assets or projects that automatically meet the Mitigation and/or Adaptation and Resilience requirements of the Criteria.
- An orange square indicates that the eligibility of these assets or projects is conditional on meeting specific requirements per the Mitigation and/ or Adaptation and Resilience requirements of the Criteria.
- A red diamond indicates that these assets or projects are not eligible for inclusion in a Certified Climate Bond under any circumstances.

Table 2 demonstrates assets and projects that are not covered by the Bioenergy Criteria.

[6] Future iterations of these Criteria will reconsider the inclusion of algae biofuels when the technology and market is more developed and better information is available.

Table 1 Illustrative assets and projects eligible for Climate Bonds Certification under the Bioenergy Criteria

Asset type	Example use of proceeds	Mitigation requirement	Adaptation & Resilience requirement
Facilities producing biofuel/biomass using feedstock in scope	Fuel preparation process facilities such as those for drying, size reduction, pelletisation or briquetting, and pyrolysis		
	Pre-treatment facilities such as those for thermochemical liquefaction, pyrolysis and gasification		
	Bio-refinery facilities which produce biomass-based products for energy purpose (power and heat). They may also co-produce bio-mass based products for non-energy use (such as food and feed ingredients, pharmaceuticals, chemicals, materials and minerals), with ≥ 50% biomass-based products produced for energy use.		
Energy production facilities using feedstock in scope	Heating/cooling, and co-generation facilities using biofuel/biomass		
	Traditional biomass assets or projects, such as a three-stone fire for heating and cooking in the residential sector.[7]		
Supporting infrastructure	Dedicated transmission lines from an eligible bioenergy facility to the main grid		
	Dedicated bioenergy storage facilities		
	Infrastructure that is built to power the extraction or distribution of fossil fuels.		

Table 2 Assets and projects not covered by the Bioenergy Criteria

Assets/projects not covered	Explanation for exclusion
Facilities producing Electricity from biodegradable municipal solid waste (MSW), including sewage sludge and food waste.	Covered by the Water Infrastructure Criteria and the Waste Management Criteria under the Climate Bonds Standard respectively.
Land and land management assets for the cultivation/ production of feedstocks and biomass for bioenergy	Covered under appropriate sector criteria, e.g. Forestry for timber, Agriculture (in development) for various other feedstocks.

[7] Traditional biomass has very low conversion efficiency (10%-20%), with inefficient combustion leading to harmful emissions with serious health implications.

Transportation assets to transport biomass to pre-treatment or bioenergy or bio-refinery facility and vehicles used in the process of the production or transportation of bioenergy, e.g. flexi-fuel vehicles, or that run on biofuels.	Covered by the Climate Bonds Standard Land Transport Criteria.
Facilities for the manufacture of ships and aircraft that run on biofuels, and those ships and aircraft themselves	Covered by the Climate Bonds Standard Shipping Criteria (in development) and Aviation Criteria (to be developed). Noting though that these Bioenergy Criteria cover biofuel used for shipping and aviation.
Blending facilities mixing with biofuel and fossil fuel	These facilities are beyond the control of bioenergy production. The Climate Bonds Standard will keep watching this space and set up requirements for blending facilities with further investigation in transport sector.
Facilities dedicated to the production of biomaterials (food, feed, chemicals, etc.)	Facilities where less than 50% of input feedstock is used to produce bioenergy, biofuel and/or biomass will not be eligible under the current iteration of the Bioenergy Criteria, due to the challenges to determining appropriate eligibility Criteria for such projects and facilities.
Infrastructure that is built to power the extraction or distribution of fossil fuels.	Do not qualify under the standard.

3. Eligibility Criteria

3.1 Overview of the Eligibility Criteria

The Bioenergy Criteria has two sets of requirements:

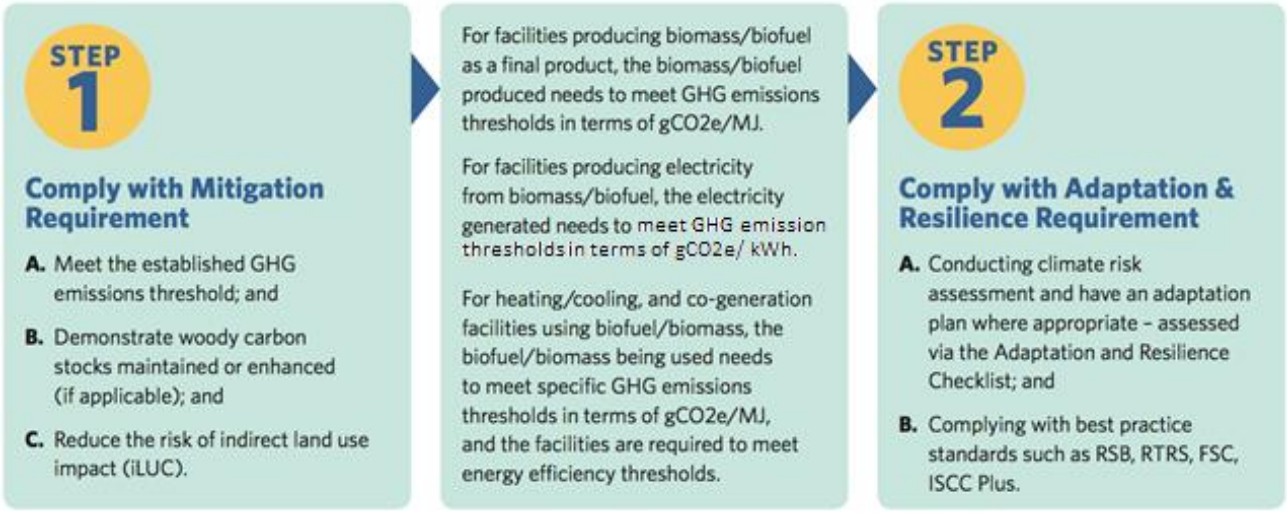
- Mitigation Requirement – details in 3.2 (bioenergy facilities)
- Adaptation and Resilience Requirement – details in 3.3

Figure 1 summarises the requirements under each of these headings, which are explained in more detail in Sections 3.2 and 3.3.

Section 3.4 (Supporting Infrastructure) makes clear that all dedicated infrastructure for bioenergy are eligible providing the bioenergy meets the criteria in 3.2 and 3.3.

Note that when the bond portfolio includes several separately identifiable projects or groups of assets, these Criteria must be met for each separately identified project or asset grouping. Bond issuers should determine and justify these project boundaries or asset groupings.

Figure 1: Summary of eligibility Criteria



3.2 Mitigation Requirement of the Criteria

For the assets and projects linked to the bond, issuers are required to:

1. Meet the established GHG emissions threshold; and
2. Reduce the risk of indirect land use impact (iLUC).

3.2.1. Requirement 1: Meet the established GHG emissions threshold

For facilities producing biomass/biofuel as a final product, including liquid biofuel, solid and gaseous biomass for heating and co-generation, and biofuel for transport, the biomass/biofuel produced needs to meet specific GHG emissions thresholds in terms of gCO_2e/MJ (primary energy) (Table 3).

For heating/cooling, and co-generation (combined heat and power, CHP) facilities using biofuel/biomass, the biofuel/biomass being used needs to meet specific GHG emissions thresholds in terms of gCO_2e/MJ (Table 3), and the facilities are required to achieve energy conversion efficiency of 80%. Note that CHP facilities need to meet requirements when they are in CHP mode.

Table 3 provides the summary of these thresholds. The rationale of determining these specific thresholds can be found in the Bioenergy Criteria Background Paper Section 4.3.3 – 4.3.7.

Table 3 Summary of the GHG emissions thresholds for different asset types

Asset type	Thresholds for biofuel/biomass produced/used (primary energy)	Energy efficiency thresholds
Facilities producing liquid biofuel, solid and gaseous biomass for heating and co-generation	16.0gCO_2e/MJ	N/A
Facilities producing biofuel for transport	18.8gCO_2e/MJ	N/A
Heating/cooling, and co-generation facilities using biofuel/biomass	16.0gCO_2e/MJ	80%

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

The scope of the LCA should include:

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

For facilities producing both biomass-based products for energy purpose (power and heat), and for non-energy use (such as food and feed ingredients, pharmaceuticals, chemicals, materials and minerals), issuers are required to allocate GHG emissions to the biomass for energy purpose based on energy content of the biomass-based products. For such facilities, only the biomass for energy purpose needs to meet the GHG emissions thresholds detailed in Table 3 above. That is, at this time, there is no additional GHG emissions thresholds for biomass products for non-energy use. However, users of these Criteria are reminded that if biomass products for energy use accounts for less than 50% of feedstock inputs then the facility is not certifiable under these Criteria.

Issuers are required to use one of the five tools in Table 4 below for GHG emissions calculation.

Table 4 Endorsed GHG Calculation Tools

Name	Technical scope	Origin
BIOGRACE I[8]	Liquid biofuels	EU
BIOGRACE II[9]	Biomass for electricity, heating and cooling	EU
RSB GHG Calculator[10]	Liquid biofuels	International
UK Solid and Gaseous Biomass Carbon Calculator[11]	Solid biomass and biogas used for heat and electricity generation	UK
GREET[12]	Alternative fuels in transport	US
RenovaCalc[13]	Ethanol, biodiesel, aviation biokerosene and biogas from waste	Brazil

Using other tools is not a viable option, issuers may not use other tools (including bespoke tools) to calculate GHG emissions. If there are extenuating circumstances which mean this is not possible, please contact Climate Bonds Initiative to discuss the options available.

3.2.2. Requirement 2: Reducing the risk of indirect land use impact

Bioenergy facilities must either:

- Be certified under the RSB low indirect land use change (iLUC) optional module[14] to demonstrate that they have low indirect land use impact; or
- Provide evidence and documentation to demonstrate that they meet low iLUC risk biomass criteria and compliance indicators under the RSB optional module, i.e.:
  - *Yield increase*: issuers demonstrate that source feedstock for the facility is produced through an increase in yield compared to a reference date, without any additional land conversion. The biomass that is produced above the baseline scenario is eligible.
  - *Unused/degraded land*: issuers demonstrate that source feedstock for the facility is produced from land that was not previously cultivated or was not considered arable land.
  - *Use of waste / residues*: issuers demonstrate that the raw material used is derived from existing supply chains and does not require dedicated production out of arable land

Details of the RSB iLUC model can be found here: http://rsb.org/the-rsb-standard/standard-documents/low-iluc/

3.3 Adaptation and Resilience Requirement

For the assets and projects linked to the bond, issuers are required to:

1. Conduct a climate risk assessment and have an adaptation plan where high risks are identified – assessed via the Adaptation and Resilience Checklist; and

[8] http://www.biograce.net/home

[9] Ibid.

[10] http://rsb.org/services-products/ghg-calculator/

[11] https://www.ofgem.gov.uk/publications-and-updates/uk-solid-and-gaseous-biomass-carbon-calculator

[12] https://greet.es.anl.gov/

[13] http://biofutureplatform.org/wp-content/uploads/2018/06/RenovaBio-Mechanism-Policy-and-Instruments.pdf

[14] Or using the Etanol Mais Verde Protocol if the potential project is an ethanol project in Sao Paulo State, Brazil.

2. Demonstrate that their source feedstocks are compliant with established and approved best practice standards for the industry to make sure feedstock production is environmentally sustainable and climate resilient; and
3. Identify food security risk, if any; and have a plan to address it when the risk is significant.

The Adaptation and Resilience Checklist is complementary to compliance with the best practice standards as currently these standards do not explicitly address climate risks nor require climate risk mitigation.

3.3.1. Requirement 1: Adaptation & Resilience Checklist

The checklist (Table 5) is a tool to verify that the issuer has implemented sufficient processes and plans in the design, planning and decommissioning phases of the asset or project to ensure that the operation and construction is appropriately adaptive and resilient to climate change and also supports the adaptation and resilience of other stakeholders in the surrounding ecosystem.

All elements of this checklist must be addressed with appropriate evidence 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 this 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, Environmental Impact Assessments, Vulnerability Assessments and associated Adaptation Plans.

Table 5 Checklist for evaluating the Issuer's Adaptation & Resilience performance in respect of a bioenergy facility

Item	Proof given	Overall assessment
Section 1: The issuer identifies the climate related risks and vulnerabilities to the asset/ site		
Processes are in place (as part of both the asset design and ongoing management) to assess key risks to the assets from a changing climate. These key risks should include the following, plus any others felt to be of concern for the operation of these assets. The risks should be identified and interpreted in terms of the impact on the asset and the related effects for the business – e.g. impact on operating feasibility and schedules and potential system outages, impact on maintenance requirements etc. N.B. This list taken from World Banks Climate and Disaster Risk Assessment Tool ● Temperature changes, and extremes in temperature ● Extreme precipitation and flooding ● Drought ● Sea level rise and storm surge ● Strong winds How these affect the asset or site in question will be highly variable and will be for the issuer to identify and relate to their operations. These assessments should use climate information, modelling and scenarios from a peer reviewed source. This assessment should be done regularly. The frequency of the assessment will depend on the nature of the climate related risks and vulnerabilities, and should be specified by the issuer and reporting against in subsequent annual reporting.		

Section 2: The issuer identifies the impacts in larger context (spatially and temporally) beyond the asset/site (i.e. the impacts of the linked assets and projects on the broader ecosystem and stakeholders in that ecosystem)		
Processes are in place (as part of both the asset design and ongoing management) to assess the impact of the bioenergy asset on the climate resilience of other stakeholders in the social, economic and environmental system in which it operates and how to mitigate or reduce any negative impacts These assessments address: ● Any ways in which bioenergy facilities might affect the climate resilience of other users/stakeholders? ● Any ways in which bioenergy facilities improve the adaptation capacity of other users/stakeholders? For example, they may include: ● Impact on water quality and quantity for other users in the basin ● Waste and pollution emitted ● Fire hazards		
Section 3: The issuer has designed and implemented strategies to mitigate and adapt to these climate risks and vulnerabilities to the underlying assets and projects and the broader ecosystem and its stakeholders.		
An adaptation plan has been designed and is being implemented to address the risks identified in assessments above The issuer has designed or amended investment and maintenance plans for the assets or projects and the broader ecosystem and its stakeholders. This is to ensure that the asset and its scheduled maintenance is sufficient to cope with the ongoing impacts of climate change and a plan has been established to govern how they approach emergency maintenance needs arising from sudden climate change impacts (e.g. extreme storms) The issue has training, capacity and governance arrangements in place for how the organization will deal with the impacts of exception events (e.g. droughts, floods, severe pollution events, extreme storms, winds etc.) The issuer has monitoring and reporting systems and processes to identify high risk scenarios The issuer has contingency plans to address disruption to operations or loss of the asset and any resulting broader environmental or social damage The issuer has processes for feeding risk assessment back into decision making. The issuer has a budget allocated to implementing the adaptation plan and has a named member of staff responsible for its implementation. The issuer complies with any existing broader or higher-level adaption plans, such as NAPAs.		

3.3.2. Requirement 2: Feedstocks certified under approved best practice standards

Issuers are required to demonstrate that they are sourcing feedstock that is produced in an environmentally sustainable way and therefore promotes climate resilience. They have two options for how they do this.

Option A – Feedstocks used are certified under one of the following, pre-approved best practice standards:

- RSB
- RTRS
- FSC
- ISCC Plus
- CBI Agriculture Criteria

Certification of all source feedstocks must be maintained for the full term of the bond.

The Bioenergy TWG will check every two years whether there are other standards or schemes that should be included in the list of pre-approved best practice standards for these Criteria.

Option B – Feedstocks are certified under a standard or a similar scheme where issuer can prove the standard has sufficient requirements and thus is robust.

In cases where certification of feedstock inputs under one of the pre-approved best practice standards is not a viable option, issuers will be able to demonstrate to the verifiers compliance with the Criteria using other standard or certification scheme.

Under this option, issuers are required to provide evidence that the proposed standard/scheme they use has sufficient requirement about environmental impacts and governance. This means the issuer needs to check the proposed standard against Table 6 in Appendix 2, which is used by the Bioenergy TWG to evaluate the robustness of the best practice standards, in order to demonstrate the proposed standard sufficiently covers the requirements in Table 6.

The Bioenergy TWG will review the evidence provided and decide whether the standards or scheme used by the issuer is robust and sufficient to cover environmental and governance issues, and make decision on whether to approve the standard proposed by the issuer as one of the approved best practice standards. Once approved, issuer will be able to use the certification against the proposed standard to demonstrate the compliance with climate change adaptation and resilience requirements under the Bioenergy Criteria.

Again, where approved, certification of all source feedstocks must be maintained for the full term of the bond.

3.3.3. Requirement 3: Addressing food security risk

The requirement for addressing food security risk is based on *RSB Food Security Assessment Guidelines*.[15]

Issuers are required to first evaluate food security at national level by checking latest International Food Policy and Research Institute's Global Hunger Index (GHI)[16] to see whether their sourcing feedstock are produced in food insecure nations. If the feedstock production is located in a country with low or moderate ranking on the GHI, there is no further requirement.

Otherwise, the issuer needs to assess whether the production of the sourcing feedstock is likely to have impacts on food security, and to establish corresponding mitigation and enhancement measures if the impacts are significant. Issuers can follow guidelines such as RSB Food Security Assessment Guidelines and FAO's Bioenergy and Food Security Assessment[17], or any other robust and publicly available guidance.

Note that there is no need for issuers whose feedstock already obtained certification from RSB (which covers food security issues), to meet this requirement. In this case, verifiers only need to verify that the issuer's feedstock is all certified under RSB.

3.4 Supporting Infrastructure

All supporting infrastructure (e.g., storage infrastructure) demonstrated to be dedicated to bioenergy is eligible for certification provided the bioenergy itself meet the overarching criteria (3.2 and 3.3).

4. Reporting Requirements

4.1 Reporting to demonstrate compliance with the Criteria described in Section 3

In accordance with the Climate Bonds Standard, it is the issuers responsibility to provide to the approved verifier the information necessary to demonstrate compliance with each requirement of the Criteria. Per the requirements outlined above, it is therefore necessary for the issuer to provide the approved verifier with:

- Life cycle assessment (LCA) of GHG emissions of biofuel/biomass produced/used, including scope, tool(s), GHG emissions allocation methodology, and the result of GHG emissions.
- Energy efficiency of facilities (only applicable for heating/cooling, and co-generation facilities using biofuel/biomass).

[15] http://rsb.org/the-rsb-standard/rsb-standard-tools-guidance/impact-assessment-guide/

[16] http://ghi.ifpri.org

[17] http://www.fao.org/energy/bioenergy/bioenergy-and-food-security/assessment/en/

- Certification against the RSB iLUC module or evidence and documentation to demonstrate the compliance with the criteria under the module.
- Assessment against the Adaptation & Resilience Checklist.
- Certification of the feedstock against one of the approved best practice standards; or assessment of the proposed standard/scheme against Table 6 in Appendix 2, and certification of the feedstock against the proposed standard/scheme.
- Information about the GHI ranking of the country where the feedstock production is, and if applicable, assessment of impacts on food security and the corresponding mitigation plan.

4.2 Additional reporting encouraged, but not mandatory for certification

In the interests of transparency and disclosure, issuers of Certified Climate Bonds are encouraged to publically disclose the following in respect of the assets and use of proceeds incorporated in that issuance. This is for transparency purpose only. There is no need for verifier to check this information.

- Project location and size, including description of ecosystem in proximity to planned installations;
- Projected lifespan of the asset/project;
- Key stakeholders involved, including other users of the area and surrounding area (sea, land or air depending on what is applicable) of the facility(ies);
- Description of project activities including details on installation, operation and decommissioning activities;
- Expected/current facility capacity and generation during and after the life of the bond;
- Details of where the energy generated is being fed into, and estimated impact on grid mix;
- The planning standards, environmental regulations and other regulations that the project has been required to comply with.

Appendix 1 Bioenergy Working Group Member

Bioenergy Technical Working Group (TWG) Members

Round 2 development

- Dr. Ausilio Bauen, Director, **E4Tech.**
- Barbara Bramble, Vice President, International Conservation and Corporate Strategies, **National Wildlife Federation.**
- Aziz Elbehri, Senior Economist, Trade and Markets Division, **Food & Agriculture Organisation (FAO).**
- Dr Birka Wicke, Assistant Professor, Copernicus Institute of Sustainable Development - Energy & Resource, **Utrecht University.**
- Jack (John) N Saddler, Professor, Department of Wood Science, **The University of British Columbia.**
- Luc Pelkmans, Project Manager Bioenergy & Biomass, **VITO.**
- Dr Thomas Buchholz, Forest and Agriculture, **Spatial Informatics Group (SIG).**
- Uwe R. Fritsche, Scientific Director, **International Institute for Sustainability Analysis and Strategy.**

Round 1 development

- László Máthé, Accreditation Program Manager and Lead Author, **Accreditation Services International.**
- Luc Pelkmans, Project Manager Bioenergy & Biomass, **VITO.**
- Molly Jahn, Professor, **University of Wisconsin-Madison.**
- Shay Reza, Co-Founder, **Arise International.**
- Dr Thomas Buchholz, Forest and Agriculture, **Spatial Informatics Group (SIG).**
- Uwe R. Fritsche, Scientific Director, **International Institute for Sustainability Analysis and Strategy.**

Bioenergy Industry Working Group (IWG) Members

- Artur Yabe Milanez, **BNDES**
- Brad C. Friedman, **Ramirez & Co., Inc.**
- Bryan Sherbacow, **AltAir Fuels**
- Christian Carraretto, **EBRD**
- Cindy Thyfault, **Wester Trade Resources**
- David Fairchild, **Bureau Veritas UK**
- David Kemp, **M&G Investment**
- Derek Ip, **S&P Trucost**
- Dimitri Koufos, **EBRD**
- Elena Schmidt, **Roundtable on Sustainable Biomaterials**
- Gerard J.Ostheimer, **SEforALL**
- Mark Robinson, **DNV GL**
- Matthew Brander, **University of Edinburgh**
- Melanie Eddis, **ERM**
- Michael Brown, **Ryze Capital Partners**
- Michael Burns, **Novozymes**
- Mike Cao, **Shanghai Mu Yi Investment Advisors Ltd**

- Monica Reid, **Kestrel Consulting**
- Nikos Ntavos, **Cluster of Bioenergy & Environment of Western Macedonia**
- Paul Curtis-Hayward, **Guy Butler Limited**
- Dr Richard Mills, **Strategy Director, Boeing UK**
- Terri Smalinsky, **Ziegler Investment Banking**
- Wenqin Lu, **CECEP**

Appendix 2 Determining the robustness of best practice standards

Table 6 Areas to be considered for determining the robustness of best practice standards

Environmental	Priority areas protection The area of land to be utilized does not contain, and is not suspected of containing, primary forest or High Conservation Value (HCV) areas. The land area is not being converted from native ecosystems, such as forests to a plantation or other land use.
	GHG emissions Efforts are made on the farm to reduce fossil fuel emissions and increase carbon sequestration. Techniques can include soil carbon management, restoration of native vegetation, and eliminating in-field burning practices.
	Indirect land use Possible unintended consequences of indirect land use change have been assessed and show that the crop generates low indirect land use change risks (e.g., produced from agricultural waste/byproducts, produced on degraded lands, or production is integrated with food production).
	Chemical use Agrochemicals are properly used on site, judiciously and in a targeted fashion using available expertise. There is no use of hazardous agrochemicals listed as Classification I or II in the World Health Organization's Recommended Classification of Pesticides by Hazard. Agrochemicals are prepared and applied by trained personnel with appropriate protective gear and in accordance with the law and producer guidelines - and not by children or pregnant women. Potential impacts on local communities of chemical run-off and spraying are assessed and managed.
	Pest management An Integrated Pest Management (IPM) plan is developed and implemented, ideally incorporating biological controls. An Integrated Weed Management plan is developed and implemented, ideally including cultural and biological controls, appropriate rates of pre- and post-emergent applications, and appropriate altering of active ingredients.
	Nutrient management A Nutrient Management Plan focused on optimal uptake and minimal loss of nutrients has been developed and is implemented. The plan can include: soil and foliage testing (regularly and especially prior to fertilizer applications), use of variable rate technologies for fertilizer application, crop rotation, and use of cover crops and filter strips.

	Soil management A Soil Management Plan is developed and implemented with a focus on soil productivity, including retention of soil biomass levels, soil structure, salinity, pH, and carbon sequestration. The plan can outline crop and geographically appropriate practices such as no-till, only planting on suitable slopes, use of cover crops, crop rotation, tree hedges, and contour planting, etc. The plan should also include adequate protection of riparian areas.
	Water management A complete assessment of water resource requirements and discharge impacts should be conducted, taking into consideration crop needs, soil water holding capacity, hydrological conditions, downstream human and environmental needs and uses, and impacts that the water use and discharge will have on the watershed, community health, and regional ecology. This is especially important in water stressed areas. A Water Management Plan is in place that addresses relevant risks and includes concrete measures to protect ground water or local water bodies.
	Genetic diversity management Species selection e.g. no introduction of invasive alien species that disrupt native genetic diversity, or that are not suitable for current or projected future ecological conditions
	Sustainable resource extraction Resources are managed to prevent overexploitation
	Waste management Minimising waste from spoilage, utilisation of by products, maximisation of waste to energy opportunities
Governance	Compliant with ISEAL's code of good practice
	Multi-stakeholder in involvement in standard development process
	Multi-stakeholder participation in the standards system
	Scientific input in development of standard
	Transparency in public reporting
	Transparency in communication of the standards documents and processes
	Complaints and appeals process
	Regular reviews and revisions of the standard
	Standard gives accreditation
	Stakeholder consultation in certification and auditing process

	Audits required annually
	Audit sample size specified
	Sanction mechanisms in place
	Training of auditors
	Training opportunities for users of the standard