



# BONSUCRO PRODUCTION STANDARD

VERSION 5.1 JANUARY 2022





## **Bonsucro Production Standard**

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This document is written in English. Bonsucro will base all its interpretation and decisions upon the English version. Bonsucro does not assume any liability for errors or misunderstandings introduced when this document is translated into other languages.

Bonsucro (trading name of Better Sugarcane Initiative Ltd.) is responsible for this document. Bonsucro Standards are reviewed at least every five years. The next review of the Bonsucro Production Standard is scheduled for January 2027.

Please write to Bonsucro if you would like to receive a printed copy of the Bonsucro Production Standard Version 5.

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## INTRODUCTION

Bonsucro is the leading global sustainability platform and standard for sugarcane, one of the world’s most important crops. We convene over 270 members from more than 50 countries to address critical challenges in the sugarcane sector and drive both performance and impact through our system of sustainability standards. We work across all sugarcane products and derivatives – sugar, ethanol, molasses, and bagasse in traditional and newer market sectors, from sugar and alcohol to biofuels and bioplastics.

## BONSUCRO STRATEGIC PLAN 2021 - 2026 CHANGING FOR GOOD

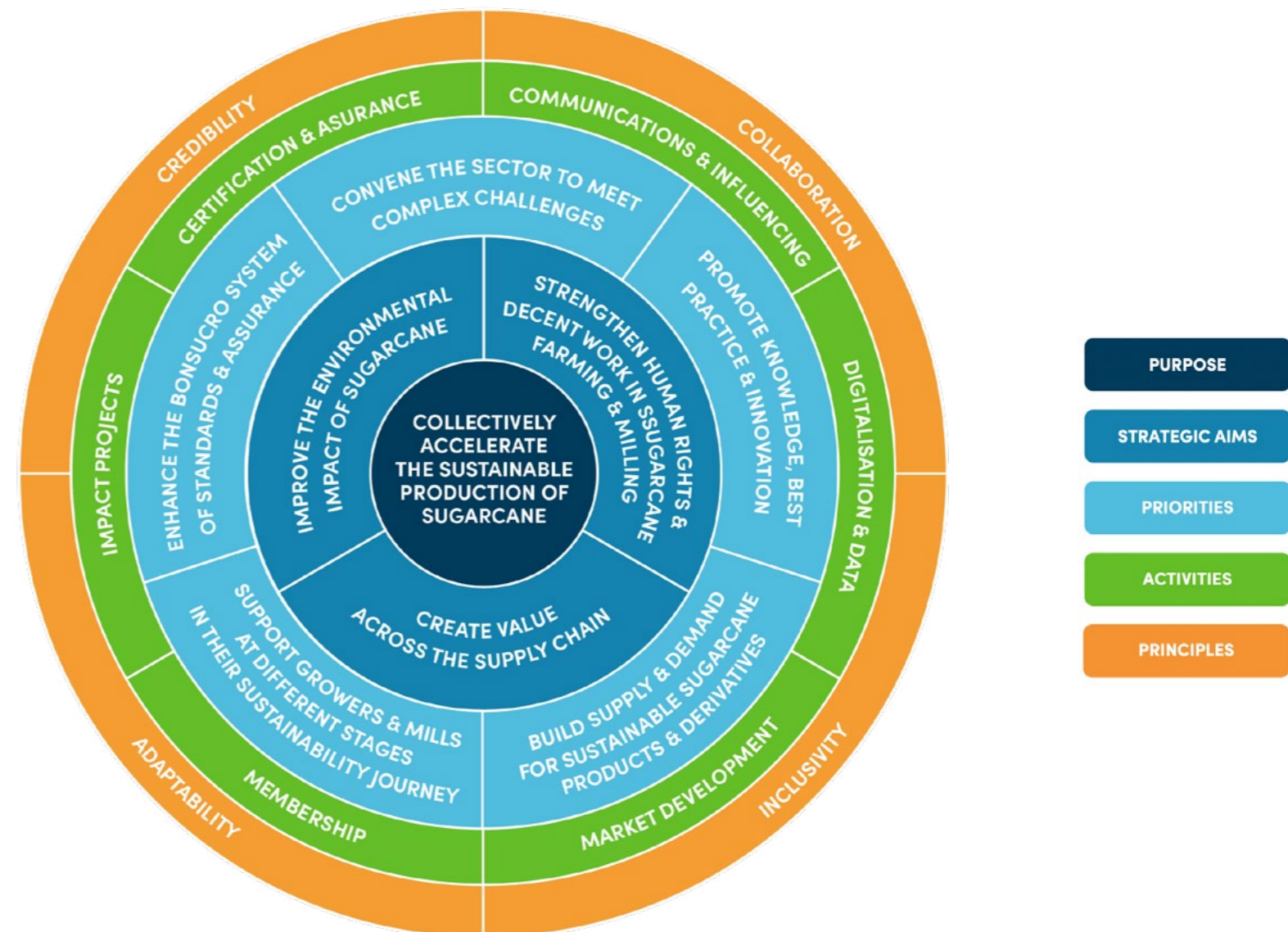
### PURPOSE

Our Statement of Purpose expresses our core reason for being and the overarching goal that drives our strategic priorities and choices.

To collectively accelerate the sustainable production and uses of sugarcane

This statement captures our role as a catalyst for market transformation, driving the production and uptake of sustainable sugarcane – across sugar, ethanol, molasses, and bagasse value chains. It also expresses our position as a global sustainability platform, working collaboratively with farmers, millers, traders, end users, civil society, government and other sustainability initiatives to scale sustainability across the sector and landscapes.

Unlike other sustainability initiatives, Bonsucro focuses exclusively on sugarcane and all its end-products. It does so on a global basis with a strong local presence in the countries that produce, use and consume the most sugarcane and its products.



AIMS	Objectives	Indicators	Baseline	Target
IMPROVE THE ENVIRONMENTAL IMPACT OF SUGARCANE	Drive climate action in the sugarcane sector	% Reduction in Scope 1 and 2 emissions of certified mills and farms after 5 years' certification	18% reduction 0.33 kg CO <sub>2</sub> e/kg sugar to 0.27 kg CO <sub>2</sub> e/kg sugar	>30% reduction
		Collective commitments & actions** in line with 1.5° global warming	To be determined through 2021-22	
	Improve water security & stewardship	% Increase in water-use efficiency (kg per mm per hectare) by certified producers after 5 years certification	28% increase 105 kg/mm/ha to 135 kg/mm/ha	>30% increase
	Improve biodiversity and soil health	# hectares High Conservation Value Areas (HCVA) protected & maintained in high-risk areas	To be determined through 2021-22	
STRENGTHEN DECENT WORK AND RESPECT FOR HUMAN RIGHTS IN SUGARCANE FARMING AND MILLING	Increase wages in sugarcane farming and milling	% increase in average differential between wages paid above legal minimum wage after 5 years of certification	Farm: +16% to +21% average differential Mills: +18% to +26% average differential	Farm: 30% increase Mill: 45% increase
		Collective commitments & actions** on Living Wage	To be determined through 2021-22	
	Improve occupational health & safety in farming and milling	% reduction in accidents in certified farms & mills after 5 years' certification	Farm: 38% decrease Mill: 18% decrease	Farm: 43% decrease Mill: 23% decrease
CREATE VALUE ACROSS THE SUPPLY CHAIN	Increase supply & demand of certified sustainable sugar, ethanol & derivatives	Hectares of certified sugarcane annually	1.3 million ha	2 million ha
		Number of certified mills	130 mills	210 mills
		Tonnes certified sugar & m <sup>3</sup> certified ethanol produced (or equivalent)	Sugar: 6.2 million Ethanol: 2.7 million	Sugar: 9.6 million Ethanol: 4.3 million
		Number of Bonsucro raw sugar credits (or equivalent) sold annually Tonnes of certified physical products sold ex-mill	Credits: 1.2million Chain of Custody: 820,000 t	Credits: 2.2 million Chain of Custody: 1.6 million t
	More inclusive & sustainable value chains	Number of independent farmers & smallholders reached* by Bonsucro certification and/or impact projects over 5 years	3,000 farmers	15,000 farmers

## CORE PRINCIPLES

Our four Core Principles guide our operational choices and decision-making in implementing our Strategic Aims and Priorities.

### COLLABORATION

Collaboration is central to our identity as a multi-stakeholder initiative with a global membership drawn from all parts of the sugarcane sector with an interest in sustainability. Our success as a standard and as a platform requires us to convene, learn and share with like-minded organisations.

### INCLUSIVITY

We need to be inclusive to drive sector transformation. This includes engaging with workers, mills, farmers, and producer communities; enabling sustainability improvements outside of certification; and aligning and co-operating with strategic partners, other sustainability standards systems and government agencies for collective benefit.

### CREDIBILITY

Transparency and the credibility of our standards, assurance, MEL and impact reporting are vital to our work. We adhere fully to the ISEAL Credibility Principles, embraced by other leading sustainability standards systems working to bring about positive social, environmental and economic impacts, while decreasing negative impacts.

### ADAPTABILITY

Sugarcane production and uses are highly impacted by landscapes, economies, markets, culture, and governments. Sustainability is a journey of continuous improvement. We will adapt our offering and approach to different contexts and, wherever possible, devolve responsibility to our people and partners on the ground. We will strengthen our organisational adaptability and resilience to ensure we can pivot to respond to unforeseen events and crises.

Sustainability Pillar	 Environmental	 Social	 Economic
<b>Strategic Aim</b>	Improve the environmental impact of sugarcane	Strengthen Decent Work and respect for human rights in sugarcane farming and milling	Create value across the supply chain
<b>SDG contribution</b>	 6. Ensure availability and sustainable management of water and sanitation for all   11. Protect & restore sustainable use of terrestrial ecosystems   13. Take urgent action to combat climate change and its impacts	 5. Achieve gender equality and empower women & girls   8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all   12. Ensure sustainable consumption & production patterns

## CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS

Our three Strategic Aims correspond to the three pillars of sustainable development and define how we will contribute to the UN’s 2030 Sustainable Development Goals (SDGs).

## BONSUCRO PRODUCTION STANDARD

The primary purpose of the Bonsucro Production Standard is to define a set of principles, criteria, and indicators, along with explanatory notes, for the assessment of the performance of operators against the three pillars of sustainability. It is aimed at Bonsucro members who wish to achieve certification. It is also used by Licensed Certification Bodies and auditors when carrying out certification audits. Finally, it is aimed at the wider audience of the sugarcane sector and any interested parties.

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## STRUCTURE

The Bonsucro Production Standard is structure around five (5) principles, twenty (20) criteria and seventy-two (72) indicators:

- PRINCIPLE 1 – Assess and manage environmental, social & human rights risks
- PRINCIPLE 2 – Respect labour rights & occupational safety and health standards
- PRINCIPLE 3 – Manage input, production, and processing efficiencies to enhance sustainability
- PRINCIPLE 4 – Actively manage biodiversity and ecosystem services
- PRINCIPLE 5 – Continuously improve other key areas of the business

Each Standard indicator includes:

- The indicator: composed of a reference number and title.
- The indicator scope: indicates the area at which the indicator should be applied to.
- The indicator standard: this verifier indicates the data or information that enhances the specificity or the ease of assessment of the indicator or a way to answer the question set by the indicator title. It can be a metric value, or it can be Yes or No.
- The full indicator wording: provides detailed requirement information to implement the indicator: the operator conformity is assessed against the indicator full description.
- Reference to the Guidance documents published separately by Bonsucro:
  - a. GUI Production Standard Implementation Guidance: the guidance offers best practices, suggestions, and examples of how operators may implement the requirements.
  - b. GUI Certification and Auditing Guidance: the guidance offers best practices, suggestions, and examples of how auditors may audit against the requirements.

The operators will not be audited against guidance. The Standard should be read in conjunction with the guidance for support in implementing and auditing against the indicators of the Production Standard.

## SCOPE

The Bonsucro Production Standard applies worldwide to any sugarcane mill and their supplying area wishing to sell sugarcane derived products as Bonsucro certified and make related claims. The Standard evaluates the outcome of practices implemented at mill and farm (also referred to as agriculture) levels.

### Unit of certification

The certificate holder can be:

- the mill
- the mills and its cane supplying area
- the group of farmers

For more information, refer to the Bonsucro Certification Protocol V6 Part 2 Section 1 Scope of certification.

Please note that some indicators are applicable to:

- Area outside the unit of certification: 1.2.3 and 1.2.4
- Whole supply area: 4.1.1 and 4.3.1

In addition, Bonsucro also publishes other Standards which operators must comply with in line with the scope of certification section of the Bonsucro Certification Protocol V6 Part 2 Section 1.

The Bonsucro Production Standard has **two different types of indicators**:

- Core indicators: which must be complied with. These are identified with the term 'Core' in the column "scope" throughout the Standard;
- Non-core indicators: which must be complied with in line with the certification decision section of the Bonsucro Certification Protocol V6 Part 2 Section 20. These are identified by the absence of the term 'Core' in the column "scope" throughout the Standard.

For more information on how an operator will be audited against the core and non-core indicators please see the Bonsucro Certification Protocol V6 Part 2 Sections 18 to 20.



## RELATED DOCUMENTS

- SCH Bonsucro Calculator
- GUI Bonsucro Production Standard Implementation Guidance
- GUI Bonsucro Certification and Auditing Guidance
- SCH Bonsucro Certification Protocol
- SCH Bonsucro EU RED Standard
- SCH Bonsucro Mass Balance Chain of Custody Standard
- SCH Bonsucro Production Standard for Smallholder Farmers
- Other scheme and reference documents as published on the Bonsucro Document Library

## IMPLEMENTATION

This version of the Bonsucro Production Standard V5.1 was published on 1<sup>st</sup> January 2022. This version supersedes all previous versions and includes new and changed requirements. New and changed requirements can be found in the Summary of changes document.

Any audit against the Bonsucro Production Standard started from 1<sup>st</sup> September 2022 must be conducted against Bonsucro Production Standard V5.1. This is applicable to:

- operators that are certified before 1<sup>st</sup> September 2022
- operators scheduled to start their first certification (initial) audit from 1<sup>st</sup> September 2022

Any audit against the Bonsucro Production Standard started between 1<sup>st</sup> April 2022 1<sup>st</sup> September 2022 may be conducted against Bonsucro Production Standard V5.1. This option, if selected by the operator, should be discussed with the certification body to consider feasibility before proceeding to the audit. This is applicable to:

- operators that are certified before 1<sup>st</sup> September 2022
- operators scheduled to start their first certification (initial) audit from 1<sup>st</sup> September 2022

## CHANGE HISTORY

As a multi-stakeholder organisation, Bonsucro seeks to engage stakeholders when changes are proposed and made to our standards. Here you will find detailed information about this process and current work on standards development, as well as information on how these key documents were created.

The Bonsucro Production Standard is at the heart of everything Bonsucro does. It sets out a definition of what sustainable cane production should look like, providing a comprehensive metric tool for sustainable farming and milling. Bonsucro wants to maximise the impact the Standard has on the future of the sugarcane sector and enhance the value added for the producers who implement, use and comply with it.

The “Bonsucro Production Standard” contains principles and criteria for achieving sustainable production of sugarcane and all sugarcane derived products in respect of economic, social, and environmental dimensions. Its primary purpose is to define a set of principles, criteria and indicators, along with explanatory notes, for the assessment of the performance of operators against the three pillars of sustainability. The Standard is used by Bonsucro members who wish to achieve certification. It is also used by Licensed Certification Bodies and auditors when carrying out certification audits.

The Bonsucro Standard development and revision procedure is based on the [ISEAL Standard Setting Code](#). It requires a multi-stakeholder consultation and decision-making process to ensure clear and auditable conditions in the standard itself. The process is driven by stakeholder led Standard Revision Working Group (SRWG) and supported by the Technical Advisory Board and the Members Council. [Standard Development and Revision Procedure](#).

Bonsucro is ISEAL Code Compliant. Our system has been independently evaluated against ISEAL’s Codes of Good Practice– a globally-recognised framework for effective, credible sustainability systems. More information is available at [www.isealalliance.org](http://www.isealalliance.org).

## VERSION 5.1

In April 2019, upon the recommendation of the Bonsucro Secretariat, the Board of Directors agreed to start the revision process of the Bonsucro Production Standard. The Board instructed the Secretariat to follow the Standard Revision Procedure set up in line with the ISEAL Code of Best Practice for Standard Setting.

The Secretariat formed a standard revision working group, made up of individuals with expertise in all areas of the Bonsucro Production Standard. The SRWG was given the task to draft the new version of the Bonsucro Production Standard. They based their work on two public consultations, two pilot audits and the involvement of several external consultants and technical experts.

Each meeting was minuted and minutes were made public on the Bonsucro website. The SRWG first met in London in July 2019. The Working group met again in November 2019 and subsequently met remotely throughout 2020. In October 2021, the Working Group met in Madrid to approve the final version of the Production Standard.

A total of 2 public consultations to which 402 people participated were carried out during the project.

- May – July 2020: 1st public consultation
- June –July 2021: 2nd public consultation

A total of two pilot audits were carried out

- July 2021: Brazil
- July 2021: India

The Bonsucro Production Standard v5.1 was endorsed by the Bonsucro Board of Directors on the 17th December 2021 and published on 17th of January 2022.

Revision round	Date	Description of amendment
A	June 2010	Draft version send to Bonsucro EU Sub Committee
B	July 2010	Final version approved by Bonsucro Management Committee
C	December 2010	Revision made based on compliance with EU RED
D	February 2011	Revision made based on compliance with EU RED
Draft version 2.0	November 2013	First draft open for public consultation
Draft version 2.5	June 2014	Second Draft open for public consultation
Draft version 2.9	July 2014	Final draft published for vote by members
Version 4	July 2014	Revised Bonsucro Production Standard and Guidance with inclusion of new indicators and clarification added to the guidance document which became a guidance for implementation. 16 core indicators over 8 criteria 12 new indicators (added or replacing other indicators) 2 indicators with modified values 2 indicators removed Removal of Principle 7 – Chain of Custody
Version 4.1	August 2015	Revised Principle 6 to include certification for cellulosic ethanol produced from by-products of sugarcane (e.g. sugarcane straw and bagasse) in the Bonsucro EU certification scope. Additional corrections made to Indicator 3.1.4 and Annex 4.
Version 4.1.1	September 2015	Revised indicator 6.1.2 to include a definition for highly biodiverse grassland to comply with EU Regulation no. 1307/2014.
Version 4.1.2	May 2016	Revised indicator 6.1.2 to clarify assessment requirements for the role of an expert to determine whether the land had or has a highly biodiverse grassland status.
Version 4.2	December 2016	Revision in light of amendments to RED and FQD, as described in Directive 2015/1513
Draft version 5.01	May 2020	First Draft for Public Consultation
Draft version 5.07	June 2021	Second Draft for Public consultation
Version 5.1	January 2022	Revised Bonsucro Production Standard and Guidance with inclusion of new indicators and clarification. Now includes 72 indicators over 20 criteria 12 new indicators (added or replacing other indicators) 2 indicators with modified values 2 indicators removed Removal of Principle 6 – EU RED

## ACKNOWLEDGEMENT

On behalf of the Bonsucro Secretariat, I would like to express our gratitude to the many people and organisations who contributed to the development of the Bonsucro Production Standard version 5.

Principal thanks go to the participants of the Standard Revision Working Group who have dedicated time, knowledge, and passion to this two-and-a-half-year project. Without their advice and decisions, we would not have delivered such an improved Standard that meets the societal expectations.

Thank you to the producers who allowed certification bodies to carry out the pilot audits against the draft Standard, their collaboration ensured the revised Standard and Guidance are practical tools that can be implemented in the field. Thank you to all the Bonsucro members, certification bodies and other experts for sharing their experience and knowledge and ensuring the resulting Standard and Guidance are in line with the reality of the sector and certification process.

Thank you to the Bonsucro Members' Council for the inputs, Technical Advisory Board for the oversight and the Board of Directors for their counsel. Their engagement to our common mission is invaluable and all played a critical role according to the terms of reference for this review.

Finally, thank you to Nicolas Viart and Nahuel Tuñon who led the revision process for the Bonsucro Secretariat, working tirelessly through the pandemic to guide the development of this new standard.

London 17th December 2021  
Danielle Morley  
CEO, Bonsucro

*\*Past and Present Members of the Standard Revision Working Group:*

*Ruth Ascencio, Robert Quirk, Miguel Tejada, Danielle Lima, Luiz Iaquina, Olivia Scholtz, Ilana Weiss, Nitin Kayande, Cristina Lopez, Pat Brenchley, Dr. Kendyl Salcito, Dr François-Régis Goebel, Marina Carlini, Alex Bjork, Aurea Nardelli, Peter Allsopp, Dr Catharina Wesseling, Marianne Lips, Mario Amador, Andre Valente.*

## PRINCIPLE 1 - ASSESS AND MANAGE ENVIRONMENTAL, SOCIAL & HUMAN RIGHTS RISKS

CRITERION	1.1 – Leadership demonstrated through elaboration and implementation of sustainability policies		
INDICATOR	Scope	Standard	Full indicator wording
1.1.1 The operator develops and implements sustainability policies.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>In line with the scope of application and content of the Bonsucro Production Standard, the operator has policies in place to respect:</p> <ul style="list-style-type: none"> <li>• human rights aligned with UNGP</li> <li>• indigenous peoples' rights, community engagement and land rights</li> <li>• labour rights,</li> <li>• occupational health and safety,</li> <li>• environmental protection / non-conversion of HCVs</li> <li>• Anti-Corruption/Anti-Bribery/money laundering,</li> <li>• Ethical conduct</li> </ul> <p>Policies shall be signed by senior management. The operator's commitment is made available to personnel, suppliers, clients, and other stakeholders, with a legitimate interest duly demonstrated. The policies clearly state that respect for these values is an active duty involving ongoing due diligence of actual and potential impacts.</p> <p><i>For further information, see Guidance</i></p>
CRITERION	1.2 Risks and impacts are systematically assessed		
INDICATOR	Scope	Standard	Full indicator wording
1.2.1 The operator conducts mapping of internal, external, and vulnerable stakeholders	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>The operator has an identification, prioritization and engagement plan with interested and affected parties. The plan shall have achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes and allocated resources. The plan reflects continuous improvement and organisation learning principles</p> <p>The plan is revised at least every 3 years or sooner as per company procedures.</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 1 - ASSESS AND MANAGE ENVIRONMENTAL, SOCIAL & HUMAN RIGHTS RISKS

INDICATOR	Scope	Standard	Full indicator wording
1.2.2 The operator conducts a risk analysis on compliance against the Bonsucro Production Standard	Mill Agriculture	Yes	The operator conducts a risk analysis on compliance against the indicators of the Bonsucro Production Standard. The analysis shall be revised at least every 3 years or more regularly as per company processes and activities.  <i>For further information, see Guidance</i>
1.2.3 The operator conducts and documents an improvement opportunity assessment outside the unit of certification	Mill Agriculture Area outside the unit of certification <b>CORE INDICATOR</b>	Yes	The operator shall conduct and document an assessment that identifies opportunities to address adverse social and environmental conditions as framed by core indicators in Principle 2, 3, 4 of the Bonsucro Production Standard on the operations in the area outside the unit of certification. The assessment shall be revised at least every 3 years or more regularly as per company processes and activities.  <i>For further information, see Guidance</i>
1.2.4 The operator develops and implements a continuous improvement plan to address the salient opportunities identified outside the unit of certification.	Mill Agriculture Area outside the unit of certification <b>CORE INDICATOR</b>	Yes	Based on the assessment in indicator 1.2.3, the operator shall develop and document a continuous improvement plan which defines and prioritises actions the operator shall take to narrow environmental and social gaps between certification area and supplier area. The continuous improvement plan shall be progressive & appropriate to the size, sector, operational context, ownership, and structure of the operator with achievable actions & objectives, agreed responsibilities, timeframes, and allocated resources. The plan reflects continuous improvement and organisational learning principles. The plan shall be revised at least every 3 years or more regularly as per company processes and activities. If conversion of natural ecosystems has been identified as a risk for the whole supply base (in indicator 1.2.3), then it should be addressed as a matter of priority.  <i>For further information, see Guidance</i>

**PRINCIPLE 1 - ASSESS AND MANAGE ENVIRONMENTAL, SOCIAL & HUMAN RIGHTS RISKS**

<b>CRITERION</b>		<b>1.3 – The implementation of the Sustainability system is systematical and risk based</b>	
<b>INDICATOR</b>	<b>Scope</b>	<b>Standard</b>	<b>Full indicator wording</b>
1.3.1 – The operator has a system in place to promote compliance with all applicable local, national, and ratified international laws and regulations.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	The operator has a documented management system in place to identify, track & promote compliance with all applicable local, national, and ratified international laws and regulations.  If the Bonsucro Standard and national law conflict, the operators shall seek ways to honour the principles of the Bonsucro Production Standard wherever possible. Where the domestic context renders it impossible to meet this responsibility fully, operators shall respect the principles of the Bonsucro Production Standard to the greatest extent possible in the circumstances, and shall demonstrate their efforts in this regard, without contravening law, regulations or court decisions.  <i>For further information, see Guidance</i>
1.3.2 The operator respects cane delivery contract terms.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	Payment shall be made according to contractual agreement (including value and timing of payment).  <i>For further information, see Guidance</i>
<b>CRITERION</b>		<b>1.4 – Systems for Monitoring and Evaluation (M&amp;E) and Grievances are implemented.</b>	
<b>INDICATOR</b>	<b>Scope</b>	<b>Standard</b>	<b>Full indicator wording</b>
1.4.1 The operator ensures that internal monitoring processes are conducted, corrective actions implemented & management review conducted.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	The operator shall perform evaluations on meeting their plans, objectives and targets, check compliance with applicable legal and other requirements to promote continuous improvement. The organisation maintains the internal monitoring records and reports.  <i>For further information, see Guidance</i>

**PRINCIPLE 1 - ASSESS AND MANAGE ENVIRONMENTAL, SOCIAL & HUMAN RIGHTS RISKS**

INDICATOR	Scope	Standard	Full indicator wording
<p>1.4.2 The operator ensures that there is a mechanism to raise grievances</p>	<p>Mill Agriculture</p> <p><b>CORE INDICATOR</b></p>	<p>Yes</p>	<p>The operator shall establish an effective grievance mechanism, accessible to all affected parties that may be adversely impacted by their operations. The grievance mechanism shall aim to satisfy the effectiveness criteria of the UN Guiding Principles on Business and Human Rights (UNGPs): Legitimate, Accessible, Predictable, Equitable, Transparent, Rights-compatible, a source of continuous learning and based on engagement and dialogue.</p> <p>The operator resolves disputes in an effective, timely and appropriate manner, ensuring anonymity of complainants when requested, without risk of reprisal or intimidation. Procedures are in place to ensure that the system is understood by the affected parties, including by illiterate parties. The operators keeps parties to a grievance informed of its progress, including against agreed timeframe and the outcome is available and communicated to relevant stakeholders.</p> <p>The conflict resolution mechanism shall include the option of access to independent legal and technical advice, the ability for complainants to choose individuals or groups to support them and/or act as observers, as well as the option of a third-party mediator.</p> <p><i>For further information, see Guidance</i></p>



## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

CRITERION	2.1 To provide a safe and healthy working environment in workplace operations		
INDICATOR	Scope	Standard	Full indicator wording
2.1.1. The operator ensures that main health & safety hazard and risks are identified, documented, assessed and communicated.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. Health &amp; Safety Assessments shall be conducted on all types of work on the operator's premises and shall adhere to relevant standards (legislation, policy, and best practice) with regards to ensuring that employment does not jeopardize the health or safety of all workers.</p> <p>Health and safety hazards and risks will be assessed with regards to occupational risks), environmental risks, pre-existing medical, and mental and cognitive health issues. Assessment is ongoing/repeated to incorporate changing conditions. A summary of the main H&amp;S hazards &amp; risks shall be made available to workers.</p> <p><i>For further information, see Guidance</i></p>
2.1.2 The operator manages health safety hazards & risks through implemented and enforced plans	Mill Agriculture  <b>CORE INDICATOR</b>		<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. Occupational, environmental and medical, mental and cognitive health issues, health hazards/risks identified are managed in line with the health &amp; safety hazard / risk assessment.</p> <p>The operator shall define a plan with achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes and allocated resources. The management plan reflects continuous improvement and organisation learning principles. The plan is revised at least every 3 years or sooner as per company procedures.</p> <p><i>For further information, see Guidance</i></p>
2.1.3 The operator ensures that workers have access to safe water & adequate sanitation facilities.	Mill Agriculture  <b>CORE INDICATOR</b>		<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator provides free and safe drinking water to all workers, in close proximity to their workstations.</p> <p>Recommended water consumption will depend on heat exposure and workloads.</p> <p>The operator provides access to free water for sanitation, hand washing, skin cooling as well as access to toilet facilities. Separate toilet facilities are provided to men and to women workers, unless unisex facilities are the cultural norm in the country, allowed by national legislation or only one gender is present</p> <p>Drinking water shall comply with the with the microbiological, physical and chemical parameters and other characteristics established in applicable country legislation or in their absence, the critical parameters defined by the World Health Organization (Annex 4)</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

INDICATOR	Scope	Standard	Full indicator wording
2.1.4. The operator ensures that workers have access to appropriate personal protective equipment free of charge	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. Required, approved and adequate PPE shall be issued for free to the workers and be in good condition. The operator shall train workers in the use of PPE. The operator shall implement a system to monitor the effective use of PPE.</p> <p><i>For further information, see Guidance</i></p>
2.1.5 The operator ensures that workers receive health & safety trainings	Mill Agriculture	>90%	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator ensures that at least 90% of new workers receive an induction, which includes basic training on occupational health and safety instructions prior to beginning activities. The training includes the information about risks associated with activities performed by the workers.</p> <p>For workers starting a new job or taking on new activities, training associated to the specific health and safety risks associated to the new position or activity is provided.</p> <p>All workers receive an update with a refresher training at least every 3 years or more frequently as determined by the H&amp;S management plan.</p> <p>Instructions on new issue-specific H&amp;S concerns are carried out as they emerge,</p> <p>Time spent on trainings shall be considered as worked time and paid as such.</p> <p><i>For further information, see Guidance</i></p>
2.1.6 The operator ensures that first aid and emergency response is available to all workers	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. First aid supplies are available and checked, and dedicated personnel is trained to use them. Emergency response prevents the escalation of injury or illness and there shall be provision for injured or ill persons to receive professional medical treatment.</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

INDICATOR	Scope	Standard	Full indicator wording
2.1.7 The operator ensures that accidents are lower than metric threshold	Mill Agriculture	Mill <15; Agric <30 number per million hours worked	Applies to all workers on the premises of the mill and farms included in the unit of certification. A lost time accident is defined as an unexpected and unplanned event which results in a personal injury which causes the worker to be unable to carry on with his/her normal duties on the next day or next shift. Incidents, non-fatal injuries and, fatalities occupational injuries shall be registered and analysed to identify their root cause and implementation of corrective actions.  <i>For further information, see Guidance</i>
<b>CRITERION</b>	<b>2.2 To provide all workers (including migrant, seasonal and other contract labour) with benefits and salary sufficient to achieve an adequate standard of living</b>		
INDICATOR	Scope	Standard	Full indicator wording
2.2.1 The operator ensures that all workers have a contract or equivalent document	Mill Agriculture  <b>CORE INDICATOR</b>	100 %	Applies to all workers on the premises of the mill and farms included in the unit of certification. All workers are provided with a contract or equivalent document (e.g. national working card). The operator shall explain the clauses in the contract to workers in an appropriate manner (especially if workers are illiterate or if they speak another language) to ensure they understand the clauses, rights and obligations included in their contract;  If not specified by local legislation, the contract includes at least the following elements: hours of work, overtime hours and payment, notice, rest periods, holidays, parental/maternity/paternity leave, wages, mode of payment, and if legal, any deductions that will be made. A copy of the contract is provided to the worker and in their own language.  <i>For further information, see Guidance</i>
2.2.2 The operator ensures that working hours at farm and mill complies with national legislation	Mill Agriculture  <b>CORE INDICATOR</b>	Hr/ 1 Hr/1  1 day rest	Applies to all workers on the premises of the farms and mills included in the unit of certification. The operator shall ensure that working hours does not exceed what is permissible under national legislation  If workers work more 60 hours a per week, the operator shall conduct and document a risk assessment to ensure that excessive working hours does not compromise health and safety and minimizes the accumulation of fatigue by monitoring accident rates and acting accordingly if accidents rates caused by excessive hours exceed normal average.  Notwithstanding any occasional exceptional circumstances, the operator shall also ensure that workers have at least 1 day off every 7 days or 2 days off every 14 days.  <i>For further information, see Guidance</i>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

CRITERION	2.2 To provide all workers (including migrant, seasonal and other contract labour) with benefits and salary sufficient to achieve an adequate standard of living		
INDICATOR	Scope	Standard	Full indicator wording
2.2.3 The operator ensures that overtime is paid at a premium rate	Mill Agriculture  <b>CORE INDICATOR</b>	>25%	Applies to all workers on the premises of the mill and the farms included in the unit of certification. Overtime work shall be voluntary and exceptional. Voluntary overtime hours are reflected in the employment/worker's contract and payroll documents are provided to present accurate information for all work performed, including overtime.  <i>For further information, see Guidance</i>
2.2.4 The operator ensures that workers receive at least the legal minimum wage including benefits	Mill Agriculture  <b>CORE INDICATOR</b>	≥1 \$/\$	Applies to all workers on the premises of the mill and farms included in the unit of certification. Minimum wage is paid as defined by legal requirement.  If wages are negotiated voluntarily between employers and workers' organizations, those negotiated wage amount(s) apply to all workers covered under the negotiated agreement. In cases where the law permits in-kind forms of payments, these do not exceed 30% of the minimum wage.  <i>For further information, see Guidance</i>
2.2.5 The operator ensures that piece rate workers are guaranteed at least the minimum wage including benefits	Mill Agriculture  <b>CORE INDICATOR</b>	≥1 \$/\$	Applies to all workers on the premises of the mill and farms included in the unit of certification. Minimum wage is paid to all workers, including those on piece rate/quotas, for whom the calculation is based on the proportion of the daily rate for minimum wage according to the hours worked (as covered in 2.2.4 and 2.2.2). If under these conditions, the piecework rate does not meet the minimum wage, then the wage level is upgraded to at least the minimum wage. No more than 30% of the required minimum wage is paid in-kind. Curtailed days (by management or due to workplace incidents/injuries) are compensated as a full day.  <i>For further information, see Guidance</i>
2.2.6 The operator ensures that prevailing wages are benchmarked	Mill Agriculture	Yes	Applies to direct workers on the premises of the mill and the farms included in the unit of certification.  The operator shall fill in prevailing wages tool, aligned to the Living Wage methodology, included in the calculator. The benchmark shall be updated every 3 years, or more regular as per company policies.  <i>For further information, see Guidance</i>

**PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS**

CRITERION	2.3 To respect workers right to favourable working conditions		
INDICATOR	Scope	Standard	Full indicator wording
2.3.1 The operator ensures that workers do not suffer from discrimination	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator has a publicly available, implemented and communicated non-discrimination and equal opportunity policy applicable in recruitment, remuneration, access to training and promotion, and access to facilities.</p> <p>Discrimination includes any distinction, exclusion or preference which has the effect of nullifying or impairing equality of opportunity or treatment.</p> <p>Discrimination can be based on race, colour, gender identity, age, language, religion, property/wealth, nationality, ethnic/social origin, caste, disability, pregnancy, indigeneity, union affiliation, political affiliation, marital/family status, personal relationships, health status, sexual orientation or other non-valid reasons that are irrelevant to the skills, capabilities, qualities and medical fitness for the job.</p> <p><i>For further information, see Guidance</i></p>
2.3.2 The operator ensures that workers do not suffer from abuse/harassment	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator has a publicly available, implemented and communicated policy to prevent sexual and all other forms of harassment and violence. Whistle-blowers are protected and their anonymity guaranteed</p> <p>The policy ensures that no worker is subject to unacceptable behaviours and practices, or threats thereof, which results in verbal and non-verbal forms of physical, psychological, sexual or economic harm, and includes gender-based violence, extortion and harassment.</p> <p><i>For further information, see Guidance</i></p>
2.3.3 The operator ensures that workers do not suffer from forced labour	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator has a publicly available, implemented and communicated policy ensuring workers do not suffer from forced or compulsory labour. The operator shall protect whistle-blowers and their anonymity guaranteed.</p> <p>The policy shall cover the various forms of force labour most relevant for the local operations including when forced labour can be an outcome of trafficking in persons and irregular migration.</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

INDICATOR	Scope	Standard	Full indicator wording
2.3.4 The operator ensures that there is no child labour	Mill Agriculture  <b>CORE INDICATOR</b>	18 Years	<p>Applies to all underaged persons on the premises of the mill and farms included in the unit of certification, regardless of whether they are employed by the operator, and assures that no workers under 18 are present in fields or managing heavy equipment.</p> <p>For young workers above the legal minimum working age but below 18, and for legal apprenticeships, there are restrictions on hours of work and overtime, working at dangerous heights, with dangerous machinery, equipment and tools, transport of heavy loads, exposure to hazardous substances or processes, and difficult conditions such as night work are prohibited.</p> <p>The operator implements a system to check worker's ages.</p> <p><i>For further information, see Guidance</i></p>
2.3.5 Where the operator provides accommodation to workers, the operator ensures that it meets minimum safety standards	Mill Agriculture  <b>CORE INDICATOR</b>	100%	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. If housing is provided to workers, either by the operator or by its subcontractors, the operator shall ensure that the housing provided meets local sanitary &amp; regulatory standards, or the requirements stated in the annex 5, whichever is more stringent.</p> <p><i>For further information, see Guidance</i></p>
2.3.6 The operator records working hours lost due to absenteeism	Mill	< 5 %	<p>This represents working hours lost due to absenteeism also referred to as "no-show" as well as strikes, non-justified sickness etc. It does not include holiday, legal time off such as maternity leave, or training.</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

CRITERION	2.4 To safeguard respect for labour rights through functioning social dialogue mechanisms		
INDICATOR	Scope	Standard	Full indicator wording
<p>2.4.1 The operator ensures that the rights of workers to form and join trade unions &amp; bargain collectively are respected, free from interference</p>	<p>Mill Agriculture</p> <p><b>CORE INDICATOR</b></p>	<p>Yes</p>	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator ensures such rights and does not interfere with workers' own efforts to set up independent representational mechanisms (unions or comparable organizing platforms) in accordance with the Universal Declaration of Human Rights and ILO core Standards. The operator applies guarantees to unionized workers throughout the workforce, extending to non-unionized workers. Collective Bargaining Agreements (CBAs) are regularly negotiated and renegotiated between employers' and workers' organizations and are duly respected to establish and the agreements made are transparent, documented and duly respected in their implementation. <i>For further information, see Guidance</i></p>
<p>2.4.2 The operator promotes consultation and information exchange between and amongst employers and workers organisation through social dialogue</p>	<p>Mill Agriculture</p>	<p>Yes</p>	<p>Applies to all workers on the premises of the mill and the farms included in the unit of certification. The operator engages in regular dialogues with direct and indirect workers to promote continuous improvement of working conditions. The operator also promotes other mechanisms of social dialogue (e.g. mix committees, gender committees, committees to address harassment, and worker consultation practices). <i>For further information, see Guidance</i></p>

## PRINCIPLE 2 - RESPECT LABOUR RIGHTS & OCCUPATIONAL SAFETY AND HEALTH STANDARDS

CRITERION			
2.5 Use of land and water resources does not diminish the legal, customary or user rights of indigenous peoples and local communities			
INDICATOR	Scope	Standard	Full indicator wording
2.5.1 The operator shall identify legal and/or customary rights in relation to land and water users and any transfer of those rights to the operator is done so on the basis of engagement and consultation.	Mill Agriculture	Yes	<p>The operator shall demonstrate that it has identified and documented any legal and/or customary rights in relation to land and water use. When rights have been relinquished by Indigenous People or Local Communities to the benefit of the operator, on or after the publication of this standard, or when the operator became first certified (whichever comes last) the operator shall demonstrate that the decision was reached through a process of Free, Prior and Informed Consent in line with national legislation, as a minimum.</p> <p><i>For further information, see Guidance</i></p>
2.5.2 The operator shall demonstrate that it is taking steps to address legitimate land & water claims in accordance with applicable legal processes.	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>The operator shall engage in good faith in applicable legal processes and takes appropriate actions in accordance with national law to resolve any land or water-related conflict. The operator complies with any court rulings. Where complaints arise through non-judicial processes, the operator shall engage in good faith to resolve land or water conflicts.</p> <p><i>For further information, see Guidance</i></p>



### PRINCIPLE 3 - MANAGE INPUT, PRODUCTION AND PROCESSING EFFICIENCIES TO ENHANCE SUSTAINABILITY

CRITERION	3.1 To monitor production and process efficiency; to measure the impacts of production and processing so that improvements are made over time		
INDICATOR	Scope	Standard	Full indicator wording
3.1.1 The operator ensures that yields of production are above the threshold set by the climatic zone map	Mill Agriculture	Tc/ha Depending on climatic zone	<p>The operator shall record average yields for rainfed and irrigated cane. The operator shall also input the GPS coordinates of the gathering mill into the Bonsucro Climatic Zone map and record the climatic zone. The operator shall ensure that the yields are higher than the threshold set by the climatic zone map</p> <p><i>For further information, see Guidance</i></p>
3.1.2 The operator shall maximise sugar content in cane	Agriculture	>10%	<p>Theoretical recoverable sugar content of cane (TRS) is a measure of how much sugar present in the cane can be extracted. It is a measure of the quality of the cane, not of the efficiency of recovery of the sugar at the mill. The fibre content of cane and the purity of the raw juice has an effect on recoverability of sugar and are included in this parameter. This indicator applies only where no ethanol is produced from crystallisable sugar.</p> <p>In cases where sugar &amp; ethanol is produced (not from final molasses), the content of Total Sugars As Invert (TSAI) in cane and not just recoverable sucrose is important. This is a measure of the quality of the cane, not of the industrial efficiency of converting sugars into ethanol at the mill. TSAI is the sum of reducing sugars and sucrose, where the sucrose is converted to equivalent reducing sugars by dividing by 0.95</p> <p><i>For further information, see Guidance</i></p>
3.1.3 The operator shall maximise the TSAI		>120Kg/t cane	<p>Used if ethanol is produced, on its own or in conjunction with sugar production. Based on a 90.5 % utilisation of Total Sugars As Invert (TSAI).</p> <p><i>For further information, see Guidance</i></p>

### PRINCIPLE 3 - MANAGE INPUT, PRODUCTION AND PROCESSING EFFICIENCIES TO ENHANCE SUSTAINABILITY

INDICATOR	Scope	Standard	Full indicator wording
3.1.4 The operator shall conduct harvesting operations efficiently	Agriculture	<16H for machine harvesting <24H manual green harvesting <48H burnt cane harvesting	This measures the average time from harvesting cane until it is crushed (also known as the kill to mill time).  For burnt cane it measures the time from when burning of the field prior to harvest ends until the cane is crushed (excluding accidental and criminal burning).  <i>For further information, see Guidance</i>
3.1.5 The operator crushes cane efficiently	Mill	>75 % Processing time as a percentage of total crushing time	Processing time as a percentage of total crushing time. Any stoppage, including maintenance activities or power supply failure must be counted with the exception of stops due to rainfall exclusively.  <i>For further information, see Guidance</i>
3.1.6 The operator maximises sugar recovery	Mill	>90%	This indicator applies only if sugar is produced and/ or ethanol is produced from final molasses only. This ratio is used to measure the actual sugar recovery from the theoretical recovery of sugar from cane.  <i>For further information, see Guidance</i>
3.1.7 The operator shall maximise the industrial efficiency	Mill	>75%	Used if ethanol only or sugar and ethanol is produced from anything other than final molasses are produced in the same mill. It is the ratio expressed as a % of the sum of TSAI equivalent products (sugar, ethanol, yeast, and molasses) to the TSAI of the cane.  <i>For further information, see Guidance</i>

### PRINCIPLE 3 - MANAGE INPUT, PRODUCTION AND PROCESSING EFFICIENCIES TO ENHANCE SUSTAINABILITY

CRITERION	3.2 To monitor global warming emissions with a view to minimising climate change impacts		
INDICATOR	Scope	Standard	Full indicator wording
3.2.1 The operator ensures that a climate change mitigation and resilience plan is in place and implemented	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>The operator shall monitor applicable climate change impacts and evaluate how these will affect its operations and workers over time. The operator shall develop and implement climate change mitigation and adaptation plans. As part of the climate change mitigation plan, the operator shall set baseline emissions and set absolute GHG reduction targets.</p> <p>The operator shall define a plan with achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes and allocated resources. The management plan reflects continuous improvement and organisation learning principles. The plan is revised at least every 3 years or sooner as per company procedures.</p> <p><i>For further information, see Guidance</i></p>
3.2.2 The operator shall ensure that GHG emissions per tonne of cane are below the metric threshold	Agriculture	<40 kg CO <sub>2</sub> eq/t cane	<p>Estimates the emissions from agriculture activities. The result is also used in the calculation of the total emissions field-to-gate.</p> <p><i>For further information, see Guidance</i></p>
3.2.3 The operator shall ensure that GHG emissions per tonne of sugar are below the metric threshold	Mill	Total <0.4 t CO <sub>2</sub> eq/t sugar	<p>Only used if sugar is being produced. Field-to-gate emissions. Environmental Burden is t carbon dioxide equivalent.</p> <p><i>For further information, see Guidance</i></p>
3.2.4 The operator shall ensure that GHG emissions per MJ of ethanol are below the metric threshold	Mill	Total <24 g CO <sub>2</sub> eq/MJ fuel	<p>Used if ethanol is produced. Environmental Burden is g carbon dioxide equivalent.</p> <p><i>For further information, see Guidance</i></p>

### PRINCIPLE 3 - MANAGE INPUT, PRODUCTION AND PROCESSING EFFICIENCIES TO ENHANCE SUSTAINABILITY

INDICATOR	Scope	Standard	Full indicator wording
3.2.5 The Operator maximises the energy return on energy invested	Mill	<9 Energy Output / Energy input	Calculates the total energy needed to produce one MJ of energy, Applies only to ethanol or electricity production.  <i>For further information, see Guidance</i>

### PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES

CRITERION	4.1 To protect and rehabilitate biodiversity and ecosystem services, as well as maintaining and enhancing HCVs		
INDICATOR	Scope	Standard	Full indicator wording
4.1.1 – The operator shall ensure that the key biodiversity and ecosystem services are mapped	Agriculture  Whole supply area	Yes	The operator maps the biodiversity and natural ecosystems across the supply base. The mapping shall be updated as per company policies or best practice.  <i>For further information, see Guidance</i>
4.1.2 The operator develops and implements a Biodiversity Management Plan (BMP)	Agriculture Mill  <b>CORE INDICATOR</b>	Yes	The operator develops and implements a Biodiversity Management Plan (BMP). The BMP addresses threats and impacts the cane production have on biodiversity, ecosystem services and HCVs, identifying mitigation and restoration measures that must be taken. The operator shall define a plan with achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes, and allocated resources. The management plan reflects continuous improvement and organisation learning principles. The plan is revised at least every 3 years or sooner as per company procedures.  <i>For further information, see Guidance</i>

## PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES

INDICATOR	Scope	Standard	Full indicator wording
4.1.3 The operator ensures that no areas of natural ecosystems defined internationally or nationally as legally protected has been converted to agriculture on or after 1st of January 2008	Agriculture <b>CORE INDICATOR</b>	0%	The operator conducts a historic land use change analysis of the unit of certification in order to determine if land converted to agriculture on or after 1st January 2008 has damaged natural ecosystems defined internationally or nationally as legally protected.  <i>For further information, see Guidance</i>
4.1.4 The operator ensures that no other areas of natural ecosystems have been converted to agriculture on or after 1st of January 2021.	Agriculture <b>CORE INDICATOR</b>	0%	The operator conducts a historic land use change analysis of the unit of certification to determine if land classified as natural ecosystems has not been converted to agriculture on or after 1st of January 2021.  Minimal levels of conversion are permissible if they are negligible in the context of a given site (because of its small area) and if they do not significantly affect the conservation values of natural ecosystems or the services and values they provide.  Prior to any greenfield expansion or new agriculture projects, the operator conducts the "Bonsucro Risk Assessment for expansion" for the planned areas and implement the Risk Assessment procedures.  <i>For further information, see Guidance</i>  Please note that a remediation and compensation procedure or equivalent document may be published in the future which will be applied to this indicator.
4.1.5 – The operator ensures that cane expansion is from non-HCV areas following certification.	Mill Agriculture <b>CORE INDICATOR</b>	Yes	From date of the initial certification or from the date of publication of this standard (which ever is the latter), the operator shall not expand into natural ecosystems or on areas containing HCVs on the unit of certification and conduct all possible actions to prevent conversion of the HCVs in the whole supply area.  Prior to any greenfield expansion or new sugarcane projects, the operator conducts the "Bonsucro HCV Risk Assessment for expansion" for the planned areas and implement the HCV Risk Assessment procedures.  <i>For further information, see Guidance</i>

## PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES

INDICATOR	Scope	Standard	Full indicator wording
4.1.6 The operator conducts an ESIA when there is a significant change in operations or land expansion	Mill Agriculture  <b>CORE INDICATOR</b>	100%	Applicable when there are major changes to the workforce (for example mechanisation) or field expansion (>5% of total supply area of 5 % rolling average, 1000 ha, whichever is smaller) or establishment of new sugar operations - changes are covered by ESIA.  <i>For further information, see Guidance</i>
<b>CRITERION</b>	<b>4.2 Soil Management Plan in place to avoid erosion and maintain and improve soil health</b>		
INDICATOR	Scope	Standard	Full indicator wording
4.2.1 Mapping of soils and/or soil management units of the farm and development of a SMP	Agriculture	Yes	The operator shall map field boundaries and their soil management unit/s, which may include soil types and other characteristics relevant to manage soil health. Mapping shall be done according to local industry recognised best practices, ideally supported by scientific publication.  <i>For further information, see Guidance</i>
4.2.2 The operator develops and implements a Soil Management Plan	Agriculture  <b>CORE INDICATOR</b>	Yes	The operator develops and implements a Soil Management Plan (SMP) that articulates the better management practices required for the operator to ensure the prevention of soil degradation and erosion of the farm's soils, to permit the optimal use of resources and the continuous improvement of soil conditions. The operator develops, documents and implements a Soil Management Plan with achievable actions & objectives, agreed responsibilities, timeframes and allocated resources that identify, and address threats & impacts of: A. Soil compaction, erosion, and disturbance B. Lack of continuous ground cover C. Low organic matter D. Alkalinisation or acidification of soils Practices aimed at preventing, mitigating, remedying and reducing soil degradation for each management unit are identified. Practices to continuously improve soil conditions are identified and implemented.  <i>For further information, see Guidance</i>

## PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES

INDICATOR	Scope	Standard	Full indicator wording
4.2.3 The operator conducts regular soil or leaf analysis	Agriculture	Yes	<p>The operator shall conduct regular soil or leaf analysis to inform the objectives and monitoring included in the soil management plan as well as for recommendations on fertilizer. Sample procedure and analytical procedures for the determination of recommendation shall be done according to local industry recognised best practices, ideally supported by scientific publication.</p> <p><i>For further information, see Guidance</i></p>
4.2.4 The operator applies as much fertilizer as recommended by soil analysis	Agriculture <b>CORE INDICATOR</b>	<1.05 for each nutrient (Ratio applied to	<p>The operator shall apply total NPK (organic &amp; inorganic) as recommended by the soil or leaf analysis. Recommendation shall be done according to local industry recognised best practices, ideally supported by scientific publication.</p> <p>The operator shall also have a plan in place to reduce fertilizer use over time.</p> <p><i>For further information, see Guidance</i></p>
4.2.5 The operator prevents sugarcane tops and leaves to be burned after harvest	Agriculture	Yes	<p>This only applies to fields which have been burnt prior to harvest (ie no green cane harvesting). No burning of mulch/trash blanket after harvest except where this would be required for field cultivation for replanting. If sugarcane is burnt prior to harvest, it is done so only with cool burns (or also referred to as “cool-burning”). Tops shall be retained and evenly scattered.</p> <p><i>For further information, see Guidance</i></p>

**PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES**

CRITERION	4.3. Water Stewardship Plan in place		
INDICATOR	Scope	Standard	Full indicator wording
4.3.1 The operator identifies the main water resources & catchment areas	Mill Agriculture  Whole supply area	Yes	<p>The operator shall to the greatest extent possible:</p> <ul style="list-style-type: none"> <li>• identify main water resources (including catchment areas, basin, sub-basin or microbasin), define their level of availability (water stress)</li> <li>• Map other users of water utilising mapped catchment areas</li> <li>• Map local water initiatives and list organisations involved in water management</li> </ul> <p><i>For further information, see Guidance</i></p>
4.3.2 The operator develops and implements a water stewardship plan	Mill Agriculture  <b>CORE INDICATOR</b>	Yes	<p>The operator develops and implements a Water Stewardship Plan (WSP) with achievable actions &amp; objectives, agreed responsibilities, timeframes and allocated resources. The WSP reflects continuous improvement and organisational learning principles.</p> <p>The operator shall define a plan with achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes and allocated resources. The management plan reflects continuous improvement and organisation learning principles. The plan is revised at least every 3 years or sooner as per company procedures.</p> <p><i>For further information, see Guidance</i></p>
4.3.3 The operator promotes sustainable water use by engaging in collaborative actions	Mill Agriculture	Yes	<p>Especially when water resources are stressed, but not only, the operator documents their engagement in collaborative and collective action to promote sustainable water use and participation with other water users, government and civil society in catchment or aquifer water planning and management including in how to allocate water equitably and without conflict</p> <p><i>For further information, see Guidance</i></p>



**PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES**

INDICATOR	Scope	Standard	Full indicator wording
4.3.4 The operator maximises water efficiency per mass of product	Mill	<20 for sugar only or <30 for ethanol  Kg of water/ kg of mass product	Water consumed at mill = water used less water returned to the environment. If effluents are exported by the mill to the fields for irrigation, the mill accounts for it as water returned to the environment.  <i>For further information, see Guidance</i>
4.3.5 The operator maximises irrigation productivity	Agriculture	WPa ≥ WPo	To ensure irrigated water is used efficiently.  Water productivity (WP) is a measure of how effectively irrigation water is used to produce sugarcane. WP equals the cane yield harvested (t/ha), divided by the net irrigation applied over the growing season (mm).  Irrigation water productivity is strongly influenced by the amount of rain received. This relationship is expressed as the benchmark water productivity - WPo  Actual cane yield and net irrigation applied over the growing season (mm) will determine actual water productivity value - WPa.  <i>For further information, see Guidance</i>
4.3.6 The operator minimises detrimental effects of waste discharge	Mill	>2.5 PPM Or 1 Kg COD / T product or 0.25 kg BOD/T	Dissolved oxygen is an indicator of the quantity of oxygen available in the receiving stream to support life. Sampling should be carried at the discharging point.  <i>For further information, see Guidance</i>

**PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES**

CRITERION	4.4 - Pest, Disease and Weed Management Plans in place and implemented		
INDICATOR	Scope	Standard	Full indicator wording
4.4.1 The operator identifies and monitors current, historical and potential pests and diseases	Agriculture	Yes	<p>The operator identifies current, historical and potential pests, including weeds affecting the fields, and where appropriate, defining for each the threshold for when control of pests becomes necessary.</p> <p>The operator conducts field monitoring of plant health, pests and beneficial organisms.</p> <p><i>For further information, see Guidance</i></p>
4.4.2 The operator implements weed, pest and disease management practices	Agriculture <b>CORE INDICATOR</b>	Yes	<p>The plan shall identify agronomic, biological and chemical strategies appropriate to the target species and farming system, thresholds when weed and pest control becomes necessary to minimise the economic impact and minimise off-site impacts.</p> <p>The operator shall define a plan with achievable actions and objectives, monitoring activities, agreed responsibilities, timeframes and allocated resources. The management plan reflects continuous improvement and organisation learning principles. The plan is revised at least every 3 years or sooner as per company procedures.</p> <p><i>For further information, see Guidance</i></p>
4.4.3 The operator maximises the efficiency of agrochemicals applied	Agriculture <b>CORE INDICATOR</b>	<5 kg active ingredient / ha/year	<p>To minimise air, soil and water contamination, particularly off-site impacts. The operator shall account for quantities of active ingredients of agro-chemicals (including pesticides, herbicides, insecticides, fungicides, nematicides, ripeners) applied. The operator shall use only products registered for use and at registered rates and use them in accordance with label directions. The operator shall average the application rate over the total treated area.</p> <p><i>For further information, see Guidance</i></p>

**PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES**

INDICATOR	Scope	Standard	Full indicator wording
<p>4.4.4 The operator only applies legal &amp; safe agrochemicals</p>	<p>Agriculture</p> <p><b>CORE INDICATOR</b></p>	<p>0 kg active ingredient/ha/y</p>	<p>The operator shall not use active ingredients of agro-chemicals included in:</p> <ul style="list-style-type: none"> <li>A. Pesticide formulations that meet the criteria of classes Ia (extremely hazardous) or Ib (highly hazardous) of the WHO Recommended Classification of Pesticides by Hazard;</li> <li>B. Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS);</li> <li>C. Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS);</li> <li>D. Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals;</li> <li>E. Pesticide active ingredients listed by the Stockholm Convention in its Annexes A and B, and those meeting all the criteria in paragraph 1 of Annex D of the Convention;</li> <li>F. Pesticide active ingredients and formulations listed by the Rotterdam Convention in its Annex III;</li> <li>G. Pesticides listed under the Montreal Protocol;</li> </ul> <p>In cases where there are no non-banned alternatives legally registered for use, research shall be conducted and documented to determine this, taking into consideration alternative chemical or non-chemical controls can be used. If this research confirms that no non banned chemical or non-chemical alternatives are available, the use of a banned agrochemical is tolerated. In these cases risk management plans must be updated to control the risks arising from applying a potentially dangerous chemical, as well as a plan to phase out or eliminate the use of banned agrochemicals.</p> <p><i>For further information, see Guidance</i></p>

## PRINCIPLE 4 - ACTIVELY MANAGE BIODIVERSITY AND ECOSYSTEM SERVICES

CRITERION	4.5 - To ensure hazardous chemicals and materials do not negatively impact biodiversity and ecosystem services		
INDICATOR	Scope	Standard	Full indicator wording
<p>4.5.1 The operator safely manages storage facilities and disposes safely of chemicals, fuels, lubricants &amp; other hazardous materials.</p>	<p>Mill Agriculture</p> <p><b>CORE INDICATOR</b></p>	<p>100%</p>	<p>Agrochemicals, oils, lubricants, batteries, medical waste and other chemicals are safely stored, access is restricted to the sole users, storage area is ventilated and allows for spillage management (such as a retention pond, etc)</p> <p>The operator must ensure that these are stored securely on its supplying farms and in a manner that prevents unauthorised access and protects the environment in the event of spillage. The operator shall ensure that these materials are safely managed and disposed.</p> <p><i>For further information, see Guidance</i></p>
<p>4.5.2 The operator trains workers on handling and correct use of farm chemicals, fuel &amp; hazardous material</p>	<p>Mill Agriculture</p>	<p>Yes</p>	<p>All workers that handle or come into contact with farm chemicals, fuel, hazardous materials are trained, and at least one worker in each field group is trained in first aid. Training is conducted by a competent professional on safe management of these substances.</p> <ul style="list-style-type: none"> <li>a) Training is specific and relevant to the task(s) performed.</li> <li>b) An explanation of the names, formulations, toxicity, health risks, and other relevant MSDS information related to farm chemicals, fuel, hazardous materials all substances to be used.</li> <li>c) Techniques for correct handling of these substances.</li> <li>d) Correct use of PPE.</li> <li>e) Preventative measures for reducing possible damage to health and the environment caused by the substances.</li> <li>f) Emergency procedures, first aid and medical attention for cases involving poisoning or undue contact with these substances.</li> <li>g) Records of training are maintained, where appropriate on an individual basis. Record keeping of all use of farm chemicals, fuel, hazardous materials and reports. records are accurate, complete, up-to-date and accessible.</li> <li>h) All records shall be kept a minimum of two years</li> </ul> <p><i>For further information, see Guidance</i></p>

**PRINCIPLE 5 - CONTINUOUSLY IMPROVE OTHER KEY AREAS OF THE BUSINESS**

CRITERION		5.1 To promote economic and social sustainability	
INDICATOR	Scope	Standard	Full indicator wording
5.1.1 The operator ensures value is maximised per tonne of cane	Mill Agriculture	Mill >14; US\$/t cane  Agric >10 US\$/t cane	Value added by the operation is the value of sales less the price of goods, raw materials (including energy) and services purchased.  <i>For further information, see Guidance</i>
CRITERION		5.2 To reduce emissions and effluents. To promote recycling of waste streams where practical	
INDICATOR	Scope	Standard	Full indicator wording
5.2.1 The operator comply with point source air emissions legislation	Mill	Yes	The operator shall measure and report point source emissions and demonstrate it complies with applicable legislation in term of PM10, PM2.5, SO2 and NOx.  <i>For further information, see Guidance</i>
5.2.2 The operator recycles or safely disposes of non-production waste	Mill Agriculture	Minimum 50%	The operator has a plan and implements recycling / re-using / safe & responsible disposal or storage (if other options are not available) programme for at least half of the following categories:  <ol style="list-style-type: none"> <li>1. fibre,</li> <li>2. metal,</li> <li>3. plastic,</li> <li>4. rubber,</li> <li>5. wood,</li> <li>6. glass,</li> <li>7. electronics.</li> </ol> <i>For further information, see Guidance</i>

**PRINCIPLE 5 - CONTINUOUSLY IMPROVE OTHER KEY AREAS OF THE BUSINESS**

<b>CRITERION</b>	<b>5.3 To train workers and other workers in all areas of their work and develop their general skills</b>		
<b>INDICATOR</b>	<b>Scope</b>	<b>Standard</b>	<b>Full indicator wording</b>
5.3.1 The operator provides vocational training to workers	Mill Agriculture	Average 16 hours per year (or full time equivalent of 16 hours per year)	<p>The operator provides an average of 16 hours of training for vocational and/or occupational skills training to all workers (excluding Health and Safety training). Training days are split between basic workers, intermediate management and upper management.</p> <p>A training plan is prepared ahead of each harvest or cutting cycle (in cases where the harvest or cutting cycle is continuous, the training plan is annual).</p> <p><i>For further information, see Guidance</i></p>
<b>CRITERION</b>	<b>5.4 Continuous improvement of worker welfare</b>		
<b>INDICATOR</b>	<b>Scope</b>	<b>Standard</b>	<b>Full indicator wording</b>
5.4.1 The operator promotes gender inclusion in management and skilled positions	Mill Agriculture	15%	<p>Applies to all workers on the premises of the mill and farms included in the unit of certification. The operator conducts community-based women's empowerment training. Recruitment operations increases women's presence in management and skilled Wpositions across the operation to meet the objectives set in the operation of not less than 15%.</p> <p><i>For further information, see Guidance</i></p>

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Absenteeism	Any failure to report for or remain at work as scheduled, regardless of the reason. This is usually unplanned, for example, when someone falls ill, but can also be planned, for example during a strike or wilful absence.	Cascio & Boudreau, 2015
All workers	<p>All workers working within the unit of certification including:</p> <p>Waged Workers:</p> <ul style="list-style-type: none"> <li>• Permanent Workers</li> <li>• Temporary and Seasonal Workers</li> <li>• Migrant Workers</li> <li>• Subcontracted Workers</li> <li>• Land-less workers</li> </ul> <p>Non-waged workers</p> <ul style="list-style-type: none"> <li>• Large and Middle Scale Farmers</li> <li>• Small Scale Farmers</li> <li>• Subsistence farmers</li> <li>• Unpaid Family workers</li> <li>• Collective farmers</li> <li>• Tenants and Sharecroppers</li> </ul>	Bonsucro Production Standard v.4.2
Area of Influence	The unit of certification and the wider landscape surrounding or adjacent to it.	HCVRN HCV Assessment Manual
Business Context Analysis	Definition to be developed by SRWG	

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Catchment	<p>The geographical zone in which water is captured, flows through and eventually discharges at one or more points. The concept includes both surface water catchment and groundwater catchment.</p> <p>A surface water catchment is defined by the area of land from which all precipitation received flows through a sequence of streams and rivers towards a single river mouth, as a tributary to a larger river, or to the sea.</p> <p>A groundwater catchment is defined by geological structure of an aquifer and groundwater flow paths. It is replenished by water that infiltrates from the surface. It has vertical thickness (from a few metres to 100s of metres) as well as area. Depending on local conditions, surface and groundwater catchments may be physically separate or interconnected.</p> <p>Catchment of origin refers to a catchment, distinct from the site's catchment(s), where a product or service is manufactured or sourced. It may be anywhere from an adjacent catchment to the other side of the world. Alternative terms are watershed, basin and river basin.</p>	<a href="#">Alliance for Water Stewardship</a>
Child	<p>Any person less than 15 years of age, unless local minimum age law stipulates a higher age for work or mandatory schooling, in which case the higher age would apply.</p> <p>The ILO Minimum Age Convention, No. 138 (1973) states that the minimum age of employment should not be less than the age of completion of compulsory schooling and, in any case, shall not be less than 15 years..</p>	ILO 138
Child labour	<p>Any work by a child younger than the age(s) specified in the above definition of a child, except as provided by ILO Recommendation No. 146.</p>	Bonsucro Production Standard v.4.2
Collective bargaining	<p>All negotiations which take place between an employer, a group of employers, or one or more employers' organisations, on the one hand, and one or more workers' organisations, on the other, for: (i) determining working conditions and terms of employment; and/or (ii) regulating relations between employers and workers; and/or (iii) regulating relations between employers or their organisations and a workers' organisation or workers' organisations</p>	<a href="#">Accountability Framework Initiative</a>
Company	<p>The entirety of any organization or business entity responsible for implementing the standard.</p>	Bonsucro Production Standard v.4.2 (Adapted from SA 800)



**ANNEX 1 – DEFINITIONS**

<b>Term</b>	<b>Definition</b>	<b>Source</b>
Consensus	General agreement characterized by the absence of sustained opposition to substantial issues by any important stakeholder group. NOTE – Consensus should be the result of a process seeking to take into account the views of interested stakeholders, particularly those directly affected, and to reconcile any conflicting arguments. It need not imply unanimity.	Bonsucro guidance v.4.2 (Adapted from ISO/IEC Guide 2:2004)
Consultation	Seeking views before making a decision. Consultation includes engaging health and safety committees and workers' representatives, where they exist.	SRWG
Contracted worker/ employee	Laborers who are not considered regular employees of a business company. They may be hired on a part-time or short-term basis, usually to complete a specific task (such as constructing company property). They may not be included in the company's regular payroll and may operate very independently of the company's normal business functions.	SRWG
Contractor	Definition to be developed by SRWG External organization providing services to the organization in accordance with agreed specifications, terms and conditions.	
Contract Substitution	The practice of substituting or changing the terms of employment to which the worker originally agreed, either in writing or verbally, which results in worse conditions or less benefits. Changes to the employment agreement or contract are prohibited unless these changes are made to meet local law and provide equal or better terms.	ILO Report to the Committee examining alleged non-compliance by Qatar of Forced Labour
Deforestation	Loss of natural forest as a result of: i) conversion to agriculture or other non-forest land use; ii) conversion to a tree plantation; or iii) severe and sustained degradation.	<a href="#">Accountability Framework Initiative</a>
Degradation	Changes within a natural ecosystem that significantly and negatively affect its species composition, structure, and/or function and reduce the ecosystem's capacity to supply products, support biodiversity, and/or deliver ecosystem services.	<a href="#">Accountability Framework Initiative</a>

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Discrimination	<p>1 The term discrimination includes – (Art 1 C111) ILO Convention C111:            (a) any distinction, exclusion or preference made on the basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation; (b) such other distinction, exclusion or preference which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation as may be determined by the Member concerned after consultation with representative employers' and workers' organisations, where such exist, and with other appropriate bodies.</p> <p>2. Any distinction, exclusion or preference in respect of a particular job based on the inherent requirements thereof shall not be deemed to be discrimination.</p> <p>3. For the purpose of this Convention the terms employment and occupation include access to vocational training, access to employment and to particular occupations, and terms and conditions of employment.</p>	Bonsucro guidance v.4.2 (Adapted from ILO Convention C111)
Displacement	A forced removal of persons from their home or country, often due to armed conflict or natural disasters. Internally displaced person, or IDP, is someone who is forced to flee his or her home, but who remains within his or her country's borders.	SRWG
Due diligence	A risk management process implemented by a company to identify, prevent, mitigate, and account for how it addresses environmental and social risks and impacts in its operations, supply chains, and investments.	<a href="#">Accountability Framework Initiative</a>
Farm	Operator producing the sugarcane which is delivered to the mill.	Bonsucro guidance v.4.2
Forced labour	All work or service that is exacted from any person under the menace of any penalty and for which the said person has not offered themselves voluntarily, including all forms of debt bondage and human trafficking for the purpose of forced labour.	<a href="#">Accountability Framework Initiative</a>

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Free, Prior, Informed Consent (FPIC)	<p>Collective human right of Indigenous Peoples and Local Communities (IP/LC) to give or withhold their consent prior to the commencement of any activity that may affect their rights, land, resources, territories, livelihoods, and food security.</p> <ul style="list-style-type: none"> <li>• Free: Consent is given by the affected IP/LC voluntarily without coercion, duress, or intimidation.</li> <li>• Prior: The consent is given before the specified activity is authorised or commenced.</li> <li>• Informed: The consent is given after the IP/LC have received the relevant, timely, and culturally appropriate information necessary to make a fully informed decision.</li> <li>• Consent: The IP/LC take a collective decision to grant or withhold approval of each activity that may impact IP/LCs</li> </ul>	<a href="#">Accountability Framework Initiative</a>
Freedom of association	Explicit right for all workers to create and/or join their own organs of representation or trade unions in whatever form they decide is most effective.	Ethical trade
Fundamental failure	<p>A procedure-altering violation that entirely prevents the business from operating in compliance with the standard. These mistakes can result in loss of productivity and a major breaches of core requirements.</p> <p>When isolated lapses (see definition) happen continuously, this can also be considered a fundamental failure.</p>	Adapted from ISO definitions on non-conformance
Grievance mechanism	Any routinised process through which grievances concerning business-related negative impacts to human rights or the environment can be raised and remedy can be sought.	<a href="#">Accountability Framework Initiative</a>
Hazard	A physical situation with a potential for human injury, damage to property, damage to the environment or some combination of these.	ILO Fundamental Principles of Occupational Health And Safety

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
<p>High Conservation Value</p>	<p>High Conservation Values (HCVs) are biological, ecological, social or cultural values which are considered outstandingly significant or critically important, at the national, regional or global level. All natural habitats possess some inherent conservation values, including the presence of rare or endemic species, provision of ecosystem services, sacred sites, or resources harvested by local residents. However, some values are more significant or critical than others, and it is the HCV approach which offers an objective way of identifying those values to be maintained or enhanced. (see <a href="http://www.hcvnetwork.org">www.hcvnetwork.org</a>).</p> <p>The six High Conservation Values (HCVs):</p> <p>HCV 1 Species diversity: Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.</p> <p>HCV 2 Landscape-level ecosystems and mosaics: Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.</p> <p>HCV 3 Ecosystems and habitats: Rare, threatened, or endangered ecosystems, habitats or refugia.</p> <p>HCV 4 Ecosystem services: Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.</p> <p>HCV 5 Community needs: Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.</p> <p>HCV 6 Cultural values: Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.</p>	<p>HCV Common Guidance for Identification</p>

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Human rights policy	A commitment to respect human rights as defined by the International Bill of Human Rights and the International Labor Organization’s (ILO) Declaration of Fundamental Principles and Rights at Work. The International Bill of Human Rights collectively includes the two Covenants: the International Covenant on Civil and Political Rights, and the International Covenant on Economic, Social, and Cultural Rights. In alignment with the UN Guiding Principles on Business and Human Rights, the Policy should commit the enterprise to ‘respect’ human rights, conduct ‘due diligence’ to assess actual and potential impacts on rights-holders, and provide remedy for adverse impacts that occur.	SRWG
Implementation plan	Documentation of the activities, investments, processes, procedures, and methodologies that a company intends to implement at the supply-base level to achieve and demonstrate compliance with environmental and social commitments and obligations. Implementation plans may follow from risk assessments, gap assessments, and other processes that identify actual or potential non-compliances, adverse social or environmental impacts, or other improvement needs.	<a href="#">Accountability Framework Initiative</a>
Incident	An unsafe occurrence arising out of or in the course of work where no personal injury is caused, or where personal injury requires only first-aid treatment.	ILO Fundamental Principles of Occupational Health And Safety
Isolated lapse	Happenings or actions that are not listed in the standard requirements, but do not detrimentally affect the operation or quality control of the entire business. This may include a single event or a low-risk situation, like a momentary lapse in managerial judgment (e.g. missing training records, single unauthorised document alteration)	Adapted from ISO definition on non-conformances
Land tenure	Understood as the relationship, whether legally or customarily defined, among individuals, groups of individuals or peoples with respect to land. In broad terms, land tenure systems determine who can use what resources for how long and under what conditions.	<a href="#">UN Human Rights Office of the High Commission report</a>
Living wage	The remuneration received for a standard workweek by a worker in a particular place sufficient to afford a decent standard of living for the worker and her or his family. Elements of a decent standard of living include food, water, housing, education, health care, transportation, clothing, and other essential needs including provision for unexpected events.	Global Living Wage Coalition

## ANNEX 1 – DEFINITIONS

Term	Definition	Source
Lost Time Accident	An injury involving a worker which causes him/ her to miss his/her next shift due to injury.	Bonsucro guidance v.4.2
Medical screening	A method for detecting disease or body dysfunction before an individual would normally seek medical care. Screening tests are usually administered to individuals without current symptoms, but who may be at high risk for certain adverse health outcome.	<a href="#">United States Department of Labour</a>
Mill	Operator that applies for certification. The mill has the ultimate responsibility for compliance with the Bonsucro Standard.	Bonsucro guidance v.4.2
Natural ecosystems	<p>An ecosystem that substantially resembles—in terms of species composition, structure, and ecological function—one that is or would be found in a given area in the absence of major human impacts. This includes human-managed ecosystems where much of the natural species composition, structure, and ecological function are present .</p> <p><b>For more specific definitions of separate ecosystem services you can use the below:</b></p> <p><b>Grasslands: terrestrial ecosystems dominated by herbaceous or shrub vegetation for at least 5 continuous years. It includes meadows or pasture that are cropped for hay but excludes land cultivated for other crop production and cropland lying temporarily fallow. It further excludes continuously forested areas as defined in this Chapter unless these are agroforestry systems which include land use systems where trees are managed together with crops or animal production systems in agricultural settings. The dominance of herbaceous or shrub vegetation means that their combined ground cover is larger than the canopy cover of tree</b></p> <p><b>Highly biodiverse forest and other wooded land: forest and other wooded land which is species-rich and not degraded, or has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes;</b></p> <p><b>Natural highly biodiverse grassland: grassland that would remain grassland in the absence of human intervention and that maintains a natural species composition and the ecological characteristics and processes</b></p> <p><b>Non-natural highly biodiverse grassland means grassland that would cease to be grassland in the absence of human intervention; and which is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the harvesting of the raw material is necessary to preserve its grassland status.</b></p>	<p><a href="#">Accountability Framework Initiative</a></p> <p>EU RED</p>

## ANNEX 1 – DEFINITIONS

Term	Definition	Source
	<p><b>Where species rich, means it is: (i) a habitat of significant importance to critically endangered, endangered or vulnerable species as classified by the International Union for the Conservation of Nature Red List of Threatened Species or other lists with a similar purpose for species or habitats laid down in national legislation or recognised by a competent national authority in the country of origin of the raw material; or (ii) a habitat of significant importance to endemic or restricted-range species; or (iii) a habitat of significant importance to intra-species genetic diversity; or 7 SCH Bonsucro EU RED Standard V1 29 June 2021 (iv) a habitat of significant importance to globally significant concentrations of migratory species or congregatory species; or (v) regionally or nationally significant or highly threatened or unique ecosystem</b></p> <p><b>Other wooded land: land not defined as ‘forest’, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use</b></p> <p><b>Peatland soils: are soils with horizons of organic material (peat substrate) of a cumulative thickness of at least 30 cm at a depth of down to 60 cm. The organic matter contains at least 20 mass percent of organic carbon in the fine soil.</b></p> <p><b>Wetlands: land that is covered with or saturated by water permanently or for a significant part of the year</b></p>	
Natural forest	<p>A forest that is a natural ecosystem. Natural forests possess many or most of the characteristics of a forest native to the given site, including species composition, structure, and ecological function. Natural forests include:</p> <p>a) Primary forests that have not been subject to major human impacts in recent history</p> <p>b) Regenerated (second-growth) forests that were subject to major impacts in the past (for instance by agriculture, livestock raising, tree plantations, or intensive logging) but where the main causes of impact have ceased or greatly diminished and the ecosystem has attained much of the species composition, structure, and ecological function of prior or other contemporary natural ecosystems</p> <p>c) Forests that have been partially degraded by anthropogenic or natural causes (e.g., harvesting, fire, climate change, invasive species, or others) but where the land has not been converted to another use and where degradation does not result in the sustained reduction of tree cover below the thresholds that define a forest or sustained loss of other main elements of ecosystem composition, structure, and ecological function.</p>	

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Occupational accident	An Occupational accident is an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers incurring a personal injury, disease or death. Included in occupational accidents are travel, transport or road traffic accidents in which workers are injured and which arise out of or in the course of work, i.e. while engaged in an economic activity, or at work, or carrying on the business of the employer. Occupational injury: any personal injury, disease or death resulting from an occupational accident; an occupational injury is therefore distinct from an occupational disease, which is a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity.	Bonsucro Production Standard v.4.2 (Adapted from ILO Resolution/ Convention 155 on statistics of occupational injuries)
Occupational disease	A disease contracted as a result of an exposure to risk factors arising from work activity	Bonsucro Production Standard v.4.2 (Adapted from ILO)
Operational Grievance Mechanisms (OGM)	Complaint process that workers can use to raise concerns about negative impacts they may have suffered as a result of certain business practices.	United Nations Guiding Principles on Business and Human Rights (UNGPs)
Operator	Farm or mill. Entities that are responsible for the undertaking and contracting activities related to the sugarcane growing and processing, including transportation.	Bonsucro guidance v.4.2
Overtime	All hours worked in excess of the normal hours unless they are taken into account in fixing remuneration in accordance with custom.	ILO
Participation	Involvement in decision-making. Participation includes engaging health and safety committees and workers' representatives, where they exist.	SRWG
Personal Protective equipment (PPE)	Equipment that protects the user against the risk of accidents or of adverse effects on health. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear, safety harnesses and respiratory protective equipment (RPE).	SRWG



**ANNEX 1 – DEFINITIONS**

<b>Term</b>	<b>Definition</b>	<b>Source</b>
Pollution Control Equipment	Pollution Control Equipment: such as electrostatic precipitators, fabric filters or baghouses, and wet scrubbers, are commonly installed to reduce the concentration of substances in process off-gases before stack emission.	Australia's National Pollutant Inventory
Policy	Public statement by a company that specifies the actions that it intends to take or the goals, criteria, or targets that it intends to meet with regards to its management of or performance on environmental, social, and/or governance topics.	<a href="#">Accountability Framework Initiative</a>
Primary aggregator	Aggregators are agricultural businesses or cooperatives of growers that consolidate and distribute agricultural products. They typically support regional growers of diverse sizes and experience, and sell products to local or regional markets.	SRWG
Reporting period	This will be one year unless otherwise agreed. The period shall include a single complete milling season.	Bonsucro Production Standard v.4.2
Risk	The likelihood of an undesired event with specified consequences occurring within a specified period or in specified circumstances. It may be expressed either as a frequency (the number of specified events in unit time) or as a probability (the probability of a specified event following a prior event), depending on the circumstances.	ILO Fundamental Principles of Occupational Health And Safety
Risk assessment	A systematic process of evaluating potential risk in a company's current or future operations, supply chains, and investments.	<a href="#">Accountability Framework Initiative</a>
Root-cause analysis	Analysis of the underlying (root) causes of identified sustainability risks in a specific supply chain.	SRWG
Significantly affected	A significant impact would be apparent if the operations of sugarcane farms or mills resulted in changes to the environment that resulted in (1) the quality and / or quantity of habitat supporting an endangered or threatened species being affected to the extent that the numbers and viability of the species (the classification from the IUCN red list) was adversely affected; (2) conversion, diminution or degradation of the integrity of an endangered habitat such that there was a measurable adverse impact on its ecological status in the opinion of a competent ecologist (3) ecosystem service (such as water supply) being sufficiently changed as to cause material adverse impacts to local communities or ecosystems (for example, flows contain additional nutrients that change downstream ecology or affect the availability of drinking water for downstream communities).	Bonsucro Production Standard v.4.2

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Social Dialogue	<p>The different types of negotiation, consultation or simply exchange of information between, or among, representatives of governments, employers, and workers, on issues of common interest relating to economic and social policy.</p> <p>Social Dialogue is also possible between employers and workers, this is called bi-partite social dialogue; this is the common form at company level. SD including government is tripartite, this is common at regional, national (f.i commission on minimum wage) and international level (ILO). There is also multistakeholder dialogue, often practised on (international) sustainability challenges in supply chains, Bonsucro is a good example on this. This difference has to be clear in order to avoid confusion on the role of government in Social Dialogue, for there is no role for government on the company level and in this indicator.</p>	ILO C154 and SRWG
Stakeholder	<p>An individual or group that has an interest in any decision or activity of an organization.</p> <p>Stakeholders may include:</p> <ul style="list-style-type: none"> <li>• Suppliers</li> <li>• Internal staff, such as employees and workers</li> <li>• Seasonal or migratory workers</li> <li>• Members</li> <li>• Customers, including shareholders, investors, and consumers</li> <li>• Regulators</li> <li>• Local and regional communities</li> </ul>	ISO 26000–Guidance on social responsibility
Standard	Document that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is voluntary.	Bonsucro guidance v.4.2 (Adapted from Annex 1 of the WTO TBT Agreement)
Subcontractor/ sub-supplier	A business entity in the supply chain which, directly or indirectly, provides the suppliers with goods and/or services integral to, and utilized in/for, the production of the suppliers' and/or company's goods and/or services.	Bonsucro Production Standard v.4.2 (Adapted from SA 800)
Supplier/ contractor	A business entity which provides the company with goods and/or services integral to, and utilized in/for, the production of the company's goods and/or services.	Bonsucro Production Standard v.4.2 (Adapted from SA 800)

**ANNEX 1 – DEFINITIONS**

Term	Definition	Source
Systemic approach	Accounting for the understanding of interactions and interdependencies present in a complex situation, based on knowledge and practices to dive into the relationships, structure, laws, characterizing the problem.	IGI Global
Vulnerable stakeholder	Women, children, migrants, disabled persons and any other people belonging, or perceived to belong, to groups that are in a disadvantaged position or marginalised.	<a href="#">Accountability Framework Initiative</a>
Wet Bulb Globe Temperature (WBGT)	Index which was developed in 1957 as a basis for environmental heat stress monitoring to control heat casualties at military training camps. The WBGT combines the effect of humidity and air movement (in tnwb), air temperature and radiation (in tg), and air temperature (ta) as a factor in outdoor situations in the presence of sunshine. If there is no radiant heat load (no sunshine), then the tg reflects the effects of air velocity and air temperature. Commercially available WBGT measuring instruments give ta, tnwb, and tg separately or as an integrated WBGT in a form for digital readouts.	SRWG

## ANNEX 2 GHG EMISSIONS CALCULATION FOR PRINCIPLE 3 ONLY

### 1. SYSTEM BOUNDARY

“The operational boundary includes growing and processing of sugarcane. It considers the boundary to include each individual mill and its growers as a unit, rather than a company owning and operating more than one mill. In the case of IPPs (Independent Power Producers) providing steam and power to a mill from bagasse that has been provided by the mill, the IPP is considered together with the mill concerned. The system boundary includes in addition the energy embedded in the manufacture and supply of all fertilizers and chemicals, but excludes the energy embedded in agricultural and milling capital equipment. All the activities of a plant on one site are considered, to reflect the sustainability of the total system producing food, fuel, energy and chemicals.

This analysis represents a B2B analysis, considering the operation of a cane sugar processing facility, producing raw sugar and/or ethanol at the factory gate. Stand-alone refineries are not considered to be within the boundary. It accounts for the provision of products to a third party that is not the end user (cradle-to-gate). “

### 2. DIRECT AND INDIRECT EFFECTS

“The energy and GHG calculations are associated with direct energy inputs and at a second level by indirect inputs. Direct inputs are mainly fuel and power inputs, expressed in terms of their primary energy value. Indirect inputs include, in addition, the energy required for the production of chemicals, fertilizers and other materials used. The indirect inputs do not include the additional energy necessary for the manufacture and construction of farm, transport and industrial equipment and buildings.

### 3. LAND USE CHANGE

Land use change can be separated into direct and indirect components:

- Direct land change refers to a change from the original state of the land to use for sugarcane production. Depending on the previous use of the land in question, it is surmised that the land use change can unlock some of the carbon in the existing soil and vegetation.
- Indirect land use change concerns secondary effects induced by large scale expansion. This displaces existing crops, leading to expansion of crop land elsewhere, either in the same country or in other parts of the world. The effects of these changes are very difficult to estimate.

If the product’s supply chain directly caused non-agricultural land to be converted to agricultural use on or after 1 January 2008, then GHG emissions associated with the direct land use change are included in the carbon footprint calculation. The table of IPCC default land use change values for selected countries published in the PAS 2050 are used in the calculation.

## 4. HANDLING OF CO-PRODUCTS AND MULTIPLE PRODUCTS

Two approaches are possible:

- The “substitution” or “displacement” method attempts to model reality by tracking the likely fate of residues. Each co-product generates an energy and emission credit equal to the energy and emissions saved by not producing the material that the co-product is most likely to displace.
- The “allocation” method allocates energy and emissions from a process to the various products according to mass or energy contents or monetary values.

“In the case of sugarcane processing, a factory exporting power or bagasse achieves a credit in terms of energy and emissions saved, according to the displacement of energy in that country. Some standards recommend the use the grid average GHG intensity to calculate the GHG credit for the exported power, although it may be more realistic to use the marginal energy mix. Since the marginal energy provision is likely to be from fossil fuels, the saving estimate is conservative when using the average generation mix. In this case, the approach aligned with the EU RED is adopted, which states that for calculating exported power credits, the average factor shall be used. The country specific table of values used is given below.

Where a factory produces only sugar and molasses, the allocation in proportion to market value is adopted; in most cases the allocation to molasses is less than 10 % of the total. Although the prices will change over time, the relative values will be far more stable. It is possible to use a displacement calculation, assuming that molasses displaces certain ingredients in an animal feed. However this is likely to vary significantly in different countries.

In the case of a factory producing more or less equivalent quantities of sugar and ethanol, the split of energy input and GHG emissions between the two products becomes a more difficult issue. The calculation assumes that allocation shall be by energy content of the products. Sugar has a calorific value of 16500 MJ/t and ethanol 21 MJ/L; on the basis that 600 L of ethanol are produced from one tonne of sucrose, this implies a sugar equivalent value of 27.5 MJ/L for sucrose. On this basis, 57 % of the emissions shall be allocated to sugar and 43 % to ethanol. As an alternative, the calculation procedure also allocates the energy use and emissions on a mass basis on equivalent sugar, on the basis that 1 tonne sugar is equivalent to 600 L ethanol.

In the case of an autonomous distillery, where the only product is ethanol, energy use and emissions are related to litres of ethanol produced or to MJ in ethanol.”

## 5. COMPONENTS CONTRIBUTING TO EMISSIONS

“CO<sub>2</sub> from sugarcane emitted in combustion and in ethanol fermentation is considered zero CO<sub>2</sub> emission to the air, because this is the carbon taken in from the air during sugarcane growth. CO and VOCs emitted in combustion are assumed to be converted to CO<sub>2</sub> fairly rapidly, but methane and nitrous oxides from burning bagasse are accounted for in GHG emissions. CO<sub>2</sub> emissions arising from biogenic carbon sources are excluded from the calculation of GHG emissions from the life cycle of products, except where the CO<sub>2</sub> arises from direct land use change.

The greenhouse gases covered are CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>. CH<sub>4</sub> and N<sub>2</sub>O have global warming potentials 28 and 265 times that of CO<sub>2</sub> respectively (IPCC 2007). Greenhouse gas emissions are aggregated on a carbon dioxide equivalent (CO<sub>2</sub>eq) basis.

Non-CO<sub>2</sub> emissions arising from both fossil and biogenic carbon sources are included in the calculation of GHG emissions. In the case of burning bagasse in sugar mill boilers, it is assumed that 30 g CH<sub>4</sub> and 4 g N<sub>2</sub>O are produced per 1000 MJ of energy in the bagasse burnt, based on IPCC data for burning of biomass. Changes in the carbon content of soils, either emissions or sequestration, other than those arising from direct land use change, are excluded from the assessment of GHG emissions. Any GHG emissions arising from transport required during the product and raw materials life cycle are included in the carbon footprint assessment. Emission factors for transport include emissions associated with creating and transporting the fuels required.

## 6. CALCULATION METHOD

"A materiality threshold of 1 % has been suggested to ensure that very minor sources of life cycle GHG emissions do not require the same treatment as more significant sources.

Both the energy usage and emissions are calculated in the same spreadsheet, since the latter are largely determined by the former. The calculation includes the effects of the manufacture of fertilizer. Farming operations include chemicals application, irrigation, tillage and harvesting (and preparation of cane setts for planting). Cane transport covers getting the cane to the mill. The cane is processed to sugar and molasses or ethanol, and may include export of electric power or bagasse. The energy embedded in the manufacture of milling and other equipment is excluded. Inclusion of energy embedded in capital goods and equipment generally has an effect of less than 10 % on calculated emissions and is excluded. No allowance for transport of products from the factory is allowed for. Transport of workers is not included.

The primary energy is calculated. It differs from the direct energy input in that it takes into account the efficiency of generation and supply of the secondary energy source e.g. using a conversion factor from energy in the fuel used to generate electricity to the energy in the power produced. This applies to power, fuel, steam and any other energy input.

The GHG balance is particularly uncertain because of fertilizer nitrous oxide emissions and error margins can be enormous. The use of nitrogen fertilizers results in GHG emissions in two stages: fertilizer manufacture (primarily CO<sub>2</sub> emissions from energy used) and fertilizer application (primarily N<sub>2</sub>O emissions from nitrification and denitrification processes in the soil). The assumption is made that 1.325 % of N in nitrogen fertilizer is converted to N in N<sub>2</sub>O through nitrification and denitrification, following the IPCC recommendations.

In addition, agricultural lime application results in GHG emissions from both production energy use and in-soil reactions that release CO<sub>2</sub>. These latter emissions are a further source of uncertainty. The model uses the IPCC factor of 0.44 kg CO<sub>2</sub>eq/kg lime, which assumes that all C in lime becomes CO<sub>2</sub>. This is the upper limit; it is possible in weakly acidic soils that limestone results in a net sink of CO<sub>2</sub>.

The calculation approach adopted in this study is similar to that used in the EBAMM model (Farrell et al. 2006), which itself is similar to the GREET model (Wang et al. 2008). These models have been used in the past mainly to model the production of biofuels from corn, and they have had to be modified for sugarcane to incorporate additional issues as follows:

1. Modifications to incorporate sugar manufacture as the major activity. This includes power, fuels and lubricants.
2. Emissions due to cane burning. This is based on IPCC emission factors for burning biomass of 0.07 kg N<sub>2</sub>O/t dry matter and 2.7 kg CH<sub>4</sub>/t dry matter.
3. Allowance for N<sub>2</sub>O emissions from filter cake, vinasse and cane residue left in the field. This assumes 1.225 % of N in the residue is converted to N in N<sub>2</sub>O (Macedo et al. 2008).
4. Emissions of CH<sub>4</sub> and N<sub>2</sub>O in burning bagasse in sugar mill boilers; values of 30 and 4 g /1000 MJ energy in bagasse respectively are used (Wang et al. 2008).
5. Energy value of process chemicals.
6. A credit for molasses (where produced) based on its economic value relative to that of sugar.
7. Emissions from anaerobic treatment of effluent in the case that methane is not captured and used as a fuel. IPCC guidelines suggest 0.21 t CH<sub>4</sub> produced per t COD removed.
8. Allowance for any imports of molasses, bagasse and/or other biomass.

## 7. DEFAULT AND SECONDARY DATA

Secondary data (obtained from sources other than direct measurement) are used to calculate emissions where primary data are not available or inappropriate, to enable consistency and, where possible, comparability:

- Global warming potential of greenhouse gases
- Electricity emissions (in kg CO<sub>2</sub>eq/kWh) from various energy sources
- Energy content of fertilizers per kg
- Energy use of pesticides and herbicides per kg
- Fuel emissions per litre
- Waste emissions per kg
- N<sub>2</sub>O and CH<sub>4</sub> emissions from burning bagasse
- N<sub>2</sub>O and CH<sub>4</sub> emissions from burning cane
- Energy embedded and emissions for process chemicals
- Direct land use change
- Agriculture emissions from soils

Default values used are given below

### 8. Presentation of results

The agricultural and processing phases are dealt with separately. Thus outputs are available as:

Net energy use in agriculture	.....	MJ/ha or MJ/t cane
Energy used in cane transport	.....	MJ/t cane
Net energy use in processing	.....	MJ/t cane or MJ/t sugar
Total net energy use	.....	MJ/t sugar or MJ/L ethanol
Agricultural GHG emissions	.....	kg CO <sub>2</sub> eq/t cane
Processing GHG emissions	.....	kg CO <sub>2</sub> eq/t cane or kg CO <sub>2</sub> eq/t sugar
Total net GHG emissions	.....	g CO <sub>2</sub> eq/g sugar g CO <sub>2</sub> eq/L ethanol and/or g CO <sub>2</sub> eq/MJ fuel

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**Fertilizer and agricultural chemicals, in MJ/kg:**

	<b>Energy Demand (MJ/kg)</b>	<b>Emissions Factor (kg CO<sub>2</sub>eq/kg)</b>	<b>Emissions on Application (kg CO<sub>2</sub>eq/kg)</b>
Nitrogen (elemental)	56.9	4	6.2
Potash (K <sub>2</sub> O)	7	1.6	
Phosphate (P <sub>2</sub> O <sub>5</sub> )	9.3	0.71	
Lime (CaCO <sub>3</sub> )	0.12	0.07	0.44
Herbicide	355.6	25	
Insecticide	358	29	

*Data from EBAMM*

**Primary energy inputs and emissions:**

	<b>Energy Demand (MJ/MJ fuel)</b>	<b>Total emissions (g CO<sub>2</sub>eq/MJ)</b>
Gasoline	1.14	85
Diesel	1.16	91
Fuel Oil	1.24	96
Natural Gas	1.12	66
Coal	1	107
Electricity	2.5	150*

Energy demand data from Macedo et al. (2008), emissions from EBAMM

\*Average value; country specific values should be used.

The energy value is multiplied by the Energy Demand factor to give the primary energy value.

**Embedded energy and emissions for process chemicals:**

	<b>Energy Demand (MJ/kg)</b>	<b>Emissions Factor (g CO<sub>2</sub>eq/MJ)</b>
Lime (CaO)	0.11	951
Biocide	3.02	951
Nitrogen	56.33	951
Caustic	75	951
Sulfuric acid	2.4	951
Anti-foam	10	951
Miscellaneous	50	95

<sup>1</sup>Macedo et al. (2008); <sup>2</sup>Mortimer et al. (2004); <sup>3</sup>EBAMM

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Afghanistan	0.057
Albania	0.012
Algeria	0.119
American Samoa (U.S.)	0.151
Andorra	0.012
Angola	0.118
Anguilla (U.K.)	0.137
Antigua and Barbuda	0.146
Argentina	0.097
Armenia	0.069
Aruba	0.125
Australia	0.114
Austria	0.037
Azerbaijan	0.114
Azores (Portugal)	0.120
Bahamas	0.128
Bahrain	0.132
Bangladesh	0.139
Barbados	0.139
Belarus	0.093

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Belgium	0.046
Belize	0.084
Benin	0.173
Bermuda (U.K.)	0.104
Bhutan	0.012
Bolivia	0.114
Bosnia and Herzegovina	0.240
Botswana	0.328
Brazil	0.056
British Virgin Islands (U.K.)	0.127
Brunei	0.105
Bulgaria	0.152
Burkina Faso	0.177
Burundi	0.088
Cambodia	0.161
Cameroon	0.076
Canada	0.064
Canary Islands (Spain)	0.132
Cape Verde	0.151
Cayman Islands	0.111

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Central African Republic	0.062
Chad	0.182
Channel Islands	0.117
Chile	0.094
China (P.R. China & Hong Kong)	0.137
Colombia	0.064
Comoros	0.180
Congo, Democratic Republic of	0.012
Congo, Republic of	0.095
Cook Islands	0.091
Costa Rica	0.040
Côte d'Ivoire	0.121
Croatia	0.066
Cuba	0.166
Curaçao (Netherlands)	0.129
Cyprus	0.123
Czech Republic	0.139
Denmark	0.065
Djibouti	0.178
Dominica	0.153

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Dominican Republic	0.128
Ecuador	0.112
Egypt	0.114
El Salvador	0.096
Equatorial Guinea	0.148
Eritrea	0.205
Estonia	0.204
Eswatini	0.012
Ethiopia	0.012
Falkland Islands (U.K.)	0.111
Faroe Islands (Denmark)	0.101
Fiji	0.119
Finland	0.045
France	0.028
French Guiana	0.093
French Polynesia	0.123
Gabon	0.122
Gambia	0.179
Georgia	0.054
Germany	0.102

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Ghana	0.100
Gibraltar (U.K.)	0.111
Greece	0.125
Greenland	0.102
Grenada	0.155
Guadeloupe (France)	0.126
Guam	0.124
Guatemala	0.112
Guinea	0.134
Guinea-Bissau	0.182
Guyana	0.169
Haiti	0.195
Honduras	0.131
Hong Kong (China)	0.110
Hungary	0.069
Iceland	0.012
India	0.187
Indonesia	0.177
Iran	0.131
Iraq	0.259

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Ireland	0.063
Isle of Man	0.084
Israel	0.084
Italy	0.070
Jamaica	0.151
Japan	0.106
Jordan	0.143
Kazakhstan	0.181
Kenya	0.088
Kiribati	0.167
Korea (North), Dem. People's Rep. of	0.113
Korea (South), Republic of	0.081
Kosovo	0.231
Kuwait	0.113
Kyrgyzstan	0.043
Laos	0.102
Latvia	0.049
Lebanon	0.153
Lesotho	0.012
Liberia	0.113

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Libya	0.149
Liechtenstein	0.027
Lithuania	0.060
Luxembourg	0.053
Macao (China)	0.066
Macedonia, North	0.192
Madagascar	0.105
Madeira (Portugal)	0.132
Malawi	0.012
Malaysia	0.131
Maldives	0.154
Mali	0.153
Malta	0.127
Marshall Islands	0.169
Martinique (France)	0.130
Mauritania	0.142
Mauritius	0.153
Mayotte (France)	0.151
Mexico	0.089
Micronesia	0.169

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Moldova	0.121
Monaco	0.012
Mongolia	0.291
Montenegro	0.151
Montserrat	0.151
Morocco	0.153
Mozambique	0.036
Myanmar	0.102
Namibia	0.037
Nauru	0.158
Nepal	0.012
Netherlands	0.061
Netherlands Antilles	0.135
New Caledonia (France)	0.116
New Zealand	0.044
Nicaragua	0.119
Niger	0.208
Nigeria	0.110
Niue	0.099
Northern Mariana Islands (U.S.)	0.135

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Norway	0.017
Oman	0.106
Pakistan	0.126
Palau	0.147
Panama	0.100
Papua New Guinea	0.130
Paraguay	0.012
Peru	0.084
Philippines	0.136
Poland	0.158
Portugal	0.073
Puerto Rico (U.S.)	0.108
Qatar	0.077
Reunion (France)	0.119
Romania	0.092
Russian Federation	0.098
Rwanda	0.128
Saint Helena (U.K.)	0.086
Saint Kitts and Nevis	0.139
Saint Lucia	0.156

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Saint Martin (France)	0.135
Saint Pierre and Miquelon (France)	0.120
Saint Vincent and Grenadines	0.145
Samoa	0.128
San Marino	0.012
Sao Tomé & Príncipe	0.147
Saudi Arabia	0.132
Senegal	0.158
Serbia	0.192
Seychelles	0.143
Sierra Leone	0.126
Singapore	0.069
Sint Martin (Netherlands)	0.130
Slovak Republic	0.056
Slovenia	0.091
Solomon Islands	0.175
Somalia	0.183
South Africa	0.231
South Sudan	0.206

**EMISSIONS FACTOR FOR ELECTRICITY, IN KG CO<sub>2</sub>/MJ:**

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Spain	0.066
Sri Lanka	0.130
Sudan	0.098
Suriname	0.135
Sweden	0.018
Switzerland	0.015
Syrian Arab Republic	0.146
Taipei (Chinese)	0.101
Tajikistan	0.018
Tanzania	0.133
Thailand	0.108
Timor-Leste	0.175
Togo	0.095
Tonga	0.162
Trinidad and Tobago	0.118
Tunisia	0.112
Turkey	0.089
Turkmenistan	0.192
Turks and Caicos Islands (U.K.)	0.130
Tuvalu	0.147

Country / Territory / Island	Emission factor for electricity generation (gCO <sub>2</sub> /MJ)
Uganda	0.039
Ukraine	0.146
United Arab Emirates	0.098
United Kingdom	0.070
United States	0.079
Uruguay	0.044
Uzbekistan	0.141
Vanatu	0.103
Venezuela	0.096
Vietnam	0.099
Virgin Islands (U.S.)	0.104
West Bank and Gaza	0.174
Yemen	0.177
Zambia	0.028
Zanzibar (Tanzania)	0.180
Zimbabwe	0.245

Source: European Investment Bank, 2020.



### ANNEX 3 DEFAULT LAND USE CHANGE VALUES FOR SELECTED COUNTRIES (FROM PAS 2050:2008) (IN T CO<sub>2</sub>EQ/(HA.YR)) FOR PRINCIPLE 3 ONLY

Country	Current Land Use	GHG Emissions of Change from Previous Land Use (t/CO <sub>2</sub> e/ha/yr)	Country	Current Land Use	GHG Emissions of Change from Previous Land Use (t/CO <sub>2</sub> e/ha/yr)
Argentina	Annual cropland Perennial cropland	Forest land 17 Grassland 2.2 Forest land 15 Grassland 1.9	Malaysia	Annual cropland Perennial cropland	Forest land 37 Grassland 10.3 Forest land 26 Grassland 8.5
Australia	Annual cropland Perennial cropland	Forest land 23 Grassland 2.2 Forest land 21 Grassland 1.9	Mozambique	Annual cropland Perennial cropland	Forest land 24 Grassland 3.6 Forest land 22 Grassland 3.2
Brazil	Annual cropland Perennial cropland	Forest land 37 Grassland 10.3 Forest land 26 Grassland 8.5	Pakistan	Annual cropland Perennial cropland	Forest land 16 Grassland 3.6 Forest land 15 Grassland 3.2
Canada	Annual cropland Perennial cropland	Forest land 17 Grassland 2.2 Forest land 16 Grassland 1.9	Poland	Annual cropland Perennial cropland	Forest land 21 Grassland 7.0 Forest land 14 Grassland 6.7
Finland	Annual cropland Perennial cropland	Forest land 15 Grassland 7.3 Forest land 14 Grassland 6.9	South Africa	Annual cropland Perennial cropland	Forest land 26 Grassland 1.6 Forest land 25 Grassland 1.2
France	Annual cropland Perennial cropland	Forest land 18 Grassland 4.5 Forest land 14 Grassland 4.2	Ukraine	Annual cropland Perennial cropland	Forest land 18 Grassland 6.2 Forest land 18 Grassland 5.8
Germany	Annual cropland Perennial cropland	Forest land 21 Grassland 7.0 Forest land 14 Grassland 6.7	United Kingdom	Annual cropland Perennial cropland	Forest land 27 Grassland 7.0 Forest land 20 Grassland 6.7
Indonesia	Annual cropland Perennial cropland	Forest land 33 Grassland 19.5 Forest land 31 Grassland 17.7	United States	Annual cropland Perennial cropland	Forest land 17 Grassland 1.9 Forest land 16 Grassland 1.5

**ANNEX 4: SAFE DRINKING WATER PARAMETERS WHO**

Parameter	Value
Faecal coliforms	Zero
Chlorine residue or residue from other treatment disinfectants	0.2 to 0.5 mg/L
Nitrates	10 mg/L as nitrates
pH	6.5 to 8.5
Sodium	20 mg/L
Sulphates	250 mg/L
Turbidity	Less than or equal to 5 NTU (nephelometric turbidity unit)
Total Dissolved Solids (TDS)	300mg/L, unless national law sets a different legal limit

*[WHO Guidelines for Drinking-water Quality \(fourth Edition\) \(2011\)](#)*

**ANNEX 5: THE HOUSING PROVIDED AND CONTROLLED BY THE MILL MEETS LOCAL REGULATORY STANDARDS.  
IF NO REGULATORY STANDARDS EXIST, THE FOLLOWING CONDITIONS SHOULD BE MET.**

- Absence of rats, mice, insects and vermin, or conditions that favour their populations that could cause disease or carry parasites that function as vectors of diseases;
- Dry floors;
- Protection against rain, wind or cold weather conditions;
- No conditions posing imminent threats to the health or security of the occupants;
- A register of workers and family members that live in management provided housing;
- A separate bed, or equivalent for each worker,
- There is a minimum space between beds, or equivalent of 1 metre.
- Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from to 0.7 to 1.10 metres.
- Triple deck bunks are prohibited.
- Separate accommodation of the sexes;
- Doors with locking mechanism;
- Toilets at 1:15 people and wash facilities for 1:6 people (1 per family), with gender separated facilities.
- Natural light during the daytime and artificial light for the night time;
- Functional and effective firewood smoke evacuation or ventilation mechanisms that are well maintained;
- Non-leaking windows, doors and roofs;
- At least one shower per 10 persons, separated by gender;
- At least one large laundry sink for every 30 persons;
- Fire extinguishing mechanisms are installed and well maintained;
- Marked emergency exits;
  - 1) the supply of clean water in the workers' dwelling in such ample quantities as to provide for all personal and household uses;
  - 2) Adequate sewage and garbage disposal systems. Specific containers for rubbish collection are provided and emptied on a regular basis.
  - 3) Appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects;
  - 4) Workers' housing standards should be revised from time to time to take account of social, economic and technical developments
  - 5) Workers' housing and related community facilities should be of durable construction.
  - 6) Access to an adequate and convenient supply of free potable water is always available to workers,
  - 7) Facilities for the storage of personal belongings for workers are provided.