BONSUCRO®

Outcome Report 2015

Bonsucro Outcome Report 2015 version 1.0

This report forms part of Bonsucro's ongoing compliance with, and attempts to strive beyond, the requirements of the ISEAL Alliance Impacts Code.

Bonsucro's mission is "to foster the sustainability of the sugarcane sector through a metric-based certification scheme and by supporting continuous improvement for members".

Bonsucro is the trading name of the Better Sugarcane Initiative ltd, a company registered in England and Wales, company number 06798568.

E&OE: information correct at time of publishing – May 2015.

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1. Introduction, Scope and Objectives

The vision of Bonsucro is *a sugarcane sector that is continuously improving and verified as sustainable*. The Bonsucro Certification System guides members toward certification and provides direction for auditors to conduct effective verification of the Bonsucro Production Standard and Chain of Custody, which is the mechanism for achieving Bonsucro's vision in the field.

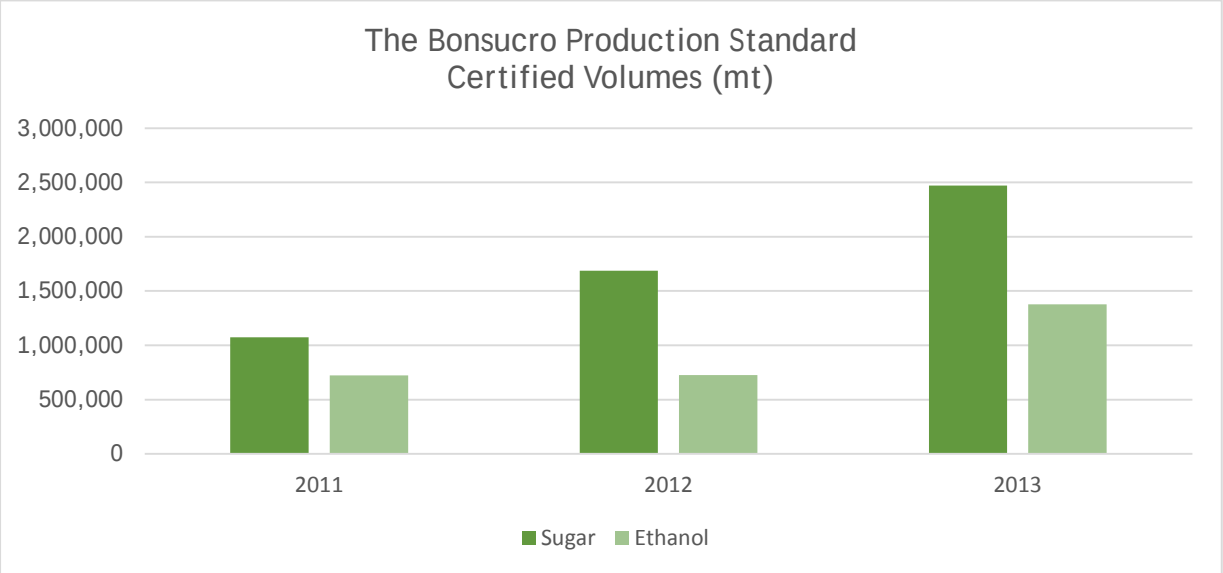
The purpose of this Outcome Report is to present the findings of Bonsucro's Monitoring and Evaluation (M&E) System. The System is described in the Bonsucro M&E System Report, which supports Bonsucro's compliance with the ISEAL Impacts Code. The Bonsucro M&E System Report provides an overview of the monitoring and evaluation tools employed by Bonsucro to ensure a transparent and credible understanding of the outcomes of the Bonsucro Standards for the sugarcane sector. The methods of data collection are described in section two of this report, and information from these sources is analysed in sections three, four, and five.

1.1 Scope

The scope of the M&E System is defined by the Bonsucro Production Standard, which mills and their sugarcane supply areas are certified against to ensure sustainability practices are carried out in the field. The mills and their sugarcane supply areas (the unit of certification) demonstrate compliance using the Bonsucro-developed reporting tool, the Bonsucro Calculator.

Since its inception, participation in the Bonsucro Certification System has grown in geographic scope and intensity. Figure 1.1 presents the amount of certified product produced per year, which has been verified by third-party audit visits to the mill and farms. The amount of certified sugar production has increased over 45% per year. That increase brings more effectiveness in the ability of the secretariat to report on outcomes of the Bonsucro Certification System.

Figure 1.1: Sugar and ethanol volumes certified against the Bonsucro Production Standard



1.2 Theory of Change and Priority Indicators

Bonsucro has further defined the goals of the M&E System in its Theory of Change, which was approved by members in the first quarter of 2014, and priority indicators for the M&E System have been defined by this report. There are 14 priority indicators, shown in Table 1, which cover five key areas of sustainability issues present in the sugarcane sector: land rights, enterprise resilience, labour rights, climate change, biodiversity and natural resources. Information collected on the priority indicators is reviewed in section five of this report, where the performance of certified mills is compared to external performance reports for the sector. Bonsucro is always striving to improve its internal systems. Stakeholders are welcome to send comments and proposals for improving the Bonsucro M&E System by contacting the secretariat at info@bonsucro.com.

Table 1: Priority Indicators for Monitoring and Evaluation

Area of Sustainability	Goal in Bonsucro Theory of Change	Indicator of Bonsucro Production Standard V3	Indicator	Metric Requirement for Mills/Agric
Land Rights	All sugarcane is grown in legally-owned land, local communities are consulted and respected	1.2.1	The right to use the land can be demonstrated.	Yes
Enterprise Resilience	Farmers add value to their work	3.1.2	Yield (tc/ha harvested/y)	45 for dryland; 65 for supplementary irrigated systems; and 85 for irrigated systems
		5.9.1	USD$/t cane	Mill >4; Agric >2
	Mills are technically efficient	3.1.4	Mill overall time efficiency (processing time as % of total time)	>75
Labour Rights	Workers work in a safe environment	2.3.1	Lost time accident frequency (# per million hours worked)	Mill <15; Agric <45
	ILO Standards apply to all workers of the sugarcane sector	2.4.1	Ratio of lowest entry level wage including benefits to minimum wage and benefits required by law ($/$)	≥1
		2.1.1	Years (Minimum)	18 for hazardous work 15 for non-hazardous work
		2.1	To comply with ILO's Labour Conventions	Yes
Climate Change	GHG Emissions are contained	3.2.1	Net GHG Emissions for sugar	<0.4 t CO2eq/t sugar
		3.2.2	Net GHG emissions for ethanol	<24 g CO2eq/MJ
Biodiversity & Natural Resources	Areas of High Conservation Value are preserved and mills mitigate their impacts on the environment	5.2.1	Net water consumed per unit mass of product (kg/kg of product)	Mill, <20 kg/kg sugar; or <30 kg/kg of ethanol. Agric <130 kg/kg cane
		4.1.7	Herbicides and pesticides applied per hectare per year	<5 kg active ingredient/ha/y
		4.1.6	Nitrogen and phosphorous fertilizer (calculated as phosphate equivalent) applied per hectare per year	<120 kg/ha/y
		4.1.2	High Conservation Value areas are used as a % of total land affected by a new project or an expansion	0

2. Methodology for Data Collection

This outcome report is built on information regularly collected to support the Bonsucro Monitoring & Evaluation System. There are three main sources of information that provide feedback from stakeholders. The first method of data collection is by monitoring external reports to evaluate input from external stakeholders, and the second is through interaction with all members, which is formalised in annual reports. The third is through interaction with members certified against the Bonsucro Production Standard, which is formalised through data collection and verification using the Bonsucro Calculator. Each of the three sources of data collection is described below.

2.1 External Stakeholders

Independent research, reports, and benchmark studies offer important data to Bonsucro; together with Bonsucro events, they contribute towards monitoring external factors and unintended effects as well as towards understanding broader implications of adoption of the Bonsucro Standards (e.g. community level impacts). We strive to take into consideration studies from respected organisations, researchers, and authors specialised in the sugarcane sector. Data from these sources is collected directly by the secretariat and by Bonsucro members. They are shared internally to relevant team members for their consideration and further actions.

2.2 Bonsucro Members

The Annual Report against the Code of Conduct is a requirement for Bonsucro membership. Members respond to questions designed by the Secretariat regarding their experiences with Bonsucro, their market, their plans, and their activities to support Bonsucro's goals. It is also an opportunity for members to let Bonsucro know about their concerns, challenges, and opportunities in the sugarcane sector. The reports offer rich qualitative information about adoption of the Standards, market of certified products, amongst others. Data is collated and studied by the secretariat to design global, regional, and local action plans.

2.3 Bonsucro Members Certified against the Production Standard

To become certified, mills and their sugarcane supply areas must demonstrate compliance with the Production Standard using Bonsucro's reporting tool, the Bonsucro Calculator. The information in the Bonsucro Calculator is used to show how the mill complies with each metric-based indicator, and guides the independent audit in the field. The methodology of data collection is guided by the Bonsucro Certification System documents: "Guidance for the Production Standard Including Guidance for the Bonsucro EU Production Standard" and the "Bonsucro Certification Protocol Including Bonsucro EU Certification Protocol".

Data collected in the Bonsucro Calculator is verified by licensed certification bodies, which are responsible for verifying reported information on the ground. Every auditor collecting data is trained on the Bonsucro Calculator as well as on the data itself, either by Bonsucro or internally, and has the necessary technical knowledge to understand and verify information collected from farms and mills and to report it. Bonsucro's Guidance for the Production Standard and Certification Protocol employ different methods to obtain

data, including: interviews, sampling, documental and background checking, visual audits, among others. Ensuring licensed certification bodies are skilled, trained, and competent increases the reliability of the data.

Audit results and Bonsucro calculators are sent to Bonsucro after validation by the certification body. This way, Bonsucro obtains individual-level data of certified member mills. Individual-level data will never be disclosed publically, it is only reported as aggregated.

3. Independent Research

As Bonsucro continues to gain global recognition in the sugarcane sector, feedback from independent stakeholders is highly valuable to ensure Bonsucro's global reach is as effective as possible in supporting a sustainable sugarcane sector. The secretariat follows independent research and collaborates on request. Bonsucro's M&E programme has prioritised research on the impact of certification at the mill and farm level, and welcomes collaboration or leadership on this work.

3.1 Independent Research

The Business Case for Mill Compliance with and Certification to the Bonsucro Production Standard

Agroicone published the results of a study titled, *The Business Case for Mill Compliance with and Certification to the Bonsucro Production Standard*. With a focus on mills in Brazil, the study presented a detailed explanation of the costs and benefits associated with certification. Agroicone gathered quantitative and qualitative information to provide comprehensive and valuable industry insight for Bonsucro as new markets seek certification and access to the Standard. The research was sponsored by the International Finance Corporation, Solidaridad, and Royal Dutch Shell. Highlights from the findings of the study are below:

- "Operational efficiency is the most important benefit for both Traditional and Modern mills. This benefit is underestimated in most of the mills."
- "Marketing benefits were listed as spontaneous media exposure, contribution for good brand image and value, and meeting some customers demand."
- "The majority of the costs are related to legal compliance and, as the mills pointed out, they are part of the mills' obligations. The incremental cost of certification is moderate."
- For traditional mills, "excluding compliance with national law and own cost of capital… payback period is 10 months for certification"

The State of Sustainability Initiatives Review 2014: Standards and the Green Economy

"The State of Sustainability Initiatives Review 2014 reports on systems and market trends across 16 of the most important standards initiatives operating across 10 key commodity sectors." The report had a number of key findings that are relevant to the growth of Bonsucro as they present a positive outlook of a growing market for certification against sustainability standards globally. Bonsucro contributed to the report along with 15 other voluntary sustainability standards. The report is structured to evaluate the standards according to respective global commodity markets, with many standards covering multiple commodities. In the sugar market section, Bonsucro has accomplished clear market leadership. The sugar market review of the report can be found on pages 275-296.

Collaborating for Change in Sugar Production: Building Blocks for Sustainability at Scale

The Corporate Social Initiative at the Harvard Kennedy School has published a report titled 'Collaborating for Change in Sugar Production: Building Blocks for Sustainability at Scale', which features an analysis of assessing business case for Bonsucro certification using a case study of Azunosa in Honduras, which achieved certification last year. The report was supported by a number of Bonsucro members.

Table 3.1: Published Research on Bonsucro in Peer-Reviewed Journals in the period 2012-2014

SOURCE	TITLE	SUMMARY
FISHER[1] (2013)	The variability and drivers of the carbon footprint of cane sugar	Builds a GHG estimation model based on the Bonsucro method for carbon assessment, and uses Monte Carlo estimation to build estimates of the variability of emissions given a distribution of inputs.
MOHR AND BAUSCH[2] (2013)	Social sustainability in certification schemes for biofuel production: An explorative analysis against the background of land use constraints in Brazil	Discusses the role of Bonsucro in social sustainability, the extent of transformative change, and the relative roles of private governance and national law.
SNEYD[3] (2014)	When governance gets going: Certifying 'better cotton' and 'better sugarcane'	Situates Bonsucro in the world commodity order and discusses the potential for multi-stakeholder initiatives to navigate between the local and global scales.
DIAZ-CHAVEZ AND LERNER[4] (2013)	Certification and standards for sugarcane and bioenergy: Experiences with development and application and their relevance for Africa	Compares Bonsucro to other local and global standards for bioenergy, in an African context.
ZEZZA[5] (2013)	Sustainability certification in the biofuel sector	Gives and overview of Bonsucro and concludes that in Brazil it has acted as an important forum for consensus-building among actors.
SELFA ET AL.[6] (2014)	Depoliticizing land and water "grabs" in Colombia: The limits of Bonsucro certification for enhancing sustainable biofuel practices	Examines how the sugar industry frames participation in Bonsucro and to what extent it can challenge historically entrenched patterns of land grabs in Colombia
JOHNSON ET AL.[7] (2012)	Transformations in EU biofuels markets under the Renewable Energy Directive and the implications for land use, trade and forests	Compares the costs of membership and compliance for biofuel certifications recognised by the European Union, including Bonsucro.
VAN DEN BOR[8] (2012)	RED's biofuel certification schemes: comparing stringency and costs	Builds an indicator to compare standards recognised by the European Union as proof of meeting the Renewable Energy Directive, including Bonsucro.
FORTIN AND RICHARDSON[9] (2013)	Certification schemes and the governance of land: Enforcing standards or enabling scrutiny?	Discusses the extent to which certification, using the example of Bonsucro, is more useful in the case of land-grabbing as a tool to allow scrutiny or a tool to enforce the law
MOURA AND CHADDAD[10] (2012)	Collective action and the governance of multi-stakeholder initiatives: A case study of Bonsucro	Applies collective action and governance theories to analyse Bonsucro's case and make observations as to address sustainability in global agrifood chains

4. Findings from Annual Reports from Members

The Annual Report against the Code of Conduct is a requirement for Bonsucro's membership. Members respond to questions designed by the Secretariat regarding their experiences with Bonsucro, market, plans, and activities to support the goals of Bonsucro. It is also an opportunity for members to let Bonsucro know about their concerns, challenges, and opportunities in the sugarcane world. The reports offer rich qualitative information about adoption of the Standards, market of certified products, amongst others.

The responses offer rich qualitative data to Bonsucro that helps the organization continuously improve and direct internal policies. In 2014, 140 members were invited to respond, and 102 replied (72.8% of the members that were requested to respond), representing an increase in annual reports received from 21 members in 2013.

4.1 Trends

Better corporate image and reputation: Responding members have associated Bonsucro with improved corporate image and reputation, which has been reflected in the steady growth of membership in the past few years.

- ***Supply chain coordination*:** Members have associated Bonsucro with improved communications internally and externally and affirmed that Bonsucro is used as a platform to communicate and work together with their stakeholders to achieve their sustainability commitments, in that sense Bonsucro offers a clear orientation to the collaborative work of its members.
- ***Platform for sugarcane sustainability*:** Members see Bonsucro as an important platform for discussing sustainability of the sugarcane sector and for promoting performance-based standards.

4.2 Ideas

Where should Bonsucro focus? Several ideas were proposed, and some of those ideas were discussed in the Member Consultation Day during Bonsucro Week 2014. The arguments that seem to be most recurrent amongst all membership classes are:

- ***Market diversification*:** Bonsucro and members need to expand availability of certified products beyond Brazil and Australia, with the goal to promote the purchasing of certified products.
- ***Credibility*:** Bonsucro needs to continue being a credible organisation, which includes amongst other things: making sure the Standards are up-to-date and science-based; ensuring that members follow the Bonsucro Code of Conduct; and improving transparency of the organisation.

4.3 Rating of Bonsucro's Value

Members were asked to rate the value they get from Bonsucro services in a five-point scale from "poor" to "excellent". The results and analysis are presented below.

- ***Access to Information:*** Approximately 70% of respondents rated this service as excellent. Access to specialised information and technical support is one of the services offered to Bonsucro members.

- ***Market Opportunities:*** 78% of respondents have rated the market opportunities of Bonsucro as "fair", indicating that more work is needed to better translate Bonsucro certification into market opportunities.

- ***Stewardship and Reputation:*** Roughly 74% of respondents rated Bonsucro as "excellent" in the provision of leadership and improvement of corporate image and reputation. Over 96% of members have rated this service between "good" and "excellent", which re-enforces the findings of open-ended questions that Bonsucro has a positive effect on corporate image;

- ***Platform to Communicate about Sustainability:*** Over 90% of respondents have rated this service either as "good" or "excellent" also supporting the findings from open-ended questions of the survey. Members use Bonsucro as a "common language" to engage with suppliers and clients, as well as to communicate their sustainability commitments internally and externally;

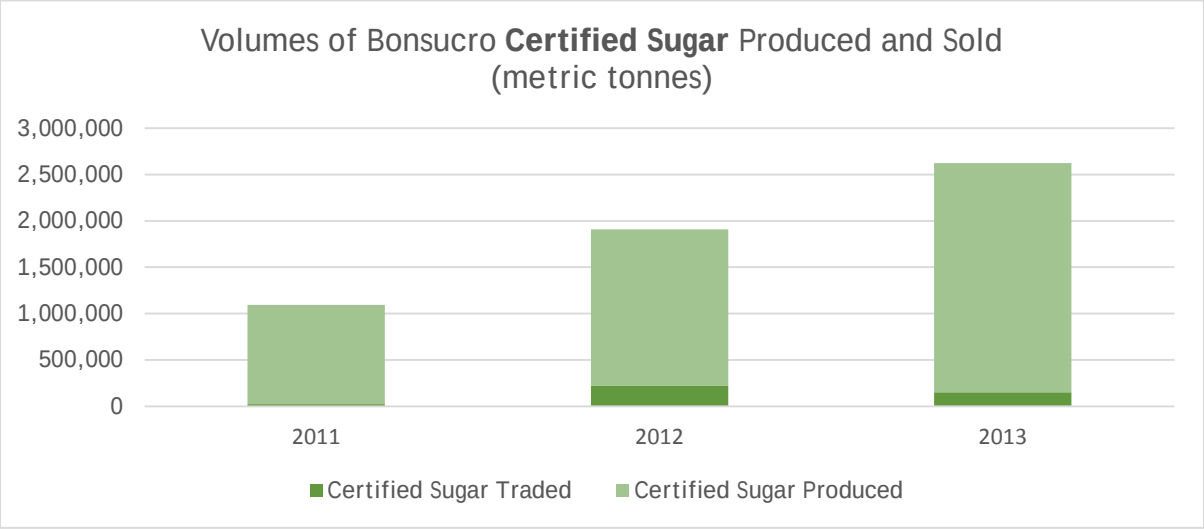
- ***The Bonsucro Calculator (compliance and continuous improvement tool):*** Over 72% of members have rated the Bonsucro Calculator as "excellent". The large majority of positive responses came from farmer and industrial members, which indicates that knowledge and use of the calculator is concentrated in those membership classes (as would be expected). The Calculator was recently revised (following the revision of the Production Standard) and Bonsucro is currently adapting the Calculator for farmers to use, especially to support out-growers;

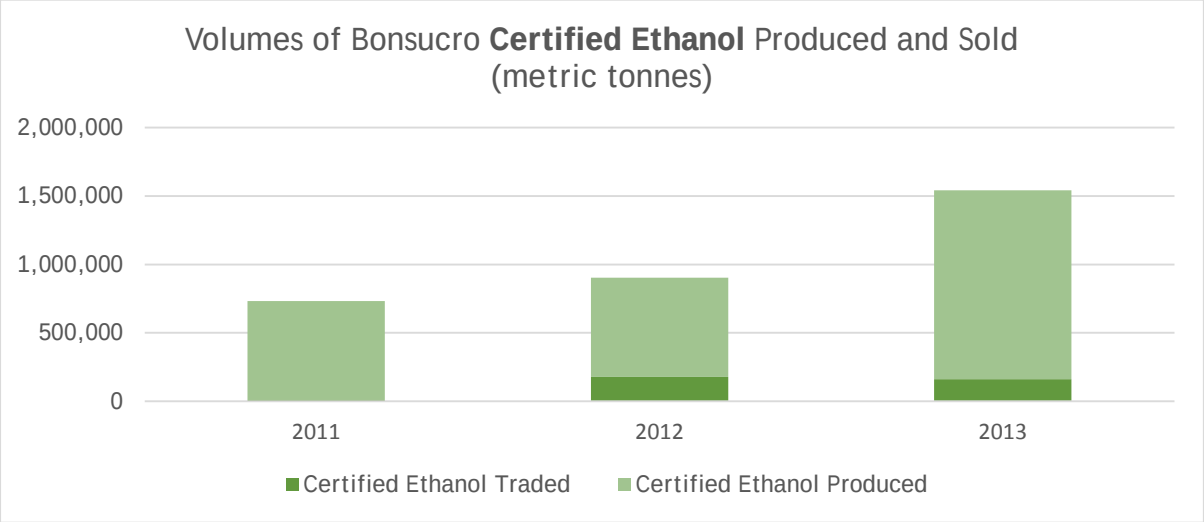
- ***Bonsucro Events and Training Courses:*** 87% of members rate Bonsucro events and training courses as "good" or "excellent". One of the main benefits of Bonsucro membership is the platform it provides through access to events (networking opportunities with other members) and trainings (including customised in-house trainings for mills and buyers). Nevertheless, a number of individual comments point to a limitation in terms of geographical coverage of trainings, and ask Bonsucro to provide more diversification of trainings offered.

4.4 Recommendations for Growth

Bonsucro certified members report on the volumes of product that have been sold as Bonsucro certified per year. This is shown in Figure 4.1. The secretariat actively engages end users and relevant stakeholders to promote the uptake of certified products. From 2011 to 2013, the number of mills selling certified, physical sugarcane-derived products has grown from three to 21.

Figure 4.1: Reported sales of certified product compared to certified production





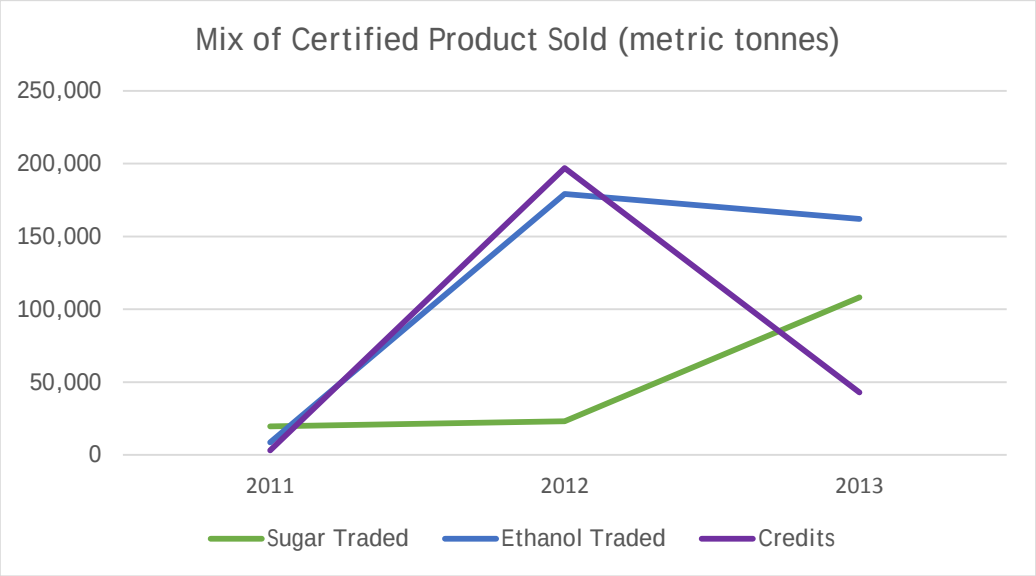
The difference in volumes produced and traded products is an essential metric for Bonsucro to quantify. The uptake of traded certified products is an indicator to follow the demand for Bonsucro certified product by the supply chain. It indicates the volumes of products for which claims can be tracked within the supply chain, from origin to point of claim (for example on product label, communication in CRS reports).

There are many potential reasons why volumes of production considerably exceed volumes traded. It is important to note that for some mills achieving certification (and therefore the potential to produce sustainable certified products) can create sufficient conditions to engage with a sustainably-minded supply chain. For example, end users might include in their purchasing guidelines a requirement that mills become Bonsucro-certified, without the end user directly purchasing any Bonsucro certified products itself. These volumes would not be accounted for within the current Bonsucro Certification System. Bonsucro is therefore working to unlock the value of certification to encourage more buyers to trade and report on Bonsucro certified products. To increase uptake, Bonsucro also continues to strengthen the value of its brand, for example by encouraging its usage as a consumer

facing label in key markets. In this case, it would allow buyers, sellers and Bonsucro to more accurately report actual volumes of traded Bonsucro certified products.

Bonsucro actively monitors three mechanisms whereby traders and end-users can purchase Bonsucro certified product: (1) physical sugar sales by certified mills and supply area, (2) physical ethanol sales by certified mills and supply area, and (3) purchase of sugar and ethanol credits through the Bonsucro Credit Trading System. Figure 4.2 shows the relative share of each mechanism in the overall trade of certified product. Bonsucro encourages end-users and traders to prioritize purchase of physical product over credits as a means to engage the entire supply chain in sustainability. 2013 saw a sharp increase in the trade of physical certified products versus the sales of Bonsucro credits. Although it is too early to conclude a long-term trend in conversion from credit to physical trades, this preliminary result might demonstrate the impact of Bonsucro's active role with its supply chain partners to encourage the transition.

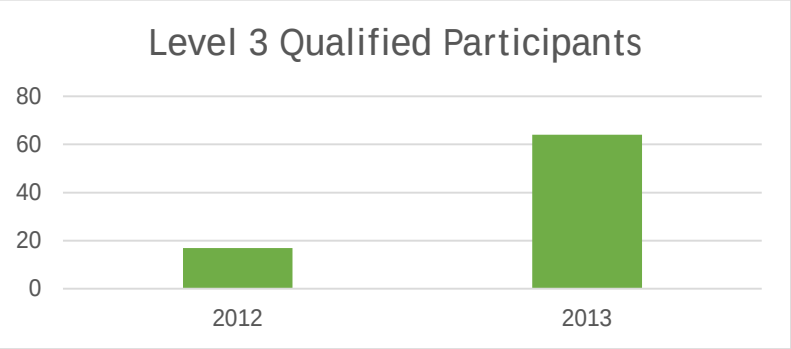
Figure 4.2: Reported sales of certified product disaggregated by mechanism of sale



To increase the reach of Bonsucro worldwide, Bonsucro has been active in the field to provide training on the Bonsucro Certification System. This allows operators to have up to date knowledge on the system and certification bodies to offer operators the services of certification. The objective of the organisation is to provide locally available expertise and certification capacity.

To become a Bonsucro qualified lead auditor, Bonsucro requires participation in Level 3 Training (conducted directly by Bonsucro staff) and for the participant to pass a qualifying exam. Figure 4.3 shows the growth in qualified participants.

Figure 4.3: Qualified trainers from Level 3 training



5. Findings from Mills' Certification Data

Sugarcane is a global commodity with production in over 100 countries. Production practices such as, farm management, harvesting, and milling are adapted to local climate, cane varieties, labour availability, and a wide range of other factors. Sustainability risks of practices vary in applicability and magnitude from country to country and from farm to farm. Bonsucro has developed a metric-based Standard, the Bonsucro Production Standard, which applies a unique and globally recognised assessment of sustainability. The Standard effectively enables mills and farms to employ locally appropriate requirements that increase the sustainability of the sector. Measuring the impact of the Standard on the sustainability of the sugarcane sector is inherently a challenging task given the potential for confounding factors. However, the information collected for certification is used to evaluate the compliance of mills to indicators that have been identified as priority risk areas in the sustainability of the global sugarcane sector. This information also supports the continuous improvement of Bonsucro's Standards and organisation and provides one of the multiple layers of evidence to assess Bonsucro's impacts against its intended goals.

5.1 Data Collection and Monitoring

The Bonsucro Production Standard is a set of principles, criteria, and indicators used to assess the performance of sugarcane mills and farms against the three pillars of sustainability. The unit of certification is the sugarcane processing mill and a percentage of its supplying agricultural land selected at the discretion of the mill, or in collaboration between the mill and independent farmers, to be included in certification. The Standard recognises the heterogeneity in the structure of sugarcane production and processing around the world—which range from centralised family-farm or corporate-farm management to networks of independent outgrowers. The Standard is divided into five principles, 18 criteria, and 53 indicators. Bonsucro's approach to sustainability is embodied in the five principles:

- Obey the law
- Respect human rights and labour standards
- Manage input, production and processing efficiencies to enhance sustainability
- Actively manage biodiversity and ecosystem services
- Continuously improve key areas of the business

There is a separate standard that builds on the Bonsucro Production Standard: Bonsucro EU. The Bonsucro EU option serves the purpose of demonstrating compliance with the EU RED 28/2009 legislation. These two Standards build on the foundation of the Bonsucro Production Standard by allowing end-users to make claims on sustainability and allowing mills to comply with EU Renewable Energy Directive requirements for the production and usage of biofuels.

Bonsucro has developed a software tool—the Bonsucro Calculator—in order to measure compliance. Mills and farms must collect production and processing data and input it into the calculator, which applies formulae to the provided information in order to assess

compliance with the Standard. This data is audited on-site by one of Bonsucro's trained and approved certification bodies, additionally, the Bonsucro Calculator enables self-assessment and aids mill managers to understand what corrective actions need to be implemented to ensure a successful audit against the Standard. Mills can use output data from the Bonsucro Calculator to identify activities that do not meet the requirements of the Standard, and are thus provided guidance on how to manage the mill more sustainably. The input data to the Bonsucro Calculator is the source of data for Bonsucro's monitoring and evaluation system.

5.2 Evaluation

The objective of Bonsucro is to support sustainability in the sugarcane sector. Evaluating progress toward this objective is difficult. However, increasing uptake of certification has significantly increased the amount of data from certified mills available, as presented in the last section, and this data can be used to compare impacts of Bonsucro certified operators to impacts of non-certified operators.

To validate the information provided from the indicators, the M&E system of Bonsucro compares results from indicators to performance of external sources of information or aggregate reporting of mills against the Bonsucro Production Standard. Though this is an indirect way to measure the impact of the Standard, it is the most accessible way to evaluate the information Bonsucro is directly receiving from the mills instead of introducing new variables unrelated to the Standard. Though this environmental sustainability impact would be ideal to measure, it is impractical with the current availability of data, and gathering representative information from certain mills would not be telling of the global situation of the Standard's impact.

The methodology employed in this M&E report allows Bonsucro to present a comparison between the current situation of Bonsucro certified mills and independent estimates of our indicators for non-certified mills. This has multiple advantages. First, it investigates the robustness of the indicator calculations and threshold values chosen by Bonsucro. Indicator validation is difficult when measuring something that cannot be directly observed, such as the long-term sustainability impacts of the Standard. One common way to validate an indicator therefore is to compare the results from one indicator to the results from a second calculation which uses a different methodology. This does not allow Bonsucro to make any claims regarding impacts.[11] However, it does tell us:

- The current sustainability of Bonsucro certified production, including the average Bonsucro mill and the variability of different indicators (and literature estimates).
- Future directions for continuous improvement.
- Opportunities and threats for the Standard.

All data from the Bonsucro Calculator used in this report is a snapshot for the latest period with full data coverage—the certification period covering 2012. Where possible, external comparison data was identified and used to compare Bonsucro mills against a wider average. This was drawn from a wide literature review carried out using online and physical sources, and all external data-points are documented in Annex 1. However, for several indicators it was not possible to identify an external figure that used a similar methodology. In these cases, we display the Bonsucro Standard as a reference point. Priority indicators from the

Standard were identified for evaluation in this report.

5.3 Quantitative Priority Indicators

5.3.1 Land Rights

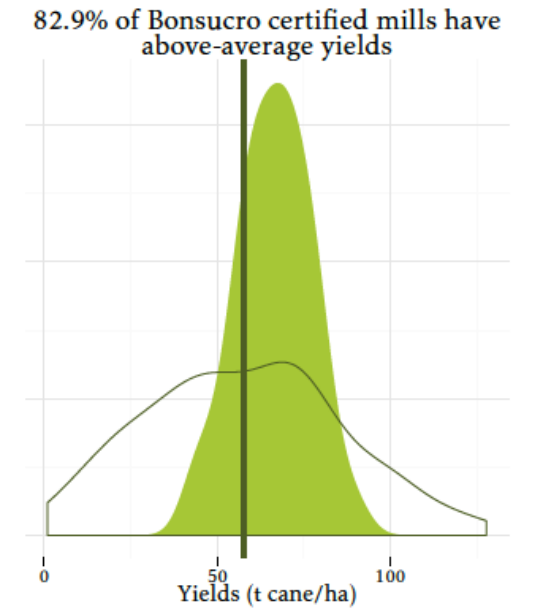
The Bonsucro Production Standard is comprised of core indicators that are mandatory for certification. The mill and supply area must demonstrate full compliance with these indicators, including with "the right to use land and water" (Indicator 1.2.1 in Version 4, and 1.2 in Version 3 of the Bonsucro Production Standard). Therefore, all mills that are certified against the Bonsucro Production Standard are compliant with this indicator, and their compliance has been verified by an accredited certification body. Reporting against this indicator is on a yes/no basis, consequently quantitative measurement of this indicator demonstrates 100% compliance.

5.3.2 Enterprise Resilience

Addressing the sustainability of a mill requires an investment. To be compliant, sugarcane processing mills are asked to demonstrate financial stability. While financial strength has no guarantee of promoting sustainable land management and the conservation of common pool resources, literature appears to show that socially strong production spends money in ways that promote sustainability, and the lack of economic sustainability can be a main barrier to the adoption of better practices.[12] [13]

Bonsucro currently measures priority indicators for enterprise resilience through three metrics. The first metric is agricultural, looking at the cane yields per hectare of land under cane. The distribution of yields of Bonsucro certified mills in 2012 is shown in Figure 7.1 against the worldwide distribution of sugarcane yields, and the global average. As shown, Bonsucro mills perform favourably, with 82.9% performing above the global average. However, defining a globally 'ideal' level of productivity per hectare of sugarcane is difficult given the wide range of factors contributing to yields, such as weather, climate, technology, cane-age, and disease.

Figure 5.1: Distribution of Bonsucro mills' yields with distribution and average of world sugarcane yields as estimated by the FAO in 2012[14]



The second metric is time efficiency within the mill. This considers the technical efficiency of the mills so that they become and stay efficient economic operators. Reliable and comparable external data was not found for time efficiency, however compared against the Bonsucro Standard in Figure 7.2, nearly 90% of Bonsucro mills performed above the Standard.

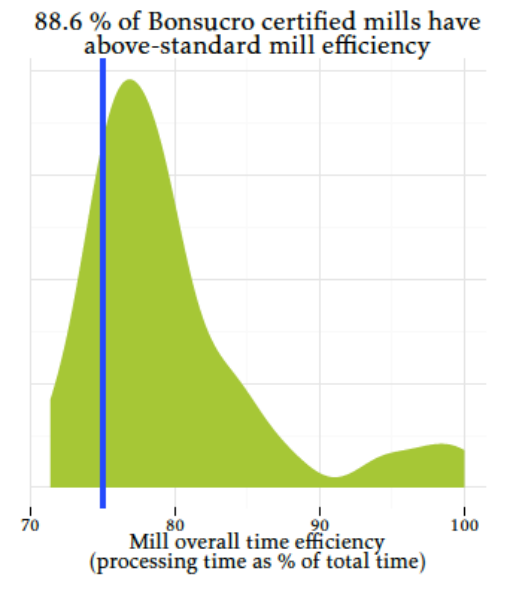
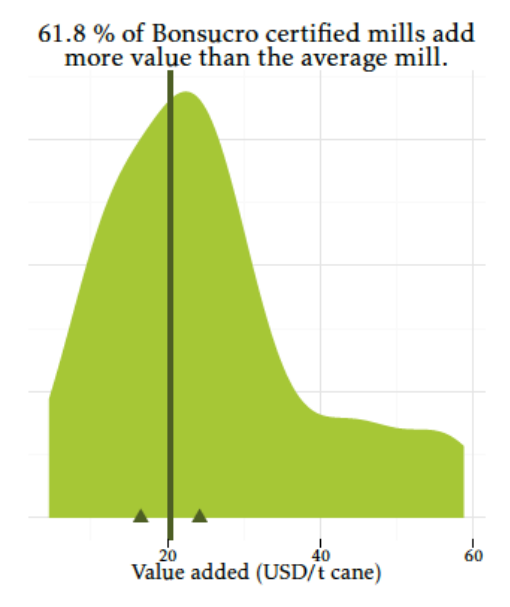


Figure 5.2: Distribution of Bonsucro mills' time efficiencies against the Bonsucro Standard

The final metric considered enterprise resilience is monetary terms—value-added per tonne of cane. This is shown in Figure 7.3. A majority of Bonsucro mills appear to add more value than the average estimate found in the literature, indicating that Bonsucro mills on average perform better than non-Bonsucro mills.

Figure 5.3: Distribution of Bonsucro mills' added value per cane-tonne with estimated average added value figures from the literature (See Annex 1)



5.3.3 Labour Rights

Labour rights are a key issue in the sugarcane sector. Child labour is a serious concern in some parts of the sector, as are health and safety hazards to workers, which include injuries from equipment or plants, repetitive action, overexposure to chemicals, sunlight or smoke, and long working hours.[15] To evaluate the impact of social sustainability, four indicators from the Standard have been selected: the absence of child labour, ILO Labour Convention compliance, minimum wage adherence, and worker safety. The first three indicators are core indicators, meaning every certified mill must demonstrate adherence.

- ***Absence of Child Labour and Compliance with ILO Labour Convention:*** These two indicators can only be evaluated on a pass/fail basis. Though this method of M&E doesn't allow us to prove causality between Bonsucro certification and the absence of child labour and compliance with the ILO Labour Convention, Bonsucro can claim that as a result of the Standard, a 3rd party is now checking compliance with these requirements in the field, which was not done before.
- ***Minimum Wage Adherence:*** The average Bonsucro mill's lowest wage is greater than the minimum wage—on average 29% greater (see Figure 7.4).
- ***Worker Safety:*** Almost all mills completely adhere to a fourth criterion capturing worker safety, restricting lost time accident frequency per million hours worked in both the agricultural phase and the mill phase (Figure 7.5).

Figure 5.4: Distribution of Bonsucro mills' ratio of lowest wage to national minimum wage **against the (compulsory core)** Bonsucro Standard

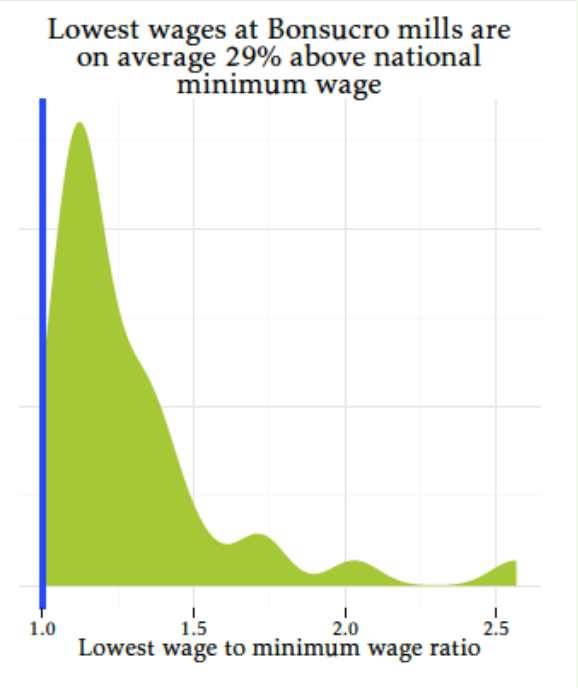
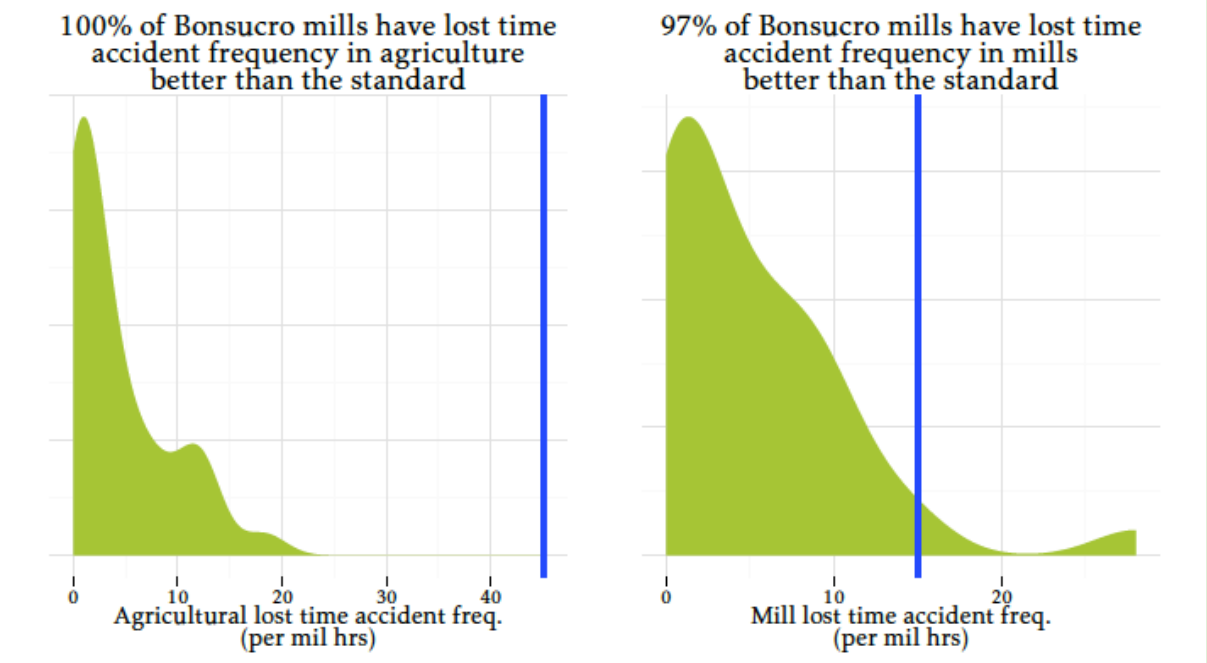


Figure 5.5: Distribution of Bonsucro mills' lost time accident frequencies **with** required limits from the Bonsucro Standard



5.3.4 Climate Change

Greenhouse gas emissions contribute to climate change, and there are a number of activities in the process of sugarcane production that generate greenhouse gas emissions, for example, use of fertilizers, diesel and chemical use at the mill. Those emissions are measured and managed as part of the Bonsucro Calculator, used by mills and supply areas to report on the Standard. Greenhouse gas emissions from sugarcane processing are estimated using input data also used for other indicators. The emissions from the mill and agricultural land are calculated separately, and operators can use the information to identify the highest sources of greenhouse gas emissions. The information is reported in kg CO_2 eq./t cane, which is an industry standard.

In 2012, Bonsucro certified mills performed better than averages seen in the literature for greenhouse gas emissions in both sugar and ethanol. Notably, 91% of Bonsucro certified mills had below-average GHG emissions when compared to estimates, which used a broad range of factors similar to those used by Bonsucro's methodology. While several additional ethanol estimates were found in the literature, they did not, unlike the Standard, include GHG emissions for land use change and were therefore excluded. For sugar, no estimates that explicitly included land use change could be found, and therefore the reference displayed is likely to be an underestimate of the real value, potentially explaining some of the disparity between the performance of Bonsucro mills with regards to ethanol and sugar. Land use change is an especially important dynamic to include and to build our understanding of, as recent research has linked sugarcane expansion to both global and local warming and cooling depending on the nature of the change.[16]

Figure 5.6: Distribution of Bonsucro mills' GHG emissions from sugarcane ethanol and sugar production with estimates of average GHG emissions taken from the literature (See Annex 1)

5.3.5 Biodiversity & Natural Resources

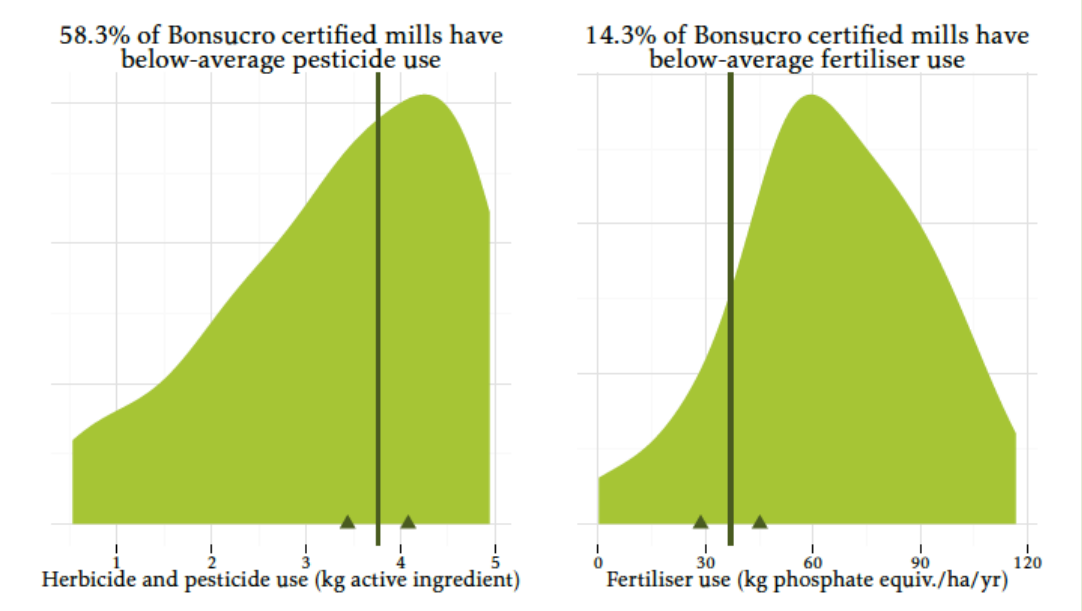
Agricultural systems such as sugarcane production are built upon and rely on ecosystem services. These services can be provisioning services, such as food or fuel production; supporting services, such as water supply, soil structure and nutrient cycling; regulating services, such as pollination, water purification or soil retention; or cultural services, such as aesthetic landscapes.

The value of ecosystem services to agriculture is enormous, and often underappreciated. Poor management can damage ecosystems such as habitat loss, nutrient runoff, and poisoning of non-target species with pesticides. Management practices should aim to both avoid these disservices, while promoting and strengthening the resilience and quality of beneficial ecosystem services. Methodologies to measure the impact of Bonsucro Production Standard certification directly have yet to be developed, but in lieu of being able to measure the health of the ecosystem services themselves, the Production Standard requires operators to measure and mitigate sugarcane processes that are known to damage ecosystems.

To conserve biodiversity and natural resources, sugarcane mills are required to (a) limit pesticide and fertiliser use, (b) limit water consumption, and (c) not allow sugarcane production to expand into areas considered to be of High Conservation Value.

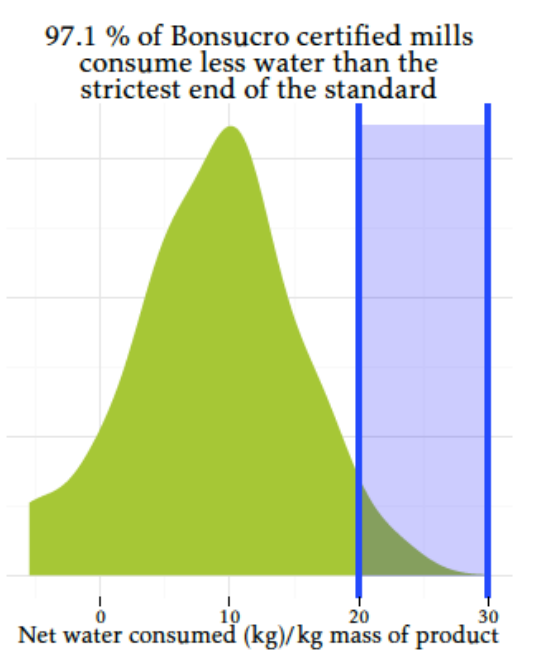
a) Chemical use reported by certified mills has had mixed results. In regard to pesticide and herbicide use, a majority of certified mills perform better than the average recorded in the literature (Figure 7.7, left). In regard to fertiliser use, the majority of mills apply more fertilizer than is estimate as an average in the literature (Figure 7.7, right). The data reviewed in this report was collected based on Version 3 of the Production Standard, but the revision process of the Production Standard to create Version 4 revealed major gaps in localisation of these indicators. To prevent runoff that can harm biodiversity levels and the natural environment, the capacity of the soil and sugarcane to uptake chemicals is dependent on localised factors adapted to soil characteristics. In Version 4 of the Standard, the thresholds of fertilizer, pesticide, and herbicide use take recommended application rates into account to reduce runoff and nutrient leaching, thereby supporting sustainability of biodiversity and natural resources. The Standard revision was not completed until late 2014, therefore the data collected for review in this report is based on Version 3 of the Standard. However, the small number of estimates found in the literature may not be wholly representative of the location and spread of the mills under Bonsucro certification, and the exact source of the data used to estimate here is not fully clear.

Figure 5.7: Distribution of Bonsucro mills' pesticide and fertiliser use with estimated average pesticide and fertiliser use values taken from the literature (See Annex 1)



b) Estimating water consumption across all mills regardless of certification is difficult because of a number of radically different consumption profiles. Estimates for ethanol calculated using similar methodologies to Bonsucro are in the range of 20-30 kg water/kg ethanol, very similar to the Standard. However, the only independent estimate for sugar places consumption between 598-1792 kg water/kg refined sugar, because the methodology (a) includes evapotranspiration, rainfall and a novel 'grey water' metric which represents the water needed to assimilate pollutants to existing ambient water standards and (b) is averaged globally over both countries that irrigate their cane and countries that tend not to. Compared to the Standard, almost all mills (97%) perform better than the stricter end of the requirement (see Figure 7.8). In recognition of methodological difficulties and diversity of water measurement, Bonsucro has implemented a new methodology to determine the sustainable threshold of water consumption, 'crop per drop' with the publication of Version 4 of the Production Standard. This methodology accounts more accurately for irrigated versus non-irrigated cane by providing a dynamic standard.[17]

Figure 5.8: Distribution of Bonsucro mills' water consumption against the Bonsucro Standard (lower end for sugar, higher end for ethanol)



c) To protect land with high concentrations of biodiversity, all mills seeking certification cannot convert land classified as High Conservation Value into sugarcane producing land. Using a cut-off of 2008, land that falls into a category listed in Table 2 cannot be converted. The methodology used to verify this standard is still under development. But the growing number of Bonsucro Production Standard certified mills indicates more mills are willing to agree to this commitment in moving forward in production and can prove none of the certified sugarcane has been produced on land that was of HCV after 2008.

Table 5.1: High Conservation Value

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.
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.
HCV 3 Ecosystems and Habitats	Rare, threatened, or endangered ecosystems, habitats or refugia.
HCV 4 Ecosystem Services	Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
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.
HCV 6 Cultural Values	Sites, resources, habitat 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.

6. Recommendations and Next Steps

6.1 Conclusion of the report

The outcome of the Bonsucro Monitoring & Evaluation System shows favourable results for Bonsucro. Each of the priority indicators have been evaluated by comparing reported data to the requirements of the Standard, performance of other mills against the Standard, or external performance analysis. Measurement against each indicator explained in the report is summarized in Table 6.1.

Table 6.1: Summary of Quantitative Outcomes from Bonsucro M&E System

Land Rights	- 100% compliance as it is a core indicator of the Bonsucro Production Standard
Enterprise Resilience	- 82.9% of mills performing above to global average for agricultural productivity - 90% of mills performing above the Standard requirement for time spent processing sugarcane - 61.8% of mills performing above requirements for added-value
Labour Rights	- Lowest wages at Bonsucro certified mills are on average 29% above national minimum wage - 100% of Bonsucro mills have lost time accident frequency in agriculture better than the Standard - 97% of Bonsucro mills have lost time accident frequency in mills better than the Standard
Climate Change	- 90.9% of Bonsucro certified mills have below-average GHG emissions from ethanol production - 66.7% of Bonsucro certified mills have below-average GHG emissions from sugarcane production
Biodiversity & Natural Resources	- 58.3% of Bonsucro certified mills have below-average pesticide use - 14.3% of Bonsucro certified mills have below-average fertiliser use

6.2 Recommendations for Improving Impact against Priority Indicators

Bonsucro continues to strive for improvement to build on the positive results shown in this report. In regard to each priority indicator, the secretariat has identified recommendations to improve the use of the Bonsucro M&E System to facilitate outcome reporting and improve the ability of the Bonsucro certification system to achieve sustainability objectives. The action items are outlined in Table 6.2. In addition to improving against the priority indicators using methodology of this report, the scope of the methodology can also be improved. As a medium- to long-term goal of the M&E System, the Bonsucro secretariat should identify ways to measure the continuous improvement of individual mills against the standard. Bonsucro staff and stakeholders witness this in the field and through interaction with members before and after certification, but it is not yet capture in the scope of the current Bonsucro M&E System, and should be considered in the future design of the system.

Table 6.2: Recommended Action Items for Improvement Impact against Priority Indicators

Land Rights	- Capture pre-certification assessment and the impact of the going through the certification process
Enterprise Resilience	- Indicator requirements for cane yields have been reassessed based on research into non-compliance, which is presented as a metric outcome of this report. Requirements have been localized with the publication of the Version 4 of the Standard. Bonsucro should continue evaluating the indicator as mills and supply area conform to new requirements - Identify leading producers in terms of yield, and evaluate the possibility for peer-learning from their practices - Evaluate pre-and post-certification gaps and develop guidance leading to higher efficiencies for monetary resource use - Improve marketing of Bonsucro certification for mills to bolster the business case for certification and increase the contribution of Bonsucro certification to provide added financial value per tonne
Labour Rights	- Measure the gap in wages before and after certification - Measure the difference in wages within the unit of certification - Research data on accident rates in non-certified mills to further justify the reference point - Identify link between health and safety activities, accident rate and overall efficiencies within certified mills to bolster the business case for certification
Climate Change	- Research data to further justify the reference point for greenhouse gas emission indicator requirements, with specific consideration for the inclusion of emissions from land use change in the Bonsucro Production Standard - Research news ways to engage mills in achieving compliance with GHG emissions indicator requirements for sugar production - Estimate the contribution of GHG savings to the impact of the sugarcane sector on global GHG emissions
Biodiversity & Natural Resources	- Indicator requirements for fertilizer and pesticide use have been reassessed based on research into non-compliance, which is presented as a metric outcome of this report. Requirements have been localized with the publication of the Bonsucro Production Standard Version 4. Bonsucro should continue evaluating the indicator as mills and supply area conform to new requirements - Identify leading producers in agrochemical compliance and lowest use, and evaluate the possibility for peer-learning from their practices - Consider measuring the unit of certification's impact on local water supply, with consideration, for example, of regional water basins and competition for use - Consider measuring the effectiveness of the standard to prevent deforestation and the impact of HCV-related requirements in achieving global goals

6.3 Impact of 2014 Bonsucro M&E Systems Report on the future of the M&E System

Bonsucro continues to maintain a credible standard, and considering the outcome of the Bonsucro M&E System is crucial to sustain that. Bonsucro has identified opportunities to improve the M&E System based on the results of last year's report and continuous feedback from stakeholders both formally and informally. To improve the verification of data collection, the Certification Protocol that guides auditors in auditing mills and supply areas against the Standard is undergoing revision. Feedback from the last outcome report was used in the revision of the Bonsucro Production Standard in the development of Version 4. Bonsucro has experienced a higher occurrence of mills conducting a gap analysis and pre-audit prior to conducting a formal audit against the Bonsucro Production Standard and Chain of Custody Standard. Bonsucro is requiring the certification body contracted to conduct the analysis to report the results to Bonsucro. This will enhance Bonsucro's M&E System to monitor improvement within the mill in the process of becoming more sustainable, which was a recommendation of the Bonsucro 2014 Outcome Report. Bonsucro will continue to improve its internal analysis on the data received and work closely with the data collectors (work carried out by the certification body) to support them in verifying and checking the quality of this information.

6.4 Strategy Refresh

In addition to recommendations based on the results of the M&E System for 2014, Bonsucro is undergoing a comprehensive strategy refresh, led by CEO Simon Usher, which will redefine Bonsucro's ambition, how it will be successful in fostering a thriving and sustainable sugarcane industry and its value proposition to individuals, communities, businesses, economies, and eco-systems. The refresh process began with a series of staff workshops, and several key strategic projects have commenced. Members have been asked to participate in the refresh through consultation and a series of surveys, which provide a real opportunity for stakeholders to feed into the formulation of Bonsucro's new strategy, and help Bonsucro become more globally credible and locally relevant.

6.5 Impact of Strategy Refresh on the M&E System

In response to Bonsucro's strategy refresh and other factors, the Bonsucro M&E System is going through a thorough revision. The revision will reflect the implementation of Version 4 of the Bonsucro Production Standard, the revision of the Chain of Custody Standard, the revision of the Bonsucro Certification Protocol that guides data verification, and the release of Version 2.0 of the ISEAL Impacts Code. The changes to the M&E System will reflect the Standard and improve the overall effectiveness of monitoring, learning, and improving. Bonsucro commits to engage stakeholders in defining the revised M&E system as required in the ISEAL Codes of Good Practice relating to M&E systems.

Annex 1: Reference Data

This information was collected from literature to provide a reference for comparing data gathered from the Bonsucro Calculator (the reporting tool for the Bonsucro Production Standard) to external research in the sugarcane sector to report on the indicators: enterprise resilience and climate change.

Enterprise Resilience

Yields

Source	Value	Measure	Notes
Seabra et al.[18]	86.7	T cane/ha	Brazil
IBGE[19]	68.88	T cane/ha	Brazil

Value Added

Source	Value	Measure	Notes
Alonso-Pippo et al.[20]	24.2	USD/t cane	General Model
Alonso-Pippo et al.[21]	16.5	USD/t cane	General Model

Climate Change

GHG from Sugar

Source	Value	Measure	Notes
Rein[22]	200-500	kg CO_2 eq/t sugar	Global Range
Hattori et al.[23]	203	kg CO_2 eq/t sugar	Thailand
Hattori et al.[22]	311	kg CO_2 eq/t sugar	Japan
Mashoko et al.[24]	364	kg CO_2 eq/t sugar	South Africa
De Figueiredo et al.[25]	241	kg CO_2 eq/t sugar	Southern Brazil
Seabra et al.[17]	234	kg CO_2 eq/t sugar	Brazil
Fereday et al. as cited in Klenk et al.[26]	630	kg CO_2 eq/t sugar	USA
Yuttitham et al.[27]	550	kg CO_2 eq/t sugar	Thailand

Herbicides and Pesticides

Source	Value	Measure	Notes
Seabra et al.[17]	4.08	kg active inred./ha/y	Brazil
Boddey et al.[27]	3.44	kg active ingred./ha/y	Brazil
UNICA[28]	2.41	kg active ingred./ha/y	Brazil

Phosphate Equivalent Fertilizer

Source	Value	Measure	Notes
Boddey et al.[29]	45.16	kg phosphate eq/ha/y	Brazil
Seabra et al.[17]	28.63	kg phosphate eq/ha/y	Brazil

[1] J Fisher. The variability and drivers of the carbon footprint of cane sugar. *International Sugar Journal*, 115(1379):782–793, 2013.

[2] Anna Mohr and Linda Bausch. Social sustainability in certification schemes for biofuel production: an explorative analysis against the background of land use constraints in Brazil. *Energy, Sustainability and Society*, 3(1), 2013. doi: 101186/2192-0567-3-6.

[3] Adam Sneyd. When governance gets going: Certifying 'better cotton' and 'better sugarcane'. *Development and Change*, 45(2):231–256, 2014.

[4] Rocio A Diaz-Chavez and Anna Lerner. Certification and standards for sugarcane and bioenergy: Experiences with development and application and their relevance for Africa. In *Bioenergy for sustainable development and international competitiveness: The role of sugar cane in Africa*, pages 284–303. Routledge, Abingdon, 2013.

[5] Annalisa Zezza. Sustainability certification in the biofuel sector. Discussion Paper 2013-03, Belfer Center for Science and International Affairs and Sustainability Science Program, Harvard University, Cambridge, MA, 2013.

[6] Theresa Selfa, Carmen Bain, and Renata Moreno. Depoliticizing land and water "grabs" in colombia: the limits of bonsucro certification for enhancing sustainable biofuel practices. *Agriculture and Human Values*, 31(3):455–468, 2014. doi: 101007/s10460-014-9509-3.

[7] Francis X Johnson, Henrique Pacini, and Edward Smeets. Transformations in EU biofuels markets under the Renewable Energy Directive and the implications for land use, trade and forests. Occasional Paper 78, Bogor, Indonesia, 2012.

[8] Remco Matthijs van den Bor. *RED's biofuel certification schemes: Comparing stringency and costs*. VU University Amsterdam, Amsterdam, 2012.

[9] Elizabeth Fortin and Ben Richardson. Certification schemes and the governance of land: Enforcing standards or enabling scrutiny? *Globalizations*, 10(1):141–159, 2013. doi: 101080/ 147477312013760910.

[10] P.T. Moura and F.R. Chaddad. Collective action and the governance of multistakeholder initiatives: A case study of Bonsuco. *Journal on Chain and Network Science*, 12(1):13-24, 2012.

[11] *C Bockstaller and P Girardin. How to validate environmental indicators. Agricultural Systems, 76: 639–653, 2003.*

[12] D Narayan and L Pritchett. Social capital: Evidence and implications. In P Dasgupta and I Serageldin, editors, *Social capital: A multifaceted perspective*, pages 269–295. World Bank, Washington, DC.

[13] Dietmar Stoian, Jason Donovan, John Fisk, and Michelle F Muldoon. Value chain development for rural poverty reduction: A reality check and a warning. *Enterprise Development and Microfinance*, 23 (1):54–60, 2012.

[14] Food and Agriculture Organization of the United Nations. FAOSTAT: Statistical databases, 2014. URL http://faostatfaoorg/.

[15] International Programme on the Elimination of Child Labour (IPEC). *Hazardous child labour in agriculture, sugarcane sector (Safety and health)*. ILO, Geneva, 2004. URL http://www.ilo.org/ipecinfo/product/download.do?type=document&id=5713.

[16] Scott R Loarie, David B Lobell, Gregory P Asner, Qiaozhen Mu, and Christopher B Field. Direct impacts on local climate of sugar-cane expansion in Brazil. *Nature Climate Change*, 1(2):105-109, 2011.

[17] MM Mekonnen and AY Hoekstra. The green, blue and grey water footprint of crops and derived crop products. *Hydrology and Earth System Sciences Discussions*, 8(1):763–809, 2011.

[18] Joaquim E A Seabra, Isaias C Macedo, Helena L Chum, Carlos E Faroni, and Celso A Sarto. Life cycle assessment of Brazilian sugarcane products: GHG emissions and energy use. *Biofuels, Bioproducts and Biorefining*, 5(5):519–532, 2011.

[19] IBGE. *Dados extraídos de: Estatísticas do século XX*. IBGE, Rio de Janeiro, 2007.

[20] W Alonso-Pippo, Carlos A Luengo, F Fonseca Felfli, Pietro Garzone, and Giacinto Cornacchia. Energy recovery from sugarcane biomass residues: Challenges and opportunities of bio-oil production in the light of second generation biofuels. *Journal of Renewable and Sustainable Energy*, 1(6), 2009.

[21] Walfrido Alonso-Pippo, Carlos A Luengo, Felix F Fonseca, Pietro Garzone, and Giacinto Cornacchia. Cogeneration and bio-oil production starting from sugarcane biomass residues: Barriers, challenges and opportunities. *Open Fuels & Energy Science Journal*, 2:34–39, 2009.

[22] Peter W Rein. Sustainable sugar production. Paper presented to BSST Meeting, London, 2012, 2012.

[23] K Hattori, A Suzuki, T Ebashi, M Ota, and K Sato. The calculation of carbon dioxide emission intensity from sugarcane to refined sugar. *Proceedings of the Research Society of Japan Sugar Refineries' Technologists*, 56:29–35, 2008.

[24] Livison Mashoko, Charles Mbohwa, and ValerieMThomas. LCA of the South African sugar industry. *Journal of Environmental Planning and Management*, 53(6):793–807, 2010.

[25] Eduardo Barretto De Figueiredo, Alan Rodrigo Panosso, Rangel Romão, and Newton La Scala Jr.Greenhouse gas emission associated with sugar production in southern Brazil. *Carbon Balance and Management*, 5(3):1–7, 2010.

[26] Ingo Klenk, Birgit Landquist, and Oscar Ruiz de Imaña. The product carbon footprint of EU beet sugar. *Sugar Industry/Zuckerindustrie*, 137(3):169–177, 2012.

[27] M Yuttitham, Shabbir H Gheewala, and A Chidthaisong. Carbon footprint of sugar produced from sugarcane in eastern Thailand. *Journal of Cleaner Production*, 19(17):2119–2127, 2011.

[28] UNICA. *Sugar cane's energy: Twelve studies on Brazilian sugar cane agribusiness and its sustainability*. UNICA, São Paolo, 2007.

[29] Robert M Boddey, Luis Henrique de Barros Soares, Bruno J R Alves, and Segundo Urquiaga. Bioethanol production in Brazil. In D Pimentel, editor, *Biofuels, solar and wind as renewable energy systems*, pages 321–356. Springer, New York, 2008.