
Sustainability Assessment Methods for the Agricultural Sector

An Overview of Existing
Tools, Voluntary
Standards /
Certification Schemes,
and Frameworks

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1. Tools / Software

1.1. Free

1.1.1. Web-based

Field to Market

Background	A collaborative stakeholder group (non-profit) of producers, agribusinesses, food, fiber and retail companies, conservation organizations, universities, and agency partners that are working together to define, measure, and develop a supply-chain system for agricultural sustainability.
System Level	<ul style="list-style-type: none"> - On-Farm scope (within the farm gates), focus on United States agriculture (national, regional, and field scales) and the outcomes associated with the production of commodity crop (corn, cotton, rice, soybeans, wheat) - 6 Environmental and 3+3 Socioeconomic indicators.
User (Target Group)	Farmers
Scenario	Scenario options in the free online calculator including comparison to base scenario
Stakeholder Engagement	Calculator as a free, confidential online tool developed with input from a diverse group of grower organizations, agribusinesses, food companies, economists and conservation groups
Hot Spot Analysis	<p>Not directly mentioned, but list of socioeconomic indicators that were explored, but are not included yet</p> <ul style="list-style-type: none"> - <u>Economic</u>: Real gross revenue per Acre, Cropland value, Total factor productivity, Cash flow, Input costs, Costs of funds, Household income - <u>Social</u>: Farmer education, Community education, Succession planning, Land ownership and tenure, Poverty rate, Health care insurance, Farm/Child labor practices, Incidence level of foodborne illnesses, Biosecurity protection against transmission of zoonotic diseases.
External Accreditation	No
Visualization of End Results	Spidergram (see Figure 1)
Latest Update	2012
Comments	<ul style="list-style-type: none"> - Mainly third-party science based measurement (from institutions/universities) - Study period > 30 years - Ready to use software: Free online calculator currently only with environmental indicators, additionally economic analysis as well as county, state, and national averages comparison.
Source	Environmental and Socioeconomic Indicators for Measuring Outcomes of On-Farm Agricultural Production in the United States: Second Report, (Version 2), December 2012. Available at: www.fieldtomarket.org .

1.1.2. Excel-based

SAI

Background	<p>Global food industry (Nestlé, Unilever, etc.) initiative. A non-profit organization to support the development and implementation of sustainable agriculture practices involving the different stakeholders of the food chain:</p> <ul style="list-style-type: none"> - SAI Platform's Principles and Practices (P&Ps) for sustainable agriculture, developing system to measure progress: <ul style="list-style-type: none"> → SPA (Sustainability Performance Assessment) project and the development of a tool to assess the financial sustainability (TFS) of farms (both in pilot phase) → Farmer Self-Assessment (Checklist for farmer to benchmark against company tools/schemes, etc., pilot phase)
System Level	<ul style="list-style-type: none"> - SPA: Mainly farm level. Currently 10 environmental main issues addressed, indicators differ according to issue, mostly LCAs

	(Farmgates as boundary). Indicators result from benchmarking more than 100 existing assessment methods. No tool yet, but recommending newly developed FAO SAFA Tool as most comprehensive approach <ul style="list-style-type: none"> - Tool (Excel) for financial sustainability (TFS): Farm level (see Figure 2) - Social Indicators only in Principles & Practices (here: for the sust. Production of arable & vegetable crops)
User (Target Group)	<ul style="list-style-type: none"> - P&Ps: Actors along the Food Chain - SPA: Companies and Software developers → for Farmers - TFS: Farmers.
Scenario	TFS: Yes
Stakeholder Engagement	Yes: Steering Committee, Technical Working Group, Communications Group for projects including companies, farmer organizations, NGOs, etc., also Advisory Council.
Hot Spot Analysis	/
External Accreditation	CLM as Consultant involved in development, otherwise only first-party audit (self-assessment)
Visualization of End Results	<ul style="list-style-type: none"> - SPA: no - TFS: Excel table
Latest Update	2014
Comments	<ul style="list-style-type: none"> - SPA: Very transparent presentation of method (see Figure 3), encouraging other companies to make use of it and develop software → no tool (yet) - Special Chapter for Argentina and extension for Australia & different key topics: arable & vegetable crops, beef, coffee, dairy, fruit, water & agriculture → first signs of Modules
Source	www.saiplatform.org ITC Standards map: http://www.standardsmap.org/

Cool Farm Tool

Background	The Cool Farm Institute's (non-profit initiative) tool is a farm-level greenhouse gas calculator for estimating net GHG emissions (CO ₂ , N ₂ O, CH ₄) from agriculture. Originally created by Unilever, the University of Aberdeen, and the Sustainable Food Lab – now also partnership with SAI.
System Level	<ul style="list-style-type: none"> - Farm-level, flexible regarding transports - Only environmental indicators
User (Target Group)	Farmer focus, being as management sensitive as possible while requiring only input data a farm manager would typically have.
Scenario	No
Stakeholder Engagement	No
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Excel tables and graphs
Latest Update	2012
Comments	<ul style="list-style-type: none"> - Ready to use Excel worksheets - Very simple
Source	COOL FARM INSTITUTE (2012). The Cool Farm Tool, a User's Guide for Use with the CFT Version 2.0. www.coolfarmtool.org

SISC

Background	SISC (Stewardship Index for Specialty Crops) is a multi-stakeholder initiative to develop a system for measuring sustainable performance throughout the specialty crop supply chain. The project is a collaboration amongst the USA's most influential grower organizations, NGOs (WWF, etc.), and buyers of specialty crop products. The project will offer a suite of outcomes-based metrics to enable operators at any point along the supply chain to benchmark, compare, and communicate their own performance.
System Level	<ul style="list-style-type: none"> - Currently: Farm level U.S. only → SISC Metrics Beta Version 1.1 (free

	Excel-Tool), includes metrics for energy, nutrients, soil, and water (for a general overview of what SISC plans to measure see Figure 4) - Environmental and 1 economic indicator
User (Target Group)	Metrics: Farmers
Scenario	No
Stakeholder Engagement	- Throughout the Metrics-development: Steering, Communications, Pilots, Metrics-Review Committee - Direct Feedback function in Excel-tool.
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Excel table
Latest Update	2013, Working metrics 1.0, demonstration calculator ready in mid-October
Comments	- Focus on specialty crops (fruits, vegetables, nuts, horticulture, etc.) - Knowledge sharing with Field to Market - Focusing on outcomes, instead of practices, thus individual firms are freed to innovate and find the practices that work best.
Source	STEWARDSHIP INDEX FOR SPECIALTY CROPS (2011). User's Guide to SISC Farm Level Metrics and Calculator (Beta Version 1.1) http://www.stewardshipindex.org/

1.1.3. Others

InVEST

Background	The Nature Capital Project's (WWF, Nature Conservancy, Stanford University, and University of Minnesota) InVEST contains a modular toolset that enables users to quantify, visualize and compare the delivery of ecosystem services under different scenarios of land, water, and marine uses. Model outputs can describe natural resources in terms of their biophysical supply, the service they provide humans, or their projected value.
System Level	A toolset of models for quantifying, mapping, and valuing the benefits provided by terrestrial, freshwater and marine systems. InVEST has a tiered design: <ul style="list-style-type: none"> - Tier 0 models map relative levels of environmental services and/or highlight regions where particular services are in high demand. - Tier 1 models can identify areas of high or low environmental service production and biodiversity across the landscape, and the tradeoffs and synergies among services under current or future conditions. Tier 1 models give outputs in absolute terms and provide the option for economic valuation (except for biodiversity). - Tier 2 models (under development) provide increasingly precise estimates of environmental services and values, which are especially important for establishing contracts for payments for environmental services programs or assessing scenarios that address change on a sub-annual basis. - Only for Environment
User (Target Group)	- Governments, companies, non-profits, and multilateral development institutions that manage natural resources employ InVEST to evaluate the impact of their decisions on the environment and on human well-being, and to inform planning efforts. - Only Environmental Models
Scenario	Yes
Stakeholder Engagement	Involved in modeling process (see Figure 6)
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Maps, Trade-off Curves, Balance sheets

Latest Update	2013
Comments	<ul style="list-style-type: none"> - Upcoming: Malaria Mosquito Habitats Model - Free and open source, additional software as prerequisite - Frequent monetary valuation
Source	Natural Capital Project (2013). InVEST 2.5.5 User's Guide: Integrated Valuation of Environmental Services and Tradeoffs. http://www.naturalcapitalproject.org/InVEST.html

1.2. With Costs

1.2.1. Web-based

IAD

Background	IAD (Institut de l'agriculture durable) is a French institution made up of farmers, agro-industrials, and associations.
System Level	<ul style="list-style-type: none"> - The scope usually is the agricultural enterprise, but indicators can also function for a plot if the technical and economic recordings are allocated to this scale. Similarly, they measure the results at sub-national or national scale by aggregation. It is possible ultimately to have results for all territorial scales, from micro-local to global and for all types of production. 26 (28) Indicators developed from assessment systems validated at national, European or international level for their relevance, balance, objectivity and ease of use: Institutions (FAO, EU,...), Professional Agricultural Bodies (FNSEA, APCA,...), Intergovernmental Organizations (UNDO, OECD,...), NGOs (WWF, Greenpeace,...), Mass-market Retailing (Nestlé, Unilever,...) - Environmental, Social, and Economic Indicators
User (Target Group)	Farmers
Scenario	Ecological Service Payment Scenario (remuneration) in report, not available in tool
Stakeholder Engagement	IAD consisting of Farmers, 3 Environmental (Farming) Associations, and 7 Companies, Partnership with University de Picardie Jules Verne
Hot Spot Analysis	No → Focus on France and Europe
External Accreditation	No
Visualization of Final Results	Spidergram
Latest Update	2011
Comments	<ul style="list-style-type: none"> - Ready to use software, Membership required to gain access → fee - simple-to-use indicators for self-assessment purposes if necessary, with a reasonable collection and processing time (two to three hours at most) - 120 farms were assessed, focus on France. Combines' productivity related indicators with biodiversity related indicators.
Source	IAD (2011). Agriculture 2050 starts here and now. Available at: www.institut-agriculture-durable.fr

RISE

Background	RISE (Response-Inducing Sustainability Evaluation) is an indicator- and interview-based method for holistically assessing the sustainability of farm operations, developed by a department of the Bern University of Applied Sciences. Nestlé and Syngenta are involved.
System Level	<ul style="list-style-type: none"> - Farm level, Environment in general. Can be used by food production industry. Assessments are based on surveys (questionnaires) which are compiled by farmers. Flexible System boundaries as the scope of some of the economic parameters can be modified to include off-farm activities. - Environmental, Social, and Economic Indicators
User (Target Group)	Farmers, Consultants for agriculture and development

Scenario	No, but discussions with the farmer and recommendations based on the end result
Stakeholder Engagement	Yes
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Spidergram including traffic light
Latest Update	2012
Comments	- Web-based RISE-Software - Fast (Interviews taking 3-4 hours), no measuring
Source	Bern University of Applied Sciences (2012), RISE (Response-Inducing Sustainability Evaluation), version 2.0. http://www.hafl.bfh.ch/index.php?id=146

LEAF

Background	LEAF (registered charity since 1991) membership brings together British farmers with retailing and processing companies as well as the farm supply and service sectors. LEAF's approach is built around the whole-farm principles of Integrated Farm Management (IFM, only accessible to members), including the LEAF Audit (Farmer Self-assessment via web-tool), Guidelines, LEAF Green Box, and knowledge exchange on demonstration farms.
System Level	- Farm-level. 24 Indicators in 9 Themes, Farmers assess themselves on a scale from 0-3 (Not started – fully achieved). - Environmental, Social, and Economic Indicators
User (Target Group)	Farmer
Scenario	No
Stakeholder Engagement	In indicator development
Hot Spot Analysis	No
External Accreditation	Yes, 19 certification bodies (TüV Nord, NSF Certification), provide a certificate and logo for products
Visualization of End Results	Dashboard
Latest Update	2013
Comments	- Possibility to find LEAF producers online - Products are identified in-store by the LEAFMarque logo - Price for LEAF membership depends on company size
Source	LEAF (2013). Driving Sustainability – A review our impact, achievements and challenges 2013. http://www.leafuk.org/ ITC Standards map: http://www.standardsmap.org/

1.2.2. Others

AgBalance

Background	Developed by BASF, based on precursor ("Seebalance" and Eco-Efficiency Analysis) systems. Holistic system for sustainability quantification.
System Level	- Supply chain (consumer, retailer, processor, and farmer) - Flexible in terms of scope - Environmental, Economic, and Social Indicators
User (Target Group)	Farmer, Data Input by Experts
Scenario	Yes
Stakeholder Engagement	During development (e.g. ADAS) and in Indicators
Hot Spot Analysis	Yes
External Accreditation	TüV Süd, DNV, NFS
Visualization of End	Spidergram with bars

Results	
Latest Update	2012
Comments	<ul style="list-style-type: none"> - Most extensive and holistic system → very expensive and time consuming - Transparent Methodology, freely accessible online
Source	http://www.agro.basf.com/agr/AP-Internet/en/content/sustainability/measuring_sustainability/agbalance/index Technical Background Paper

KSNL

Background	Developed in Germany by BMELV and “Thüringer Landesanstalt für Landwirtschaft”
System Level	<ul style="list-style-type: none"> - Farm level, but also applicable for cropping systems (based on multiple farm surveys) - Environmental, Social, and Economic Indicators
User (Target Group)	Experts
Scenario	Difficult to calculate
Stakeholder Engagement	Not apparent
Hot Spot Analysis	No
External Accreditation	TüV Thüringen
Visualization of End Results	Spidergram with traffic-light signal (red green)
Latest Update	2008
Comments	<ul style="list-style-type: none"> - Issue a certificate to companies - Extensive set of indicator does not seem to evolve any more.
Source	THÜRINGER LANDESANSTALT FÜR LANDWIRTSCHAFT (2006). Wissenschaftliche Tagung 2006- Sektion Nachhaltigkeit - Schriftenreihe Heft 8 / 2006. http://www.thueringen.de/de/tl/oekologie/nachhaltige_landwirtschaft/

IDEA

Background	A French multi-disciplinary research work has given this concept of sustainability its practical expression in the elaboration of the IDEA method (Indicateurs de Durabilité des Exploitations Agricoles or Farm Sustainability Indicators method).
System Level	<ul style="list-style-type: none"> - Farm-level. The three sustainability scales are of equal weight and go from 0 to 100 points. Maximum score for each of the 41 indicators, mostly established on the basis of easily quantifiable magnitudes, but also some cases of more qualitative data. - Environmental, Social, and Economic Indicators
User (Target Group)	Farmer
Scenario	No
Stakeholder Engagement	Pilot phase on farms with feedback
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Spidergram
Latest Update	2006
Comments	Data recovery requires at least half a day on farms. Then it takes 2 times 3 hours to complete the interviews, calculations and recording the results.
Source	http://www.idea.portea.fr (last updated 2006!)

INL REPRO

Background	INL's software REPRO was developed in 1996 in cooperation with the Martin-Luther-University Halle-Wittenberg, as a tool for holistically analyzing and evaluating farms by defining underlying subsystems (location, crop farming, storage, and animal husbandry) that are interconnected.
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System Level	<ul style="list-style-type: none"> - Farm level - Basic (mainly for collecting and documenting location and management data) and Professional Version (analysis and evaluation) - Only Environmental Indicators
User (Target Group)	Farmer, Data Input by Experts
Economic Indicators	/
Social Indicators	/
Scenario	No, but analysis of weak points and recommendations to for optimization
Stakeholder Engagement	No
Hot Spot Analysis	No
External Accreditation	No, but indicators are in accordance to the DLG (German Agricultural Association) Sustainability Standard, option to receive a certificate
Visualization of End Results	Unknown
Latest Update	2011 (?)
Comments	Cooperation for scientific projects with university, but mainly private consulting
Source	http://www.nachhaltige-landbewirtschaftung.de/

1.3. For Internal Company Use

McDonald's MAAP

Background	McDonald's uses its MAAP (McDonald's Agricultural Assurance Program) as an internal reference tool to assess the relative standards in the assurance schemes used on the farms which supply McDonald's. It is part of the Flagship Farm project on farms all over Europe.
System Level	<ul style="list-style-type: none"> - Farm-level - 'Good-Practice-Matrix': Ethical, Environmental, and Economic indicators
User (Target Group)	McDonald's (Experts)
Scenario	Unknown
Stakeholder Engagement	Partnership with SAI, FAI (Food Animal Initiative), EAWP (European Animal Welfare Platform)
Hot Spot Analysis	Unknown
External Accreditation	No
Visualization of End Results	Unknown
Latest Update	2011 (?)
Comments	Standards are reviewed annually
Source	http://www.flagshipfarms.eu/index.php

PepsiCo's SFI

Background	PepsiCo's SFI (Sustainable Farming Initiative) is an internal comprehensive program with application to potato, citrus, oats, rice and corn crops and to growers of all sizes in developed, developing and emerging markets. It enables PepsiCo to measure the environmental and local economic impacts associated with its agricultural supply chain.
System Level	<ul style="list-style-type: none"> • Farm-level • SFI provides a framework with nine environmental, four social and three economic sustainability indicators with detailed criteria and global standards • Additionally: Farm Foundation Indicators <ul style="list-style-type: none"> - Storage - Handling and Transport - Machinery - Records - Trainings

User (Target Group)	PepsiCo (Experts)
Scenario	Unknown
Stakeholder Engagement	Stakeholder partnerships across the public, private, NGO, nonprofit and academic sectors
Hot Spot Analysis	Unknown
External Accreditation	Cooperation with third party certification schemes (GlobalG.A.P., RSPO)
Visualization of End Results	Unknown
Latest Update	Data not available
Comments	<ul style="list-style-type: none"> - 36 SFI pilot programs in 14 countries by the end of 2012, launched SFI in North-America in 2013 - SAI Member - Demonstration Farms - Additional measures: Precision Agriculture, breeding technologies...
Source	http://www.pepsico.com/Purpose/Environmental-Sustainability/Agriculture

2. Voluntary Standards / Certification Schemes

GlobalG.A.P.

Background	GLOBALG.A.P. (Good Agriculture Practice, non-profit), an independent certification system, began in 1997 as EUREPGAP, an initiative by retailers (mainly started by British retailers & supermarkets) belonging to the Euro-Retailer Produce Working Group. Today it is the world's leading farm assurance program, primarily designed to reassure consumers about how food is produced on the farm by minimizing detrimental environmental impacts of farming operations, reducing the use of chemical inputs and ensuring a responsible approach to worker health and safety.
System Level	<ul style="list-style-type: none"> • Depends on the selected module (e.g. Crops vs. Chain of Custody, for a module overview see Figure 7): a pre-farm-gate standard that covers the whole agricultural production process • 3 main certification products named localg.a.p, GLOBALG.A.P., and GLOBALG.A.P.+ Add-on (GRASP – Social Practice, Animal Welfare) • Rather a set of central points and compliance criteria (in form of a questionnaire with Yes/No questions), instead of clear indicators.
User (Target Group)	According to module: actors along the supply chain
GLOBALG.A.P.	<ul style="list-style-type: none"> • Certification is divided into several scope-levels of modules. All participants have to fulfill the All Farm Base criteria that cover: <ul style="list-style-type: none"> - Food safety and traceability - Environment (including biodiversity) - Workers' health, safety and welfare - Animal welfare - Includes Integrated Crop Management (ICM), Integrated Pest Control (IPC), Quality Management System (QMS), and Hazard Analysis and Critical Control Points (HACCP) ○ Different sub-modules are available for: <u>Crops</u>, Aquaculture, Livestock, Chain of Custody, Plant Propagation Material, Compound Feed Manufacturing. The Crop Module covers: <ul style="list-style-type: none"> - Traceability - Propagation Material - Site History and Site Management - Soil Management - Fertilizer Application - Irrigation/Fertigation - Integrated Pest Management - Plant Protection Products - Equipment

	<p>With additional guidelines for:</p> <ul style="list-style-type: none"> - Microbiological Hazards - Responsible Water Use - Integrated Pest Management - PPP use in countries that allow extrapolation - Residue Analysis - MRL Exceedance - Visual inspection and functional tests of application equipment ▪ The Crop Module is then again split into 5 additional modules (Fruit & Vegetables, Flowers & Ornamentals, <u>Combinable Crops</u>, Green Coffee, and Tea). Combinable Crops cover: <ul style="list-style-type: none"> - Propagation Material - Machinery and Equipment - Crop Protection - Harvesting - Harvested Crop Handling
Localg.a.p.	<ul style="list-style-type: none"> • Cost-effective, ready-to-use solution offers a stepwise approach that covers the minimum requirements for food safety and hygiene with a subset of GLOBALG.A.P. control points (see Table 1 for a comparison) • Foundation (only for fruit & veg. producers) and Intermediate level (Fruit & veg., Livestock, Aquaculture producers) • Also as a customized version, individually selecting from the full range of options and products that GLOBALG.A.P. provides.
GLOBALG.A.P.+ Add-On	<ul style="list-style-type: none"> • As individual customized solution • 2 ready-to-use, made-to-measure add-ons: <ul style="list-style-type: none"> ○ GLOBALG.A.P. Risk Assessment On Social Practice (GRASP) <ul style="list-style-type: none"> - Set of additional topics, each addressed by several questions to be answered with Y/N. Based on the answers, the compliance with the topic has to be judged (1-4) - Addressing specific aspects of workers' health, safety and welfare - Helps producers establish a good social management system on their farms. ○ GLOBALG.A.P. Animal Welfare (for poultry/broiler chicken and finishing pigs) <ul style="list-style-type: none"> - Set of additional questions to be answered with Y/N.
Scenario	No
Stakeholder Engagement	Yes
Hot Spot Analysis	No
External Accreditation	No, but participating actors are assessed (Certification bodies need to be trained and recognized by GLOBALG.A.P.) and receive a certificate
Visualization of End Results	/
Latest Update	2012
Comments	<ul style="list-style-type: none"> • Due to the Y/N questionnaire structure, probably one of the easiest and solutions • Participation is not for free (fees depend on company size) • Database to lead buyers and producers together • Recognized by the GFSI (Global Food Safety Initiative) • Relatively easy to offer customized solutions → can also be initiated and created by participants.
Source	http://www.globalgap.org/ and corresponding documents from webpage. ITC Standards map: http://www.standardmap.org/

RSPO

Background	RSPO (Roundtable on Sustainable Palm Oil, non-profit) is an association that unites stakeholders from all sectors of the Palm Oil industry (also NGOs: WWF) to develop and implement global standards for sustainable palm oil.
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System Level	<ul style="list-style-type: none"> - The unit of certification is the unit of palm oil production – the palm oil mill and its supply base. Requires compliance with the Principles and Criteria (P&C), with limited adaptations for National Interpretations (NI), drawn up by the RSPO. Set of 8 Principles with 43 (6/8/8/1/1/3/3/13) Criteria: Indicators specify requirements for fulfilling criteria, mainly documentation. (Different set of criteria for other actors of the SC → RSPO Supply Chain Certification Systems). - Environmental, Social, and Economic Indicators
User (Target Group)	Palm Oil Producer
Scenario	No
Stakeholder Engagement	Throughout the development process, including public consultation rounds
Hot Spot Analysis	No
External Accreditation	<ul style="list-style-type: none"> - Independent third party certification bodies which are approved by the RSPO carry out the audits and take care of the certification procedure. Accreditation Services International (ASI) leads and oversees the accreditation of the certification bodies. - Standard reviewed every 5 years (ISEAL recommendation) - Complaint resolution process
Visualization of End Results	/
Latest Update	2013
Comments	<ul style="list-style-type: none"> - Membership fee for small producers/growers (<500ha) 500€/y, 2000€/y for rest (>500ha, NGOs, Retailers...) - Logo use on end-products - Harmonized with EU-RED Scheme (additional requirements)
Source	RSPO (2013). Principles and Criteria for the Production of Sustainable Palm Oil. http://www.rspo.org/ ITC Standards map: http://www.standardsmap.org/

RTRS

Background	The Round Table on Responsible Soy Association (RTRS) unites stakeholders from all sectors of the soy industry (also NGOs: WWF, Nature Conservancy) to set up a voluntary certification system for global production and consumption of certified responsible soy.
System Level	<ul style="list-style-type: none"> - Applicable to the production of soy. Standard includes 5 Principles with 28 (5/11/3/5/4) Criteria: Indicators specify requirements for fulfilling criteria, mainly documentation. National interpretations need to be recognized by the RTRS. Additional Modules available: RED, Non-GM. (All links in the 'chain of custody' of responsible soy, including companies that trade, ship and/or store responsible soy products or their derivatives, need to be certified before they can claim to sell responsible soy → Chain of Custody Standard) - Environmental and Social Indicators
User (Target Group)	Producers
Scenario	No
Stakeholder Engagement	Throughout the development stage, including public stakeholder consultations.
Hot Spot Analysis	No
External Accreditation	<ul style="list-style-type: none"> - Independent third party certification bodies which are approved by the RSPO carry out the audits and take care of the certification procedure. Organismo Argentino de Acreditación (OAA) and Instituto Nacional de Metrología, Qualidade e Tecnologia (Inmetro) lead and oversee the accreditation of the certification bodies. - Complaint resolution process
Visualization of End Results	/
Latest Update	2010
Comments	- Membership fee for small producers/growers (<10000ha) 250€/y,

	2500€/y for all others - Harmonized with EU-RED Scheme - Logo use on end-products
Source	RTRS (2010). Standard for Responsible Soy Production Version 1.0. http://responsiblesoy.org/ ITC Standards map: http://www.standardsmap.org/

Bonsucro

Background	The Bonsucro™ - Better Sugar Cane Initiative (BSI) is a private, non-governmental, not-for-profit initiative dedicated to reducing the environmental and social impacts of sugar cane production which links its name to a product, process or service that has been certified by an independent certification body as being in compliance with the Bonsucro standard. The Bonsucro standard is the first ever metric based standard developed for an agricultural feedstock
System Level	- Production and Processing & Milling-level, applicable indicators vary slightly. Measureable standard in key environmental and social impacts of sugarcane production and primary processing, auditable document according to ISO 65. 5 Principles + 1 for EU RED + 1 for Chain of Custody - Environmental, Social, and Economic Indicators
User (Target Group)	Mills (Chain of Custody Companies)
Scenario	No
Stakeholder Engagement	- Throughout the standard development (series of global Stakeholder Outreach Meetings) - Complaint resolution process
Hot Spot Analysis	No
External Accreditation	- No, but standard complies with ISEAL specifications - Certification bodies licensed and audited by Bonsucro
Visualization of End Results	/
Latest Update	2011
Comments	- Fees: Farmers according to ha, £0-700; Rest £200-13.000 - Possibility for certified users to use the Bonsucro Logo on the final product - Harmonizes with EU Renewable Energy Directive (RED) and its similar provisions in the EU Fuel Quality Directive (FQD)
Source	BONSUCRO (2011). Bonsucro Production Standard– Version 3.0 March 2011 Including Bonsucro EU Production Standard. http://bonsucro.com/ ITC Standards map: http://www.standardsmap.org/

3. Frameworks

FAO SAFA

Background	The FAO (UN Food and Agriculture Organization) Guidelines: Sustainability Assessment of Food and Agriculture systems (SAFA) provide a holistic global reference framework for the assessment of sustainable management, monitoring and reporting in food and agriculture at all levels of the supply chain. SAFA was developed as an international reference document, a benchmark that defines the elements of sustainability and framework for assessing trade-offs and synergies between all dimensions of sustainability. The Guidelines do not replace existing systems but put them into the perspective of an overarching common sustainability language for the food and agriculture sector. SAFA builds on existing sustainability tools, with the goal of integrating and relating current systems through the common framework. In 2014 Development of 2 Tools: SAFA Tool (Betaphase Jan-Jun '14) &
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	SAFA Small APP (for Smallholders, expected for Nov '14, in cooperation with amongst others COSA, funded by Germany)
System Level	<ul style="list-style-type: none"> - Mainly Farm level, but being science-based and generic in nature, SAFA can be implemented at any level, national, supply chain or operational unit (framework that is adaptable to all contexts and sizes of operations). - Categorized into 4 Dimensions with (5/6/4/6) Themes, (14/13/14/15) Sub-Themes, and (19/52/26/16) Core Indicators: Good Governance, Environmental Integrity, Economic Resilience, Social Well-being
User (Target Group)	Farmer, IT Tool under way & SAFA can address all entities from the site of primary production to that of final sales to the consumer.
Scenario	No
Stakeholder Engagement	<ul style="list-style-type: none"> - Has evolved in the last four years in a participatory process through expert meetings and E-forums, now entered into pilot phase. - Good Governance Dimension: Participation with indicators
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	Spidergram with traffic light signal (see Figure 5)
Latest Update	2014
Comments	<p>Additional Dimension: <u>Good Governance</u></p> <ul style="list-style-type: none"> • Corporate Ethics: <ul style="list-style-type: none"> - Mission Statement → Mission explicitness; Mission driven - Due Diligence • Accountability: <ul style="list-style-type: none"> - Holistic Audits - Responsibility - Transparency • Participation: <ul style="list-style-type: none"> - Stakeholder Dialogue → Stakeholder identification; Stakeholder engagement; Engagement barriers; Effective participation - Grievance Procedures - Conflict Resolution • Rule of Law: <ul style="list-style-type: none"> - Legitimacy - Remedy, Restoration and Prevention - Civic Responsibility - Resource Appropriation → Free, prior and informed consent; Tenure rights • Holistic Management: <ul style="list-style-type: none"> - Sustainability Management Plan - Full-cost Accounting
Source	FAO (2013), NATURAL RESOURCES MANAGEMENT AND ENVIRONMENT DEPARTMENT - Sustainability Assessment of Food and Agriculture systems, Draft Guidelines (Version 2.0), http://www.fao.org/nr/sustainability/sustainability-assessments-safa/en/

OECD

Background	OECD Compendium of Agri-environmental Indicators (AEIs) provides a set of indicators across 34 OECD countries from 1990 to 2010, building on 20 years of developing AEIs.
System Level	<ul style="list-style-type: none"> - Primary Agriculture, Farm gate level. 18 Economic Indicators organized in five themes, additionally several economic indicators from OECD.Stat database - Environmental and Economic Indicators, in earlier AEI versions also social: Farmer age/gender distribution, Farmer education. (see Table 2)
User (Target Group)	Policy Makers
Scenario	No
Stakeholder Engagement	No

Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	/
Latest Update	2013
Comments	- No software - Extensive databases online.
Source	OECD (2013). OECD Compendium of Agri-environmental Indicators, OECD Publishing. http://dx.doi.org/10.1787/9789264181151-en

NAP

Background	The current National Action Plan on Sustainable Use of Plant Protection Products was enacted by the Federal Government on 10th April 2013. The Action Plan is part of the implementation of the European Union's Sustainable Use Directive. As a part of it, SYNOPS (developed by the German "Institut für Folgenabschätzung (JKI)") calculates the risk potential of pesticides for the environment considering rather realistic environmental conditions.
System Level	- Farm-level. Quantification of pesticide related risk potential. Monitoring of the effectiveness of policies in Germany - Environmental Indicators
User (Target Group)	Experts
Scenario	No
Stakeholder Engagement	No
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	/
Latest Update	2013
Comments	Synops is at present the indicator which reflects rather realistic conditions of pesticide application (in spite of the fact that only laboratory data are used).
Source	BUNDESMINISTERIUM FÜR ERNÄHRUNG, LANDWIRTSCHAFT UND VERBRAUCHERSCHUTZ (2013). Indikatoren (inkl. der Indikatorendatenblätter) des Nationalen Aktionsplans zur nachhaltigen Anwendung von Pflanzenschutzmitteln. http://www.nap-pflanzenschutz.de/de/indikatoren-und-analysen/

COSA

Background	COSA (Committee On Sustainability Assessment) is a non-profit consortium of institutions that promotes sustainability in agriculture with credible and globally comparable information based on quantifiable evidence from actual practice. Partners: e.g. IFC, United Nations International Trade Centre, Harvard University Part of Sustainable Commodity Initiative (SCI) managed by Int. Institute for SD (IISD) & UNCTAD
System Level	- Farm/enterprise level or national level. Transparent meta-tool (common framework and indicators) to understand the costs & benefits of sustainability. - Environmental, Economic, and Social Indicators
User (Target Group)	Depending on level: actors along the supply chain or policy makers
Scenario	No
Stakeholder Engagement	Measurements were designed and evaluated using global participatory processes that involved hundreds of developing country producers, traders, leading companies, NGOs, standards bodies, intergovernmental agencies, and research institutions.

Hot Spot Analysis	No
External Accreditation	No, but partnership with ISEAL and IRIS (Impact Reporting & Investment Standards)
Visualization of End Results	/
Latest Update	2014
Comments	<ul style="list-style-type: none"> - Globally comparable indicators (>100 + option to develop others → flexibility) and tested field surveys; Data Gathering and Reporting can be standardized - COSATouch software offers skip-logic, question helper, and data validation – using various technologies from tablets and smart phones to netbooks and GPS systems - Data management via a dedicated and searchable database; claim to have largest set of comparable data on agricultural sustainability in developing countries - Managerial Tools - Field process requires about 1-2 hours with a farmer and less with buyers and producer organizations to complete a survey
Source	http://www.thecosa.org/

EISA

Background	EISA (European Initiative for Sustainable Development in Agriculture) was founded in May 2001 with the common aim of developing and promoting sustainable farming systems, which are an essential element of sustainable development.
System Level	<ul style="list-style-type: none"> - Farm-level. Integrated Farming Framework is not based on a set of fixed parameters but on informed management processes. 11 categories with indicators that either must (m), should (s), or can (c) be considered to be part the Integrated Farming System. Compliance to explaining guideline: Y/N - Environmental, Economic, and Social Indicators
User (Target Group)	Farmer
Scenario	No
Stakeholder Engagement	Stakeholders and experts have given their input, encourages local community engagement
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	/
Latest Update	2012
Comments	<ul style="list-style-type: none"> - EISA members help create a better public understanding of agriculture through a network of demonstration farms - Additional indicators for Livestock sector
Source	EISA (2012). European Integrated Farming Framework. http://sustainable-agriculture.org/

OPERA

Background	OPERA is a young think tank and a research centre (non-profit) of the Università Cattolica del Sacro Cuore, committed to supporting the successful implementation of the agri-environmental measures within the European legislation. One objective is to provide a series of pragmatic recommendations to policy makers to bridge the interest and objectives of agriculture and environment as well as to ensure efficient implementation of the agriculture related policies in the EU.
System Level	<ul style="list-style-type: none"> - Farm-level - Environmental and Social Indicators (providing examples of quantitative targets for indicators)
User (Target Group)	Polycymakers to develop a legislative framework and National Action Plan

Scenario	/
Stakeholder Engagement	Think tank brings together relevant stakeholders to debate difficult agricultural issues (Member States representatives; the Commission; the plant protection industry; NGO's; international organizations; scientific research institutes)
Hot Spot Analysis	No
External Accreditation	No
Visualization of End Results	/
Latest Update	2011
Comments	OPERA has several projects to provide a platform for stakeholders at EU-level, including SIA Network (promote and facilitate debate and dialog in order to create and promote economic, social and environmentally sustainable production solutions for the development of European agriculture)
Source	OPERA (2011). Risk Indicator selection and Quantitative Targets to meet Sustainable Use Directive objectives. http://operaresearch.eu/

Annex I – Indicators

Ecological

Field to Market	<ul style="list-style-type: none"> - Crop yield - Land use, - Soil erosion - Irrigation water applied - Energy use - GHG Emissions (all in three formats: efficiency per unit of production, per acre resource use or impact, Total use)
SAI	<ul style="list-style-type: none"> - SPA: - Climate & energy (LCA): Emissions of GHG - Pesticides (LCA): Potential Risk Score (on people and environment) - Soil quality: Acidity (pH); Organic Matter Balance; Reduced Erosion Risk - Water quantity (LCA): Water Requirement; Irrigation Efficiency - Nutrients (LCA): Surplus/Deficit N + P - Biodiversity: Biodiversity score based on questionnaire (by CLM.nl) - Land use (LCA): Land used for Crop Production and Land used for off-farm fodder - Financial stability - Animal welfare - Occupational health and safety - Implicitly covered: Water quality and waste.
Cool Farm Tool	<ul style="list-style-type: none"> - Fertilizer Production - Direct and indirect field N₂O - Paddy methane - Pesticides - Crop residue management - Carbon stock changes - Livestock enteric emissions - Livestock manure management - Livestock feed - Field energy use - Primary processing - Waste water - Off-Farm Transport
SISC	<ul style="list-style-type: none"> - Water Use → Water & Irrigation Efficiency - Soil → Soil Carbon Balance - Nutrients → NPK applied - Energy Use → Direct + indirect (energy utilized to produce fertilizers and pesticides)
InVEST	<ul style="list-style-type: none"> • <u>Biodiversity: Habitat Quality and Rarity</u> (Tier 0) → Habit degradation and quality index (Optional: Relative habitat rarity index for current and/or future land use/land cover; Degradation and quality of baseline; Habitat degradation, quality and optionally rarity for future scenario) • <u>Carbon Storage and Sequestration</u> → Total carbon stock (Carbon sequestration rates; Value of sequestered carbon) • <u>Hydropower production</u> (Tier 1) → Mean annual yield; mean annual water yield available for hydropower production (Energy production; Net present value) • <u>Water purification: Nutrient retention</u> (Tier 1) → Nutrient export/retention; Water purification through ecosystem nutrient retention (Avoided treatment costs) • <u>Sediment retention model: Avoided dredging and water quality regulation</u> (Tier 1) → Mean annual erosion/sediment retention; Mean annual generated and retained sediment loads; Annual average sediment retention of value to water treatment plants (Avoided dredge costs; Avoided treatment costs)

	<ul style="list-style-type: none"> • <u>Managed timber production</u> (Tier 1) → Harvested timber volume/biomass (Net present value of timber) • <u>Crop pollination</u> (Tier 0) → Index of pollinator abundance; Index of relative pollinator abundance on farm (Index of crop yield value from pollination) • <u>Food from fisheries</u> → Number of total returns or escaped spawners per year or trend in returns or escapement; number of fish landed per year by sector (Net present value of fish land by sector) • <u>Food from Aquaculture</u> → Biomass of fish produced per farm (Net present value of fish produced per farm) • <u>Protection from coastal inundation</u> → Area of property or infrastructure flooded per event; avoided property or infrastructure damage per event (value of avoided property or infrastructure damage per event; value of avoided dune nourishment or shoreline protection) • <u>Wave energy generation</u> → Wave power resource at each location; Captured wave energy per array (Net present value of electricity captured from waves per array) • <u>Aesthetic value from viewsheds</u> → Number of natural (non-development or development) views per location • <u>Recreation value</u> → Index of recreation importance by activity and weighted overall index • <u>Habitat Risk Assessment</u> → Habitat Risk • <u>Offshore Wind Energy</u> → Wind power; Harvested wind energy (Levelized cost of energy; Net present value of energy; Offset carbon emissions) • <u>Overlap Analysis</u> → Frequency of activities on the landscape; Relative importance of the landscape for activities
IAD	<ul style="list-style-type: none"> • Theme 3: <u>Efficiency of input use</u> <ul style="list-style-type: none"> - IFT – Pesticide treatment frequency index - NPK balance - Energy balance - Water consumption (irrigation) - Food autonomy rate - Yield ha, livestock farm - Energy independence rate - (Energetic Yield) • Theme 4: <u>Greenhouse gas</u> <ul style="list-style-type: none"> - GHG level • Theme 5: <u>Soil quality</u> <ul style="list-style-type: none"> - Yield / ha UAA - Yield / ha main fodder area - Soil tillage index - Annual soil cover rate - Organic matter level - Soil biological activity - Soil utilization - (Soil carbon balance) • Theme 6: <u>Water</u> <ul style="list-style-type: none"> - NO3 level – boreholes and wells - NO3 level – rivers • Theme 7: <u>Biodiversity</u> <ul style="list-style-type: none"> - Biodiversity surface area - Crop diversity - STOC “birds” (common bird mapping) - STERC “insects” (common insect mapping)
RISE	<ul style="list-style-type: none"> • Energy & Climate: <ul style="list-style-type: none"> - Energy management - Energy intensity - Share of sustainable energy carriers - Greenhouse gas balance • Water use:

	<ul style="list-style-type: none"> - Water management - Water supply - Water use intensity - Risks to water quality • Soil use: <ul style="list-style-type: none"> - Soil management - Crop productivity - Soil organic matter balance - Soil reaction - Soil pollution - Soil erosion - Soil compaction • Biodiversity & Plant protection: <ul style="list-style-type: none"> - Crop protection & biodiversity management - Ecological priority areas - Intensity of production - Landscape quality - Diversity of production • Nutrient flows: <ul style="list-style-type: none"> - Nitrogen balance - Phosphorus balance - Tightness of N & P cycles - Ammonia emissions - Waste management • Animal welfare: <ul style="list-style-type: none"> - Livestock management - Livestock productivity - Species-appropriate housing - Quality of the physical environment - Livestock health
LEAF Marque	<ul style="list-style-type: none"> • Crop Health and Protection: <ul style="list-style-type: none"> - Improve pesticide stewardship • Energy Efficiency: <ul style="list-style-type: none"> - Effectively employ GHG mitigation measures - Improve energy efficiency • Landscape and Nature Conservation: <ul style="list-style-type: none"> - Actively increase - Enhance management at a landscape level • Pollution Control and By Product Management: <ul style="list-style-type: none"> - Implement responsible waste management - Improve air quality - Improve water quality • Soil Management and Fertility: <ul style="list-style-type: none"> - Improve soil health - Enhance nutrient management efficiency • Water Management: <ul style="list-style-type: none"> - Improve water use efficiency - Source water sustainably • Animal Husbandry: <ul style="list-style-type: none"> - Demonstrate good animal health & welfare
AgBalance	<ul style="list-style-type: none"> • Soil: <ul style="list-style-type: none"> - Soil Erosion - Potential for Soil Compaction - Nutrients balance - Soil Organic matter balance • Biodiversity: <ul style="list-style-type: none"> - State indicator - Agri-environmental schemes - Protected Areas - Crop rotation

	<ul style="list-style-type: none"> - Eco-Toxicity - Farming Intensity - Potential for Intermixing - N-surplus • Water use: <ul style="list-style-type: none"> - Assessed total water use • Land use: <ul style="list-style-type: none"> - Amount of land needed for a production system - Suitability of that land for eco-systems • Primary Energy Consumption: <ul style="list-style-type: none"> - Non-renewable energy - Renewable energy • Emissions: <ul style="list-style-type: none"> - Air emissions (GWP, Acidification Potential, Ozone depletion potential, Photochemical Ozone Creation potential) - Water emissions - Solid Waste • Raw Material Consumption: <ul style="list-style-type: none"> - Depletion of non-renewable resources • Eco-Toxicity potential: <ul style="list-style-type: none"> - Eco-toxicity potential of the production system
KSNL	<ul style="list-style-type: none"> - Nutrients balance → N-Net total (area); NH3-Emissions; P-Net total, Soil pH index; Soil carbon balance - Soil protection → Erosion disposition; Compaction risk - Crop protection → Crop protection intensity (<i>Pesticide treatment frequency index?</i>) - Biodiversity → HCV areas ratio; crop type diversity; Median field size; - Energy balance → Operational Energy-Net total; Crop farming Energy-Net total - GHG-Emissions
IDEA	<ul style="list-style-type: none"> • Diversity: <ul style="list-style-type: none"> - Diversity of annual or temporary crops - Diversity of perennial crops - Diversity of associated vegetation - Animal diversity - Enhancement and conservation of genetic heritage • Organization of Space: <ul style="list-style-type: none"> - Cropping patterns - Dimensions of fields - Organic matter management - Ecological buffer zones - Measures to protect the natural heritage - Stocking rate - Fodder area management • Farming Practices: <ul style="list-style-type: none"> - Fertilization - Effluent processing - Pesticides and veterinary products - Animal well-being - Soil resource protection - Water resource protection - Energy dependence
INL REPRO	<ul style="list-style-type: none"> • Biodiversity: <ul style="list-style-type: none"> - Landscape preservation - Agrological biodiversity • Soil protection: <ul style="list-style-type: none"> - Organic matter balance - Erosion - Soil compaction

	<ul style="list-style-type: none"> • Climate change: <ul style="list-style-type: none"> - GHG emissions • Resource efficiency: <ul style="list-style-type: none"> - Energy intensity - NPK rating • Water protection: <ul style="list-style-type: none"> - Azote balance - Leaching of Nitrates - Phosphor balance - Crop protection intensity
McDonald's MAAP	<ul style="list-style-type: none"> • Climate change: <ul style="list-style-type: none"> - Greenhouse gas emissions - Energy usage efficiency - Renewable energy • Natural resources - Soil <ul style="list-style-type: none"> - Soil fertility & health - Soil, erosion, deforestation & salinization - Soil contamination • Natural resources – Water <ul style="list-style-type: none"> - Water Pollution - Water usage efficiency • Natural resources – Air <ul style="list-style-type: none"> - Air emissions • AgroTechnology <ul style="list-style-type: none"> - Agrochemical minimization and control - Genetically modified organisms • Ecosystem Protection <ul style="list-style-type: none"> - High Conservation Value (HCV) - Habitat and species preservation - Invasive Species • Waste <ul style="list-style-type: none"> - General Farm waste - Hazardous waste - Waste to Landfill
PepsiCo SFI	<ul style="list-style-type: none"> - Agrochemicals - Air - Biodiversity - Energy - Greenhouse Gas (GHG) - Nutrients - Soil - Waste - Water
GLOBALG.A.P.	<ul style="list-style-type: none"> • All Farm Base: <ul style="list-style-type: none"> - Waste and Pollution Management, Recycling, and Re-Use → Identification of Waste and Pollutants; Waste and Pollution Action Plan - Environment and Conservation → Impact of Farming on the Environment and Biodiversity; Unproductive Sites; Energy Efficiency • Crops Base: <ul style="list-style-type: none"> - Propagation Material → Quality and Health (Seed); Chemical Treatments and Dressings; Genetically Modified Organisms - Soil Management → Maps; Structure; Erosion - Fertilizer Application → Nutrient Requirement; Advice on Quantity and Type of Fertilizer; Records of Application; Fertilizer Storage; Organic Fertilizer; Nutrient Content - Irrigation/Fertigation → Requirement Prediction; Method; Quality of Irrigation Water; Supply of Irrigation Water - Integrated Pest Management → Training; Prevention; Observation

	<p>and Monitoring; Intervention; Follow Anti-Resistance Recommendations</p> <ul style="list-style-type: none"> - Plant Protection Products → Choice; Advice on Quantity and Type; Records; Pre-Harvest Interval; Disposal of Surplus Application Mix; Product Residue Analysis; Storage; Handling; Empty Containers; Obsolete Products • Combinable Crops Base: <ul style="list-style-type: none"> - Crop Protection → Choice of Chemicals - Harvesting → Hygiene - Harvested Crop Handling → Hygiene; Pest Control; Post-Harvest Treatments (incl. Records); Storage
<p>RSPO</p>	<ul style="list-style-type: none"> • Environmental responsibility and conservation of natural resources and biodiversity: <ul style="list-style-type: none"> - Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continual improvement - The status of rare, threatened or endangered species and other High Conservation Value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and operations managed to best ensure that they are maintained and/or enhanced - Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner - Efficiency of fossil fuel use and the use of renewable energy is optimized - Use of fire for preparing land or replanting is avoided, except in specific situations as identified in the ASEAN guidelines or other regional best practice - Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored. • Responsible development of new plantings: <ul style="list-style-type: none"> - A comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations - Soil surveys and topographic information are used for site planning in the establishment of new plantings, and the results are incorporated into plans and operations - New plantings since November 2005 have not replaced primary forest or any area required to maintain or enhance one or more High Conservation Values - Extensive planting on steep terrain, and/or marginal and fragile soils, including peat, is avoided - No new plantings are established on local peoples' land where it can be demonstrated that there are legal, customary or user rights, without their free, prior and informed consent. This is dealt with through a documented system that enables these and other stakeholders to express their views through their own representative institutions - Where it can be demonstrated that local peoples have legal, customary or user rights, they are compensated for any agreed land acquisitions and relinquishment of rights, subject to their free, prior and informed consent and negotiated agreements - No use of fire in the preparation of new plantings other than in specific situations, as identified in the ASEAN guidelines or other regional best practice - New plantation developments are designed to minimise net greenhouse gas emissions

	<ul style="list-style-type: none"> • Use of appropriate best practices by growers and millers: <ul style="list-style-type: none"> - Operating procedures are appropriately documented, consistently implemented and monitored - Practices maintain soil fertility at, or where possible improve soil fertility to, a level that ensures optimal and sustained yield - Practices minimize and control erosion and degradation of soils - Practices maintain the quality and availability of surface and ground water - Pests, diseases, weeds and invasive introduced species are effectively managed using appropriate Integrated Pest Management techniques - Pesticides are used in ways that do not endanger health or the environment - An occupational health and safety plan is documented, effectively communicated and implemented - All staff, workers, smallholders and contract workers are appropriately trained
RTRS	<ul style="list-style-type: none"> • Environmental Responsibility: <ul style="list-style-type: none"> - On and off site social and environmental impacts of large or high risk new infrastructure have been assessed and appropriate measures taken to minimize and mitigate any negative impacts - Pollution is minimized and production waste is managed responsibly - Efforts are made to reduce emissions and increase sequestration of Greenhouse Gases (GHGs) on the farm - Expansion of soy cultivation is responsible - On-farm biodiversity is maintained and safeguarded through the preservation of native vegetation • Good Agricultural Practice: <ul style="list-style-type: none"> - The quality and supply of surface and ground water is maintained or improved - Natural vegetation areas around springs and along natural watercourses are maintained or re-established - Soil quality is maintained or improved and erosion is avoided by good management practices - Negative environmental and health impacts of phytosanitary products are reduced by implementation of systematic, recognized Integrated Crop Management (ICM) techniques - All application of agrochemicals is documented and all handling, storage, collection and disposal of chemical waste and empty containers, is monitored to ensure compliance with good practice - Agrochemicals listed in the Stockholm and Rotterdam Conventions are not used - The use of biological control agents is documented, monitored and controlled in accordance with national laws and internationally accepted scientific protocols - Systematic measures are planned and implemented to monitor, control and minimize the spread of invasive introduced species and new pests - Appropriate measures are implemented to prevent the drift of agrochemicals to neighboring areas - Appropriate measures are implemented to allow for coexistence of different production systems - Origin of seeds is controlled to improve production and prevent introduction of new diseases
Bonsucro	<ul style="list-style-type: none"> • Actively manage biodiversity and ecosystem services: <ul style="list-style-type: none"> - Assess impacts of sugarcane enterprises on biodiversity and ecosystems services → Aquatic oxygen demand per unit mass product; Percent of areas defined internationally or nationally as legally protected or classified as High Conservation Value areas; Existence and implementation of an environmental management

	<p>plan (EMP) taking into account endangered species, habitats and ecosystems as well as reference to ecosystem services and alien invader plant and animal control; Use of co-products does not affect traditional uses; Fertilizer applied according to soil or leaf analysis; Nitrogen and phosphorus fertilizer (calculated as phosphate equivalent) applied per hectare per year; Herbicides and pesticides applied per hectare per year</p> <ul style="list-style-type: none"> - Implement measures to mitigate adverse impacts where identified → Document plan and implementation • Continuously improve key areas of the business: <ul style="list-style-type: none"> - Train employees and other workers in all areas of their work and develop their general skills → Training expense of workers as a percentage of payroll expense - Continuously improve the status of soil and water resources → Net water consumed per unit mass of product; Percent Ground cover of tops or leaves after harvest; Soil surface mechanically tilled per year; Percent fields with samples showing analyses within acceptable limits for pH - Continuously improve the quality of sugarcane and products from the sugar mill → Theoretical recoverable sugar content of cane; Fermentable total sugars content of cane, expressed as invert - Promote energy efficiency → Total Net Primary Energy Usage per kg product; Energy used in cane transport per ton cane transported; Primary energy use per ton of sugarcane - Reduce emissions and effluents. Promote recycling of waste streams where practical → Atmospheric acidification burden per unit mass product; Non-hazardous solid residues per ton cane - Foster effective and focused research, development and extension expertise → Research and extension costs as a % of sales - For greenfield expansion or new sugarcane projects, to ensure transparent, consultative and participatory processes that address cumulative and induced effects via an environmental and social impact assessment → Compliance with a recognized ESIA; High Conservation Value areas used as a % of total land affected by a new project or an expansion - Ensure active engagement and transparent, consultative and participatory processes with all relevant stakeholders → Existence of a recognized grievance and dispute resolution mechanism for all stakeholders; Percentage of meetings of stakeholder engagement where agreement has been reached by consensus driven process - To promote economic sustainability → Value added / ton cane
<p>FAO SAFA</p>	<ul style="list-style-type: none"> • Atmosphere: <ul style="list-style-type: none"> - Greenhouse Gases → GHG reduction target; GHG mitigation practices; GHG balance - Air Quality → Air pollution reduction target; Air pollution prevention practices; Ambient concentration of air pollutants • Water: <ul style="list-style-type: none"> - Water Withdrawal → Water conservation target; Water conservation practices; Ground and surface water withdrawals - Water Quality → Clean water target; Water pollution prevention practices; Concentration of water pollutants; Wastewater quality • Land: <ul style="list-style-type: none"> - Soil Quality → Soil-Improvement practices; Physical structure; Chemical quality; Biological quality; Organic matter content - Land Degradation → Land conservation and rehabilitation plan; Land conservation and rehabilitation practices; Net loss/gain of productive land • Biodiversity: <ul style="list-style-type: none"> - Ecosystem Diversity → Landscape/marine habitat conservation plan; Ecosystem-enhancing practices; Structural diversity of ecosystems; Ecosystem connectivity; Land–use and land-cover

	<ul style="list-style-type: none"> change - Species Diversity → Species conservation target; Species conservation practices; Diversity and abundance of key species; Diversity of production - Genetic Diversity → Wild genetic diversity enhancing practices; Agro-biodiversity in-situ conservation; Locally adapted varieties/breeds; Genetic diversity in wild species; Saving of seeds and breeds • Materials and Energy: <ul style="list-style-type: none"> - Material Use → Material consumption practices; Nutrient balances; Renewable and recycled materials; Intensity of material use - Energy Use → Renewable energy use target; Energy-saving practices; Energy consumption; Renewable energies - Waste Reduction and Disposal → Waste reduction target; Waste reduction practices; Waste disposal; Food loss and waste reduction • Animal Welfare: <ul style="list-style-type: none"> - Health and Freedom from Stress → Integrated animal health practices; Humane animal handling practices; Species-appropriate animal husbandry; Freedom from stress; Animal health
OECD	<ul style="list-style-type: none"> - Soil: Erosion → Agricultural land affected by water and wind erosion - Water: Resources → Agricultural freshwater withdrawals; Irrigated land area; Irrigation water application rate - Water Quality → Nitrate, Phosphorus, and Pesticide pollution derived from agriculture - Air and Climate Change: - Ammonia → Agricultural Ammonia emissions - GHGs → Gross total agricultural GHG emissions (methane, nitrous oxide, CO2 excluded in some cases) - Methyl bromide → Use - Biodiversity: Farmland birds → Populations of a selected species depending on agricultural land - Agricultural land cover → Types: arable crops, permanent crops, and pasture areas - Agricultural Inputs and Outputs: <ul style="list-style-type: none"> o Production → Agricultural production volume o Nutrients → Gross agricultural nitrogen and phosphorus balances o Pesticides → Sales o Energy → Direct on-farm consumption; Biofuel production to produce bioethanol and biodiesel from agricultural feedstock o Land → Agricultural land use area; Certified organic farming area; Transgenic crop area
NAP	<ul style="list-style-type: none"> - Rate of the maximum level of residues present - Pesticides in surface waters - Share of waterbodies with permanently vegetated buffer zones in surface water in agriculture - Pesticide residues in small waterbodies - Pesticides in groundwater - Number of confirmed cases of bee poisonings - Beebread monitoring - Rate of maintaining a reasonable level - Share of areas/farms with organic agriculture - Share of farm with cultivation according to crop- or sector-specific guidelines for integrated crop protection - Status report organic crop protection - Rate of infringements against phytosanitary legislation - Availability of pesticides - Pesticide application equipment - Domestic sales of pesticide agents/ critical agents - Funding situation

	<ul style="list-style-type: none"> - Organic farming - Situation of the official consultation within the federal states - Yield security via crop protection - Efficiency of the area - High Nature Value Farmland-Indicator - SPEAR-Index (Pesticides) - Sustainability indicator for biodiversity (population trends of selected bird species on agricultural landscapes) - Intensity of infestation - Agricultural area - Domestic sales of agents - Treatment index - SYNOPSIS Risk index for aquatic/terrestrial non-target organisms
COSA	<ul style="list-style-type: none"> • Water: <ul style="list-style-type: none"> - Conservation → Water conservation measures - Quality → Access to safe water; Contamination (Water contamination prevention measures, Water discharge control) • Resource Management: <ul style="list-style-type: none"> - Waste management → Farms recycling - reusing waste; Water contamination prevention measures - Input management → Amount of biocides used; Toxicity class of biocides used; Use levels of synthetic and natural fertilizers for N, P, K use efficiency; Energy quality and use • Soil: <ul style="list-style-type: none"> - Soil health → Level of erosion on farms; Soil conservation measures; Local (closed) nutrient cycle of organic matter & crop processing left overs • Biodiversity: <ul style="list-style-type: none"> - Flora diversity → Overstory biodiversity; Managed conservation areas - Flora density → Overstory trees per hectare; Reforestation • Climate Change: <ul style="list-style-type: none"> - Sequestration and Mitigation → Carbon Sequestration proxy (Overstory or Forest quantity/quality); Emissions proxy (Energy & Nitrogen calculation); Conversion of natural areas to farm land • Perception: <ul style="list-style-type: none"> - Producer Perception → Producer perceptions of changed environmental issues (Farm's care of environment; Community's care of environment)
EISA (indicators that either must (m), should (s), or can (c) be considered)	<ul style="list-style-type: none"> • Water Use and Protection: <ul style="list-style-type: none"> - Water Management Plan (s) - Water Protection (m) - Efficiency of Water Use (s) - Water Use Compliance (m) - Water Output Control (m) - Water Use Records (s) - Monitoring of Ditches / Water Courses (s) - Maps of Drains in Fields and Yards, in Particular New Land Drainage and Outlets (s) - Water Usage for Irrigation (s) - Water Efficient Equipment (s) - Water Efficient Lines / Varieties (c) - Separate Collection of Rain Water (s) - Run-off Control (m) - Cleaning of Sprayers for Crop Protection Products (m) - Storage of Diesel Fuel Close to / for Irrigation Pumps in Fields (m) - Evaluation of Practices / Equipment and Subsequent Reviewing of Water Management Plan (s) • Climate Change and Air Quality: <ul style="list-style-type: none"> - Management Concept to Avoid Emissions (s) - CO2 Emissions from Machinery and Fuel Use (s)

	<ul style="list-style-type: none"> - NH3 Losses in the Stable (s) - NH3 and N2O Losses on Fields (m) - CH4 Emissions from Ruminants (s) - Aerosol Emissions from Stables (m) - Aerosol Emissions from Field Work and Machinery (s) - Heating of Farm Buildings (s) - Increase Sink Function on Farm (s) - Off-farm Transportation (s) - Odor Emissions from Livestock Keeping (m) - Indirect Energy Needs and Related Emissions (s) - Dust Build-up due to Wind Erosion (s) - Evaluation of Practices / Equipment and Subsequent Revision of Management Plan (s) • Soil Management: <ul style="list-style-type: none"> - Soil Mapping (s) - Long Term Crop Rotation Plan (s) - Soil Management Plan (s) - Soil Management: Advice / Technical Recommendations (s) - Organic Matter (m) - Monitoring Soil quality (m) - Assessment of Field Conditions (m) - Record of Soil Operations (s) - Soil Cover Index (s) - Choice of Appropriate Soil Operations (s) - Measures to Prevent Soil Compaction (s) - Evaluation / Revision of Soil Management Plan (s) • Crop Nutrition: <ul style="list-style-type: none"> - Crop Nutrient Management Plan (m) - Organic Based Fertilizer Management Plan (m) - Training for Spreading (s) - Advice / Technical Recommendations (s) - Calculation of Nitrogen Needs (m) - Nitrogen Use (m) - Phosphate / Potassium Balance in the Rotation (m) - Micro-nutrient Deficiencies (s) - Soil pH (s) - Records of Nutrient Applications (m) - Storage of Manures / Other Organic Based Fertilizers (m) - Storage of Mineral Fertilizers (m) - Records of Import / Export of Organic Material (m) - Maintenance / Calibration of Spreading Equipment (s) - Application of Fertilizers (m) - Use of Catch Crops (c) - Spring Ploughing (c) - Evaluation of Results / Revision of Crop Nutrient Management Plan for Next Year (s) • Crop Protection: <ul style="list-style-type: none"> - Crop Protection Management Plan (s) - Strategy to Avoid Pest Resistance to Herbicides / Fungicides / Insecticides (m) - Skills in the Identification of Pests / Weeds / Diseases / Crop Disorders, Environmental Care/ Responsibility (m) - Willingness to Improve System and Learn (m) - Training (m) - Disposal of Un-sprayed Diluted Solutions and Sur-plus Chemicals (m) - Maximum Residue Levels (m) - Inspection of Spraying Equipment (m) - Emergency Plan (m) - Protection / Enhancement of Important Species, Beneficial Organisms and Agricultural Biodiversity (s)
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	<ul style="list-style-type: none"> - Other Prevention / Management Decisions for Integrated Pest Management (Weed / Pest / Dis-ease Management) (m) - Decision Making Progress (m) - Environmental Impact of All Crop Protection Measures (s) - Justification of Crop Protection Measures (m) - Non-chemical Means as First Resort (m) - Threshold Concept (m) - Crop Protection Recommendations (s) - Determination of Crop Protection Product / Rate / Timing (m) - Minimizing Undesired Effects of any Method of Crop Protection (m) - Storage of Crop Protection Products (m) - Environmental Protection During Mixing / Filling of Crop Protection Products (m) - Advice on the Appropriate Mixing Area for Crop Protection Products (s) - Observing Pre-harvest Intervals (m) - Use Crop Protection Products Only in Required Area (m) - Applications to Field Boundaries and Margins (m) - Post-Harvest Treatments (m) - Disposal of Left-over Spray Mix (m) - Assessing Results of Measures Taken / Revision of Crop Protection Management Plan (s) • Energy Use and Efficiency: <ul style="list-style-type: none"> - Whole Farm Management Plan for Energy Use (s) - Energy Use for Cropping (s) - Energy Use in Animal Husbandry (m) - Two Crop Systems (c) - Use of Products with High Energy Input behind (m) - Use of Renewable Fuels (s) - Energy Production from Biomass and Liquid Manure (c) - Regular Check of Present State / Performance and Revision of Future Planning (s) • Landscape, Wildlife and Biodiversity: <ul style="list-style-type: none"> - Whole Farm Conservation Plan (s) - Preservation of Historical Features on the Farm (m) - Minimum 5 % of Farm Area not Used for Cropping (m) - Implementation of Whole Farm Conservation Plan (s) - Field Margins (s) - Field Margin Management within the Whole Farm conservation Plan (s) - Cultivation under Canopy of Trees (s) - Native Species (s) - Field Boundaries (m) - Leaving Winter Stubbles before Spring Cropping (c) - Machinery Movements on Field Boundaries / Margins (m) - Field Operations and Nesting Birds (s) - Timing / Frequency of Hedge Cutting (m) - Timing / Frequency of Ditch Clearance (s) - Trees (m) - Conservation Headlands (c) - Small Areas of Wildlife Seed Mixes (c) - Beetle Banks and Comparable Strips / Structures (c) - Monitoring Wild-life (s) - Annual Review / Development of Whole Farm Conservation Plan (s) • Resource Management, Product Storage / Waste Disposal: <ul style="list-style-type: none"> - Concept for Waste Handling / Minimization (m) - Resource Management Plan, Integrated with Crop Nutrient Management Plan (m) - Professional Advice (s) - Fuel Storage and Rest Oil (m)
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	<ul style="list-style-type: none"> - Recycling of Waste Oil and Filters (m) - Maintenance of Equipment / Machinery to Avoid Spillage / Leakage of Fuel and Oil (s) - Action Plan to Re-duce the Potential of Pollution on the Farm (c) - Liquid Fertilizer Storage (m) - Solid Mineral Fertilizer Storage (m) - Chemical / Veterinary Product Storage (m) - Fresh Produce Storage (m) - Packaging Facilities (s) - Effluent Quantities and Storage (m) - Disposal of Crop Washings (m) - Storage / Disposal of Empty Containers (m) - Storage / Disposal of Unused / Expired Crop Protection Products (m) - Storage / Disposal of Other Surplus Chemicals (m) - Plastic Waste Disposal (m) - Waste Products (m) - General Waste (m) - Review of Current Practices / Adjustment of Relevant Management Plans / Concepts (s)
<p>OPERA</p>	<ul style="list-style-type: none"> • Water: <ul style="list-style-type: none"> - Specialized training and advice on spray preparation, application and maintenance → Number of sprayer inspections; Number of recorded incidents of point source contamination; Number of farmers attending; Number of jobs created; Financial costs - Spray drift reduction technology → Level of residues in surface and groundwater; Impact of spray applications on non-target organisms; Recording of diffuse source contamination incidents; Number of reported incidences of spray drift; Number of reduced spray drift nozzles sold; Recorded use of Personal Protective Equipment; Impact on farm productivity and profitability - Multi-functional Field margin buffer zones → Measured reduction in run-off into water courses; Level of residues in water/soil; Populations of pollinating insects; Presence of indicator species in field margins; Impact on food supply; Number of reported incidences of spray drift; Effect on tourism and landscape use; Impact on farm productivity and profitability - Specialist training for application in designated protected areas → Incident monitoring of non-compliance - Certified professional operator schemes and knowledge proof tests → Number of certifications issued; Number of farmers meeting continuous professional development targets; Impact on rural jobs market; Additional costs and administrative burden on farmers and businesses - Training on Integrated Pest Management programs → Number of farmers attending courses and implementing IPM programs; Presence of indicator species in field margins; Number of jobs created/lost; Impact on farm productivity and profitability - Pesticide container recycling schemes → Cases of container related point source contaminations reported; Number of jobs created; Volume of plastic recycled; Cost of container disposal - Biobeds/on-farm water management/wetlands → Level of residues in surface and groundwater; Number of recorded incidents of point source contamination; Investment cost and maintenance - Reduced use of substances of particular concern → Level of specific pesticide residues in water; Effect on road safety and aesthetic appearance from reduced use of herbicides; Impact on farm productivity and profitability • Biodiversity: <ul style="list-style-type: none"> - Multi-functional field margin buffer zones → Populations of pollinating insects; Presence of indicator species in field margins;

	<p>Impact on food supply; Number of reported incidences of spray drift; Effect on tourism and aesthetic landscape; Impact on farm productivity and profitability</p> <ul style="list-style-type: none">- Training on Integrated Pest Management programs- Spray drift reduction technology- Biobeds/on-farm water management/wetlands- Specialized training courses regarding applications in protection areas → Incident monitoring of non-compliance
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Economic

Field to Market	<ul style="list-style-type: none"> - Debt/Asset ratio - Return above variable costs - GDP/Tax base contribution
SAI	<ul style="list-style-type: none"> • TFS: <ul style="list-style-type: none"> - Output - Variable Costs - Gross Margin - Total Overheads (Labor, Imputed Labor, Power, General Overheads, Property) - Rent & Finance - Depreciation - Total Cost of Production - EBITDA - Net Margin
SISC	<ul style="list-style-type: none"> - Yield
IAD	<ul style="list-style-type: none"> • Theme 1: <u>Economic viability</u> <ul style="list-style-type: none"> - EBITDA per ha and / or per livestock unit - EBITDA / labor unit - Production costs per ha or livestock unit
RISE	<ul style="list-style-type: none"> • Economic viability <ul style="list-style-type: none"> - Liquidity reserve - Indebtedness - Economic vulnerability - Livelihood insurance - Financial scope • Farm management <ul style="list-style-type: none"> - Farm strategy & planning - Supply & yield stability - Planning instruments & documentation - Quality management - Cooperation
LEAF Marque	<ul style="list-style-type: none"> • Organization and Planning: <ul style="list-style-type: none"> - Implement appropriate planning and review processes - Enhance productivity and efficiency (yields and biodiversity) - Improve management performance - Increase staff performance - Actively develop market opportunities for sustainable food - Implement appropriate financial system - Improve efficiency from - Improve the business financial status
AgBalance	<ul style="list-style-type: none"> • Macroeconomic: <ul style="list-style-type: none"> - Subsidies - Productivity, Gross Value of Production - Farm profits • Variable costs: <ul style="list-style-type: none"> - Costs of seed - Fertilization - Crop protection products - Soil preparation - Machinery • Fixed costs: <ul style="list-style-type: none"> - Costs of labor - Depreciation - Maintenance/general repair - Credits - Insurance costs - Investment
KSNL	<ul style="list-style-type: none"> - Profitability → Income (Operating income + labor costs); Profitability rate; Return on assets; Return on Equity; Relative

	<p>factor remuneration (operative income to factor costs of all production factors)</p> <ul style="list-style-type: none"> - Solvency → Financial capacity; CASH FLOW III - Resilience → Equity ratio; Changes in equity; Net investment - Value added → Revenue
IDEA	<ul style="list-style-type: none"> • Economic viability: <ul style="list-style-type: none"> - Available income per worker in relation to national legal minimum wage - Economic specialization rate • Independence: <ul style="list-style-type: none"> - Financial autonomy - Reliance on direct subsidies from CAP and indirect economic impact of milk and sugar quotas • Transferability <ul style="list-style-type: none"> - Operating capital (not taking account value of land) • Efficiency <ul style="list-style-type: none"> - Operating expenses as a proportion of production value
McDonald's MAAP	<ul style="list-style-type: none"> • Sufficient High Quality Production <ul style="list-style-type: none"> - Producer income security & access to market - Agricultural input costs - Crop & livestock disease • Community investment <ul style="list-style-type: none"> - Local employment & sourcing - Support for community programs
PepsiCo's SFI	<ul style="list-style-type: none"> - Management Practices - Efficiency - Commercial Relationships
GLOBALG.A.P.	<ul style="list-style-type: none"> • All Farm Base: <ul style="list-style-type: none"> - Site History and Site Management - Record Keeping and Internal Self-Assessment • Crops Base: <ul style="list-style-type: none"> - Machinery and Equipment → Maintenance
RSPO	<ul style="list-style-type: none"> • Commitment to long-term economic and financial viability: <ul style="list-style-type: none"> - There is an implemented management plan that aims to achieve long-term economic and financial viability. • Commitment to continuous improvement in key areas of activity: <ul style="list-style-type: none"> - Growers and millers regularly monitor and review their activities, and develop and implement action plans that allow demonstrable continual improvement in key operations.
Bonsucro	<ul style="list-style-type: none"> • Manage input, production and processing efficiencies to enhance sustainability: <ul style="list-style-type: none"> - Monitor production and process efficiency → Total raw material used per kg product; Sugarcane yield; Working hours lost as percent of total working hours; Mill overall time efficiency; Factory performance index; Industrial efficiency - Monitor global warming emissions with a view to minimizing climate change impacts → Global warming burden per unit mass product
FAO SAFA	<ul style="list-style-type: none"> • Investment: <ul style="list-style-type: none"> - Internal Investment - Community Investment - Long-ranging Investment → Long-term profitability; Long-term business plan - Profitability → Net income; Cost of Production; Price determination • Vulnerability: <ul style="list-style-type: none"> - Stability of Supply → Procurement channels; Stability of supplier relationships; Dependence on the leading supplier - Stability of Market - Liquidity → Net cash flow; Safety nets - Risk Management - Stability of Production → Guarantee of production levels; Product

	<ul style="list-style-type: none"> diversification • Product Quality and Information: <ul style="list-style-type: none"> - Food Safety → Control measures; Hazardous pesticides; Food contamination incidents - Food Quality → Quality standards - Product Information → Product labeling; Traceability system; Certified production • Local Economy: <ul style="list-style-type: none"> - Value Creation → Regional workforce; Fiscal commitment - Local Procurement
OECD	<ul style="list-style-type: none"> - Total Value of Production - Total Value of Consumption - Total Support Estimate: Producer Support Estimate; General Services Support Estimate; Consumer Support Estimate.
COSA	<ul style="list-style-type: none"> • Producer Livelihood: <ul style="list-style-type: none"> - Revenue → Farm revenue; Target crop revenue (Yield, Price); Household labor revenue - Costs → Total production costs for target crop (Labor costs; Fertilizer costs; Biocide costs; Equipment costs; Energy costs); Certification costs (direct); Compliance costs (indirect) to meet Standards (Specific training & infrastructure, Record keeping e.g. traceability) - Income → Producer net income from target crop • Risk: <ul style="list-style-type: none"> - Diversification → Portion of total production revenue from target crop; Portion of cultivated farm area used for other crops - Information → Access to market information; Price formation - Producers understanding the factors that affect the price - Credit → Access to credit (how much and from what sources) - Volatility → Price; Yield - Vulnerability → Access to medical services; Relationship to National Poverty Line; Days without sufficient food; Discrimination - compare pay (gender or diverse ethnicity or affiliation) for same role • Competiveness: <ul style="list-style-type: none"> - Business Development → Access to market information; Ratio of farm price to global reference price; Training attended (Type, amount of time); Price formation - Differentiation → Quality practices in cultivation and processing; Producers knowing quality levels; Ownership or control of certification or standard; Number of current standards or certifications; Amount of price premium for complying to a standard or certification; Portion of crop sold as compliant or certified - Efficiency → Labor efficiency; Wealth change over time; Productivity - efficiencies of output/inputs (Labor use, agrochemical use, energy use) • Producer Organization: <ul style="list-style-type: none"> - Governance → Producer participation levels in groups; Democratic process in organization; Women's participation with local producer groups - Services → Number of basic services provided by association; Community relations - farms participating in projects • Perception: <ul style="list-style-type: none"> - Producer Perception → Producer perceptions of change in overall economic circumstances
EISA (indicators that either must (m), should (s), or can (c) be considered)	<ul style="list-style-type: none"> • Organization, Management / Planning: <ul style="list-style-type: none"> - Auditing (s) - Certification and Assurance (c) - Business Management Mission Statement / Whole Farm Management Plan (s) - Diversification (s)

	<ul style="list-style-type: none">- Operating Resources Plan (s)- Whole Farm Technology Concept (c)- Whole Farm Communication Concept (c)- Farm Environmental Policy (s)- Awareness of Technology Developments (s)- Rental and Purchase of Land (c)- Fire Prevention / Emergency Plan (m)- Communication / Participation with Local Community (c)- Policy Statement of Responsibility to End Customer / Consumer / Food Industry Contacts for Transparency (s)- Evaluation / Revision of Business Management Mission Statement / Whole Farm Management Plan (s)
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Social

Field to Market	<ul style="list-style-type: none"> - Non-Fatality illness and injury - Fatalities - Labor hours
SAI	<ul style="list-style-type: none"> • Principles & Practices for the sust. Production of arable & vegetable crops: <ul style="list-style-type: none"> - Working Conditions - Training - Local Economy
IAD	<ul style="list-style-type: none"> • Theme 2: Social viability <ul style="list-style-type: none"> - Full-time equivalent working hours (1,800 hours / year) - SI- Satisfaction Index
RISE	<ul style="list-style-type: none"> • Quality of life <ul style="list-style-type: none"> - Work and education - Financial situation - Social relations - Personal freedom and values - Health - Further aspects of life • Working conditions <ul style="list-style-type: none"> - Personnel management - Working times - Work safety - Wage and income level
LEAF Marque	<ul style="list-style-type: none"> • Community Engagement: <ul style="list-style-type: none"> - Improve well-being of management, staff and contractors - Build social capital - Demonstrate effective business marketing and communication
AgBalance	<ul style="list-style-type: none"> • Farmer and entrepreneurs: <ul style="list-style-type: none"> - Wages and salaries - Professional training - Association membership - Toxicity Potential - Risk Potential - Strikes and Lockouts • Consumer: <ul style="list-style-type: none"> - Residues in feed and food - Presence of unauthorized or unlabeled GMO - Toxicity potential - Functional Product Characteristics • Local and national community: <ul style="list-style-type: none"> - Access to land - Employment - Number and qualification of employees - Gender equality - Integration of disabled people - Part-time workers - Family support within a specific region and/or scope • International community: <ul style="list-style-type: none"> - Developing countries import - Amount of fair trade volume - Investments from foreign countries - Child labor • Future generations: <ul style="list-style-type: none"> - Number and working hours of Trainees - Level of living conditions and of social services - Internal and external expenditures of companies in research and development activities - Amount of capital investments
KSNL	<ul style="list-style-type: none"> - Scope and structure of employment → Provided work places; Age

	<ul style="list-style-type: none"> distribution; Women ratio; Qualification/Education - Labor conditions → Holidays; Working conditions; Level of income - Participation → Corporate activities; Owner share
IDEA	<ul style="list-style-type: none"> • Quality of the products and land: <ul style="list-style-type: none"> - Quality of foodstuffs produced - Enhancement of buildings and landscape heritage - Processing of non-organic waste - Accessibility of space - Social involvement • Employment and services: <ul style="list-style-type: none"> - Short trade - Services, multi-activities - Contribution to employment - Collective work - Probable farm sustainability • Ethics and human development: <ul style="list-style-type: none"> - Contribution to world food balance - Training - Labor intensity - Quality of life - Isolation - Reception, hygiene, and safety
McDonald's MAAP	<ul style="list-style-type: none"> • Human Health & Welfare: <ul style="list-style-type: none"> - Employee health & welfare - Food safety • Animal Health & Welfare: <ul style="list-style-type: none"> - Nutrition - Medication & growth promoters - Genetic Selection - Animal cloning - Husbandry - Transport - Emergency Slaughter • Business Ethics & Supplier Relationships • Rural Landscape Preservation
PepsiCo's SFI	<ul style="list-style-type: none"> - Employment conditions - Employment Practices - Community - Health, Wellness and Safety
GLOBALG.A.P	<ul style="list-style-type: none"> • All Farm Base: <ul style="list-style-type: none"> - Worker's Health, Safety, and Welfare → H&S; Hygiene; Training; Hazards and First Aid; Protective Clothing/Equipment - Subcontractors → Records; Introduction to on-site safety and hygiene procedures - Complaints - Recall/Withdrawal Procedure → Documents - Traceability and Segregation → Identification and Segregation; Dispatch Monitoring; Records • G.R.A.S.P.: <ul style="list-style-type: none"> - Representation of Staff Interests - Complaint procedure - Communication of Self-Declaration on good social practice - National Labor Regulation (Knowledge and Access) - Working Contracts - Regular salary payment - Conformity with at least minimum wage - Child labor - Education - Working hours
RSPO	<ul style="list-style-type: none"> • Commitment to transparency:

	<ul style="list-style-type: none"> - Growers and millers provide adequate information to relevant stakeholders on environmental, social and legal issues relevant to RSPO Criteria to allow for effective participation in decision making - Management documents are publicly available - Growers and millers commit to ethical conduct in all business operations and transactions. • Compliance with applicable laws and regulations: <ul style="list-style-type: none"> - There is compliance with all applicable local, national and ratified international laws and regulations - The right to use the land is demonstrated, and is not legitimately contested by local people who can demonstrate that they have legal, customary or user rights - Use of the land for oil palm does not diminish the legal, customary or user rights of other users without their free, prior and informed consent. • Responsible consideration of employees, and of individuals and communities affected by growers and mills <ul style="list-style-type: none"> - Aspects of plantation and mill management that have social impacts, including replanting, are identified in a participatory way, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continual improvement - There are open and transparent methods for communication and consultation between growers and/or millers, local communities and other affected or interested parties - There is a mutually agreed and documented system for dealing with complaints and grievances, which is implemented and accepted by all affected parties - Any negotiations concerning compensation for loss of legal, customary or user rights are dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions - Pay and conditions for employees and for contract workers always meet at least legal or industry minimum standards and are sufficient to provide decent living wages - The employer respects the rights of all personnel to form and join trade unions of their choice and to bargain collectively. Where the right to freedom of association and collective bargaining are restricted under law, the employer facilitates parallel means of independent and free association and bargaining for all such personnel - Children are not employed or exploited - Any form of discrimination based on race, caste, national origin, religion, disability, gender, sexual orientation, union membership, political affiliation, or age, is prohibited - There is no harassment or abuse in the work place, and reproductive rights are protected - Growers and millers deal fairly and transparently with smallholders and other local businesses - Growers and millers contribute to local sustainable development where appropriate - No forms of forced or trafficked labor are used - Growers and millers respect human rights.
RTRS	<ul style="list-style-type: none"> • Legal Compliance and Good Business Practice: <ul style="list-style-type: none"> - There is awareness of, and compliance with, all applicable local and national legislation - Legal use rights to the land are clearly defined and demonstrable - There is continual improvement with respect to the requirements of this standard. • Responsible Labor Conditions:

	<ul style="list-style-type: none"> - Child labor, forced labor, discrimination and harassment are not engaged in or supported - Workers, directly and indirectly employed on the farm, and sharecroppers, are adequately informed and trained for their tasks and are aware of their rights and duties - A safe and healthy workplace is provided for all workers - There is freedom of association and the right to collective bargaining for all workers - Remuneration at least equal to national legislation and sector agreements is received by all workers directly or indirectly employed on the farm. • Responsible Community Relations: <ul style="list-style-type: none"> - Channels are available for communication and dialogue with the local community on topics related to the activities of the soy farming operation and its impacts - In areas with traditional land users, conflicting land uses are avoided or resolved - A mechanism for resolving complaints and grievances is implemented and available to local communities and traditional land users - Fair opportunities for employment and provision of goods and services are given to the local population
Bonsucro	<ul style="list-style-type: none"> • Obey the Law: <ul style="list-style-type: none"> - Comply with relevant applicable laws - Demonstrate clear title to land in accordance with national practice and law • Respect Human Rights and Labor Standards: <ul style="list-style-type: none"> - Comply with ILO labor conventions governing child labor, forced labor, discrimination and freedom of association and the right to collective bargaining → Min. Age of workers; Absence of forced or compulsory labor; Absence of discrimination; Respect the right of all personal to join and form trade unions and/or bargain collectively in accordance to the law - Apply BSI human rights and labor standards to suppliers and contractors → Demonstrated compliance of suppliers and contr. - Provide a safe and healthy working environment in work place operations → Lost time accident frequency; Assessment of the main health and safety risks and measures implemented for mitigation of risk; Appropriate personal protective equipment supplied to and used by all workers, Training for Health & Safety; Availability of sufficient safe drinking water to each worker; Access to first aid and provision for emergency response - Provide employees and workers with at least the national min. wage → Ratio of lowest entry level wage to minimum wage - Provide clear, equitable, and comprehensive contracts → Existence of a contract or equivalent document
FAO SAFA	<ul style="list-style-type: none"> • Decent Livelihood: <ul style="list-style-type: none"> - Right to Quality of Life - Capacity Building - Rights of Fair Access to Land and Means of Production • Fair Trading Practices: <ul style="list-style-type: none"> - Responsible Buyers → Suppliers' freedom of association and right to collective bargaining; Fair pricing and negotiated contracts or agreements • Labor Rights: <ul style="list-style-type: none"> - Employment Relations - Forced Labor - Child Labor - Employees' Freedom of Association and Right to Bargaining • Equity: <ul style="list-style-type: none"> - Non-discrimination

	<ul style="list-style-type: none"> - Gender Equality - Support to Vulnerable People • Human Health and Safety: <ul style="list-style-type: none"> - Workplace Safety and Health Provisions for Employees - Public Health • Cultural Development: <ul style="list-style-type: none"> - Indigenous Knowledge - Food Sovereignty
COSA	<ul style="list-style-type: none"> • Labor Conditions: <ul style="list-style-type: none"> - Health and Safety → Restricted agrochemical use for vulnerable groups (Children, Pregnant Women); Farms w/protective gear (agrochemical application); Farm injuries; Access to Medical Services (Time to reach, Cost) - Living Conditions → Smoke ventilation in cooking area; Farms w/safe water for domestic use • Basic Human Rights and Equity <ul style="list-style-type: none"> - Labor Rights → Children working (Children in school at appropriate grade level); Workers and smallholders earn at least minimum wage or national poverty line; Discrimination (worker) - Education → Training attended (Type, Cost to producer, Amount of time); Children in school at appropriate grade level - Gender → Women's participation with local producer groups; Farms with women as head of farm; Women serving as a community-level delegate or committee member; Women holding a leadership post in the producer group; Access to training for women; Access to education by gender - Food Security → Days without sufficient food • Community: <ul style="list-style-type: none"> - Participation → Community relations - farms participating in projects (infrastructure); Producer participation levels in groups; Democratic process in organization (vote); Women's participation with local producer groups; Buyer (or co-op) provided financial or management support • Shared Value: <ul style="list-style-type: none"> - Transparency → Access to market information; Price formation - Producers understanding the factors - Investing in Capacity → Training attended • Perception: <ul style="list-style-type: none"> - Producer Perception → Producer perceptions of changed social issues (Community relations, Community care of the Environment, Quality of life)
EISA (indicators that either must (m), should (s), or can (c) be considered)	<ul style="list-style-type: none"> • Human and Social Capital: <ul style="list-style-type: none"> - Employee Training Plan (m) - Staff Meetings (m) - Staff Awareness of Hygiene Importance (m) - Working Hours (s) - Information on Site-specific Management Practices (s) - Labor Conditions (m) - Housing (m) - Wages and Social Security (m) - Pension (m) - Holiday (m) - Sick Leave (m) - Risk Assessment to Form an Action Plan Promoting Health / Safety (m) - First Aid (m) - Accident / Emergency Systems (m) - Health / Safety (s) - Annual Health Checks for Staff (m) - Marketing Possibilities with a Focus on Local Marketing if Possible (s)

	- Communication on Farm Environmental Policy (s)
OPERA	<ul style="list-style-type: none"> • Reducing consumer exposure to pesticide residues in food: <ul style="list-style-type: none"> - Training of farmers in application techniques, particularly post-harvest treatments → Residue monitoring in food produce; Attendance of designated training courses; Adoption of precision application equipment; Participation in recognised professional bodies and adherence to their guides of practice - Training on Integrated Pest Management programmes - Education in the importance of adhering to approved label recommendations → Attendance of designated training course • Reducing bystander and resident exposure to spraying: <ul style="list-style-type: none"> - Multi-functional field margin buffer zones → Number of reported incidences of spray drift; Number of reported incidences of exposure to sprays; Populations of pollinating insects; Presence of indicator species in field margins; Impact on food supply; Level of pesticide residues in water; Effect on tourism and landscape use; Impact on farm productivity and profitability - Spray technology to minimize drift → Sprayers fitted with drift reduction nozzles; Sprayers sold with airbags or other devices to minimize drift; Operators recording wind speed and drift risk during application • Reducing operator exposure: <ul style="list-style-type: none"> - Training of farmers and operators in application techniques and equipment maintenance → Attendance of designated training courses; Number of calibrations and inspections of application equipment; Participation in recognized professional bodies; Number of incidents due to point source contamination from equipment; Skill tests for operators; Number of jobs created; Financial impact for users - Use of Personal Protective Equipment → Sales of PPE; Completion of records of PPE used during spray application; Attendance of designated training courses; Cost of specialist PPE; Number of reported incidences of exposure to sprays - Education in the importance of adhering to approved label recommendations → Attendance of designated training courses; Number of recorded incidents of point source contamination from equipment - Procedures for preparing pesticide handling operations → Point source contamination incidents; Number of accidents that require medical attention related to pesticide applications • Providing professional education to reduce risks: <ul style="list-style-type: none"> - Specialized training courses on reducing environmental risks → Incidences of pesticide residues in water; Impact of spray applications on non-target organisms; Recording of diffuse source contamination incidents; Populations of pollinating insects; Presence of indicator species in field margins; Records of products used; Effects on productivity and farm profitability with changes in technology - Specialized training courses for sprayer operators → Number of accidents involving sprayer operators; Number of reported incidences of exposure to sprays; Attendance of designated training courses; Skill tests for operators; Cost of specialist PPE - Specialized spray application and sprayer maintenance training courses → Number of farmers attending training courses; Number of sprayer inspections and independent calibrations; Number of recorded incidents of point source contamination from equipment; Number of jobs created; Financial cost for users - Training on Integrated Pest Management programs

Annex II – Figures

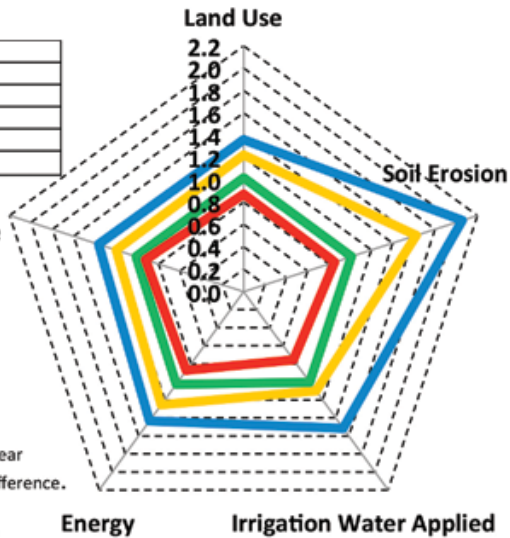
Index of Per Bushel Resource Impacts to Produce Corn for Grain (United States, Year 2000 = 1)

Year	2000 *	Unit - per Bushel
Land Use	0.008	Planted Acres
Soil Erosion	0.038	Tons
Irrigation Water Applied	0.242	Acre Inches
Energy	47,779	Btu
Greenhouse Gases	13.0	Pounds CO ₂ e

* Five-year average 1996 - 2000

- 5 Yr. Avg. 1980 - 84
- 5 Yr. Avg. 1987 - 91
- 5 Yr. Avg. 1997 - 01
- 5 Yr. Avg. 2007 - 11

Greenhouse Gases



Note: Data are presented in index form, where the year 2000 = 1 and a 0.1 point change is equal to a 10% difference. Index values allow for comparison of change across multiple dimensions with differing units of measure.

Figure 1: Spidergram, Field to Market

C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
SAI PLATFORM														
Financial Tool for Sustainable Farming, for Arable Crops 1.0														
Start														
<p>Please ensure you select 'Options, Enable Macros' at the top of this pane for this tool to function properly</p> <p>This Tool has been prepared to provide Growers with a platform to analyse Production economics in the context of sustainability of production. It is intended to be used to analyse both historical data and future strategy.</p> <p>The outcomes are principally to improve understanding of financial returns from sustainable systems, and to enable modelling of potential changes to benefit all aspects of sustainable management.</p> <p>Follow the instructions on the left hand side of the page.</p>														
										Company Logo				

Figure 2: SAI TFS Start Sheet

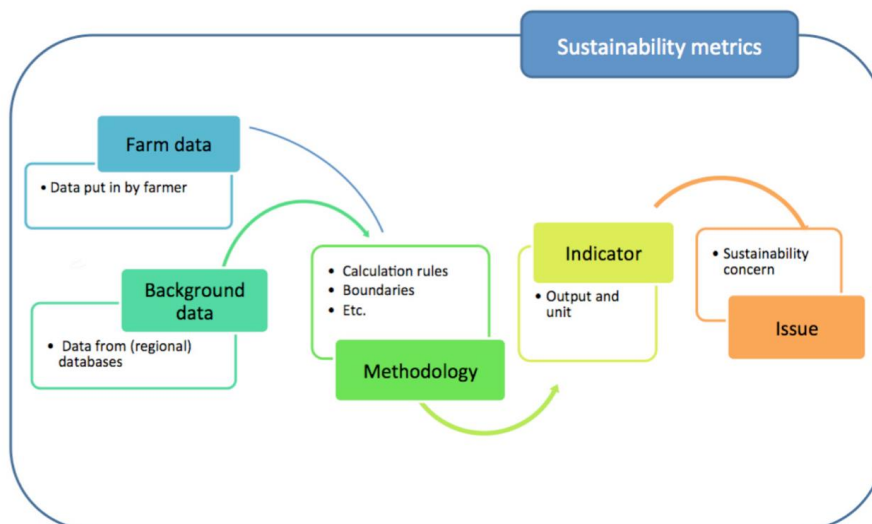


Figure 3: SPA's Core Elements of Sustainability Metrics

	Farm	Processing	Distribution	Retail / Food Service
PEOPLE				
Human resources (worker health & safety, employment practices, etc.)	X	X	X	X
Community (local sourcing / hiring, etc.)	X	X	X	X
PLANET				
Air quality	X	X	X	X
Biodiversity and ecosystems	X			
Energy use	X	X	X	X
GHG emissions	X	X	X	X
Nutrients ¹	X			
Packaging	X	X	X	X
Pesticides ^{1, 2}	X	X	X	X
Soils	X			
Waste	X	X	X	X
Water quality ³	X	X	X	X
Water use	X	X	X	X
PROFIT⁴				
Green procurement	X	X	X	X
Fair price/incentives	X	X	X	X

- 1. includes related water quality issues
- 2. includes health and safety of workers and communities
- 3. includes stormwater runoff and process water
- 4. improved efficiency/cost reduction will be incorporated into other metrics where appropriate

Figure 4: Measuring according to SISC Homepage

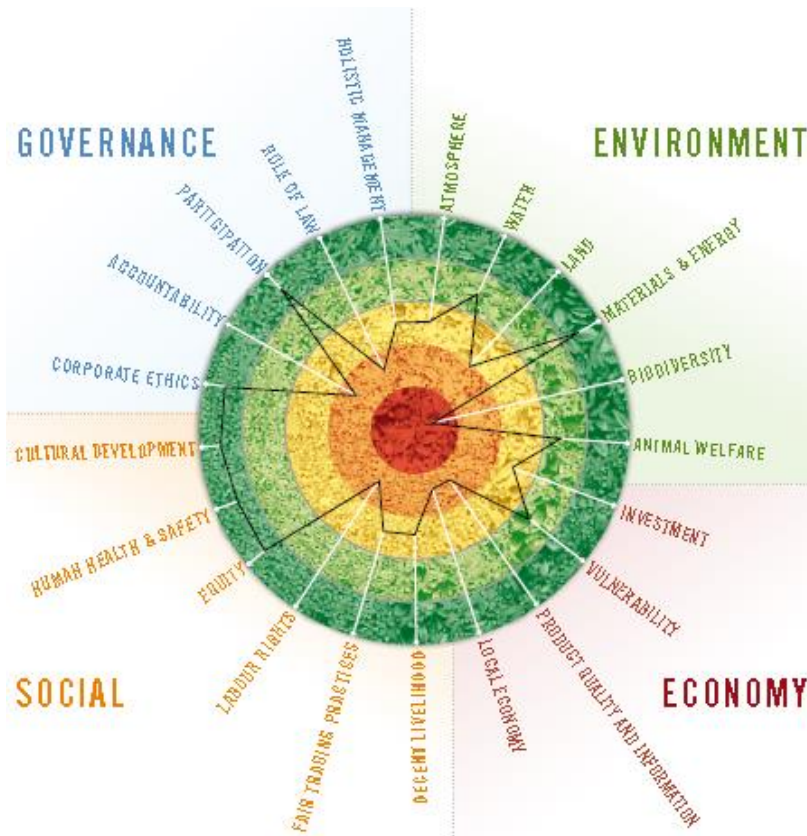


Figure 5: FAO Visualization of a Company Score

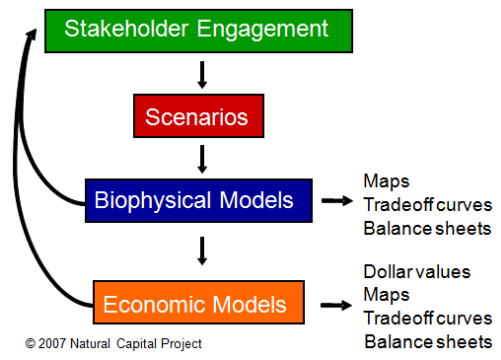


Figure 6: Modeling process

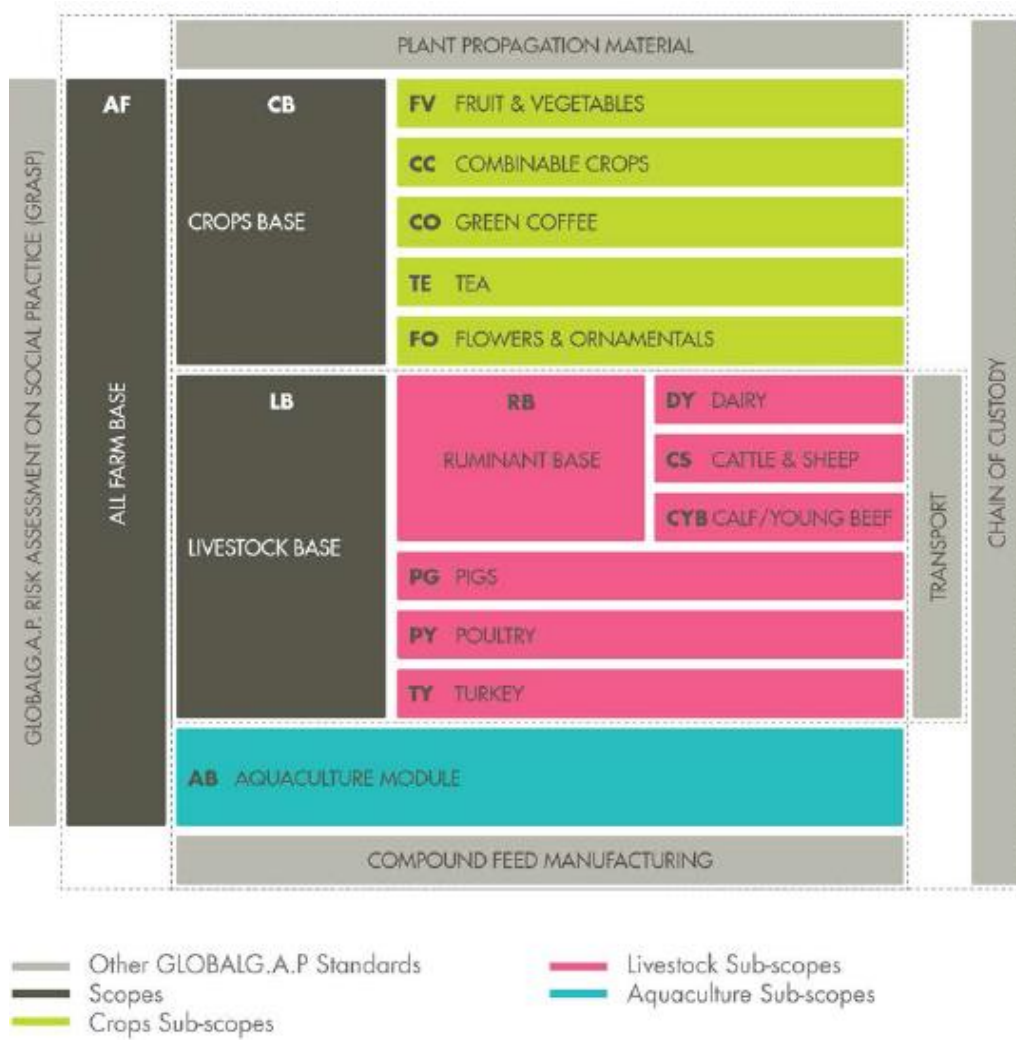


Figure 7: Module Overview

Annex III – Tables

Table 1: Different Requirements for localg.a.p. and GLOBALG.A.P.

Localg.a.p		GLOBALG.A.P.
Foundation	Intermediate	
All Farm Base: <ul style="list-style-type: none"> • Site History and Site Management • Record Keeping and internal Self-Assessment/ internal Inspection • Worker's Health, Safety and Welfare • Subcontractors • Waste and Pollution Management, Recycle and Reuse • Complaints • Recall/Withdrawal Procedure 	All Farm Base: <ul style="list-style-type: none"> • Site History and Site Management • Record Keeping and internal Self-Assessment/ internal Inspection • Worker's Health, Safety and Welfare • Subcontractors • Waste and Pollution Management, Recycle and Reuse • Complaints • Recall/Withdrawal Procedure • Food Defense 	All Farm Base: <ul style="list-style-type: none"> • Site History and Site Management • Record Keeping and internal Self-Assessment/ internal Inspection • Worker's Health, Safety and Welfare • Subcontractors • Waste and Pollution Management, Recycle and Reuse • Complaints • Recall/Withdrawal Procedure • Food Defense • Environment and Conservation • GLOBALG.A.P. Status • Logo Use • Traceability and Segregation
Crops Base Module: <ul style="list-style-type: none"> • Traceability • Propagation Material • Fertilizer Application • Irrigation/Fertigation • Plant Protection Products 	Crops Base Module: <ul style="list-style-type: none"> • Traceability • Propagation Material • Fertilizer Application • Irrigation/Fertigation • Plant Protection Products • Equipment 	Crops Base Module: <ul style="list-style-type: none"> • Traceability • Propagation Material • Fertilizer Application • Irrigation/Fertigation • Plant Protection Products • Equipment • Site History and Site Management • Soil Management • Integrated Pest Management

Table 2: Previous version of OECD's Agri-Environmental Indicators (2001)

I. AGRICULTURE IN THE BROADER ECONOMIC, ENVIRONMENTAL, AND SOCIAL CONTEXT		
1. Contextual information and indicators		2. Farm financial resources
<ul style="list-style-type: none"> • <i>Agricultural GDP</i> • <i>Agricultural output</i> • <i>Farm employment</i> • <i>Farmer age/gender distribution</i> • <i>Farmer education</i> • <i>Number of farms</i> • <i>Agricultural support</i> 	<ul style="list-style-type: none"> • <i>Land use</i> <ul style="list-style-type: none"> – Stock of agricultural land – Change in agricultural land – Agricultural land use 	<ul style="list-style-type: none"> • <i>Farm income</i> • <i>Agri-environmental expenditure</i> <ul style="list-style-type: none"> – Public and private agri-environmental expenditure – Expenditure on agri-environmental research
II. FARM MANAGEMENT AND THE ENVIRONMENT		
1. Farm management		
<ul style="list-style-type: none"> • <i>Whole farm management</i> <ul style="list-style-type: none"> – Environmental whole farm management plans – Organic farming 	<ul style="list-style-type: none"> • <i>Nutrient management</i> <ul style="list-style-type: none"> – Nutrient management plans – Soil tests • <i>Pest management</i> <ul style="list-style-type: none"> – Use of non-chemical pest control methods – Use of integrated pest management 	<ul style="list-style-type: none"> • <i>Soil and land management</i> <ul style="list-style-type: none"> – Soil cover – Land management practices • <i>Irrigation and water management</i> <ul style="list-style-type: none"> – Irrigation technology

III. USE OF FARM INPUTS AND NATURAL RESOURCES

1. Nutrient use	2. Pesticide use and risks	3. Water
<ul style="list-style-type: none"> • <i>Nitrogen balance</i> • <i>Nitrogen efficiency</i> 	<ul style="list-style-type: none"> • <i>Pesticide use</i> • <i>Pesticide risk</i> 	<ul style="list-style-type: none"> • <i>Water use intensity</i> • <i>Water use efficiency</i> <ul style="list-style-type: none"> – <i>Water use technical efficiency</i> – <i>Water use economic efficiency</i> • <i>Water stress</i>

IV. ENVIRONMENTAL IMPACTS OF AGRICULTURE

1. Soil quality	3. Land conservation	4. Greenhouse gases
<ul style="list-style-type: none"> • <i>Risk of soil erosion by water</i> • <i>Risk of soil erosion by wind</i> 	<ul style="list-style-type: none"> • <i>Water retaining capacity</i> • <i>Off-farm sediment flow (soil retaining capacity)</i> 	<ul style="list-style-type: none"> • <i>Gross agricultural greenhouse gas emissions</i>
<p align="center">2. Water quality</p> <ul style="list-style-type: none"> • <i>Water quality risk indicator</i> • <i>Water quality state indicator</i> 		
5. Biodiversity	6. Wildlife habitats	7. Landscape
<ul style="list-style-type: none"> • <i>Genetic diversity</i> • <i>Species diversity</i> <ul style="list-style-type: none"> – <i>Wild species</i> – <i>Non-native species</i> • <i>Eco-system diversity (see Wildlife Habitats)</i> 	<ul style="list-style-type: none"> • <i>Intensively-farmed agricultural habitats</i> • <i>Semi-natural agricultural habitats</i> • <i>Uncultivated natural habitats</i> • <i>Habitat matrix</i> 	<ul style="list-style-type: none"> • <i>Structure of landscapes</i> <ul style="list-style-type: none"> – <i>Environmental features and land use patterns</i> – <i>Man-made objects (cultural features)</i> • <i>Landscape management</i> • <i>Landscape costs and benefits</i>