ANSI/ASABE S629 JUN2016
Framework to Evaluate the Sustainability of Agricultural Production Systems

American Society of Agricultural and Biological Engineers

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Framework to Evaluate the Sustainability of Agricultural Production Systems

Developed by the ASABE technical committee ASE-16 Engineering for Sustainability. Approved by ASABE and ANSI June 2016.

Keywords: Efficiency, Impact, Management, Metric, Sustainability, Risk Management, Best Management Practice

1 Purpose

This Standard establishes a framework for developing programs to chart progress towards sustainable agricultural production, including defining and benchmarking key performance indicators (KPIs), setting goals, implementing strategies for continuous improvement, and reporting improvements over time. This framework constitutes the minimum criteria for developing and implementing a program for sustainable agriculture. The purpose of this sustainability framework is to provide a process by which key performance indicators may be used to improve sustainability across agricultural production systems. The elements of this framework are critical for uniform, effective, and legitimate implementation of sustainability initiatives across the complex, diverse, and multifaceted landscape of agriculture around the world. The Framework provides explicit guidance on the goal and scope of each element, the process for implementing each element, and the necessary components for each element. As with all ANSI standards, this is a voluntary standard and is not intended to be exclusive.

2 Scope

2.1 This Standard is intended to define frameworks for sustainability documentation of all types of farming operations (which includes ranching) typically found around the world.

2.2 The scope of application for this framework includes producers and processors from cradle to farm or factory gate, across the primary dimensions of sustainability (Social Economic, and Environmental) (Figure 1). These boundaries include the processes on which agricultural producers can exert influence or control over.

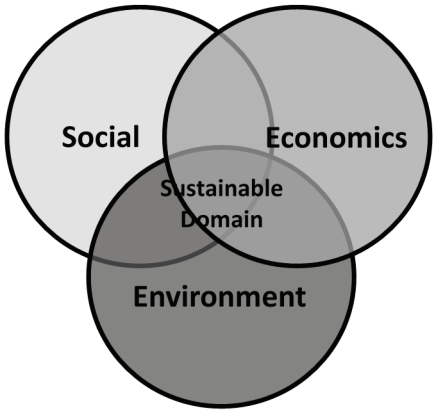

Figure 1 – The three dimensions of sustainability key performance indicators

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2.3 The documentation process described by this standard shall exclude the farm residence, except where it is not practical to separate baseline data.

3 References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies.

ANSI/ASABE S612, Performing On-farm Energy Audits

Field to Market 2012 Environmental and Socioeconomic Indicators Report. http://www.fieldtomarket.org/report/

ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework

Nesheim, M. C., Oria, M., & Yih, P. T. (Eds.). (2015). A framework for assessing effects of the food system. National Academies Press. USDA NRCS whole farm Environmental Audit program's Evaluation Third Party audit

4 Definitions

4.1 Agricultural sustainability: An integrated system of plant and animal production practices having a site-specific application that will, over the long-term (1) satisfy human demand for food, feed, fiber, and fuel from the biosphere; (2) enhance environmental quality and the natural resource base upon which the economy depends; (3) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; (4) sustain the economic viability of farm operations; and (5) enhance the quality of life for farmers and society as a whole (Food, Agriculture, Conservation and Trade Act of 1990, Section 1603, Definitions).

4.2 Agricultural producers: Those enterprises (plural) engaged in growing plants and/or animals for commercial purposes.

4.3 Aspirational goal: A goal that is broad and directionally specific (increase or decrease, for example), but without a specific end point or timeline.

4.4 Benchmark: A level or state of a metric representing performance of an indicator at a specific place or point in time, usually for comparative purposes.

4.5 Dimensions of sustainability: The three primary categories or classes of impacts, processes, metrics, and concerns regarding human endeavors, typically characterized as Social, Economic, and Environmental. Social includes community, political, and cultural dimensions. Economic includes financial, commercial, and transaction dimensions. Environment includes geochemical, biological, ecological, and hydrologic dimensions.

4.6 Efficiency: The amount of output produced for a unit of input (kilogram of grain per liter of water, for example).

4.7 Efficiency Key Performance Indicators: Efficiency KPIs are measurements of the parameters of concern with respect to units of production (yield, area, time).

4.8 Enterprise: An organization or affiliation for a common economic purpose, such as farm or company.

4.9 Farming operation: A discrete enterprise that grows plants and/or animals for commercial purposes.

4.10 Greenhouse gas emissions: Release to the atmosphere of any gas that creates or contributes to creation of the greenhouse effect in Earth's atmosphere, particularly CO_2, CH_4, and N_2O.

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4.11 Impact(s): The outcome(s) of a specific practice or production system on, social, economic, and environmental systems, usually undesirable.

4.12 Impact Key Performance Indicators: Impact KPIs are measurements of outcomes or impacts that result directly or indirectly from activities and processes.

4.13 Key Performance Indicators: Elements that producers and stakeholders can identify, define and measure that are important outcomes of activities. KPIs should be procedural, physical, or otherwise measurable using one or more metrics. KPIs should be outcomes based, science driven, technology neutral, and transparent. The relationship between the KPI and the outcome of concern should be described, and the metrics should represent the outcome as closely as possible.

4.14 Land use transformation: Converting land use (cover, topography) from a non-human dominated purpose (e.g., forest habitat, riparian buffer zone, prairie) to a human-dominated purpose (e.g., pasture, crop lands, urban development, transportation).

4.15 Operational goal: A goal that defines the rate and scope of implementation of practices and other activities to achieve tactical goals.

4.16 Outcomes: The measurable impact or changes in KPIs that occur as a result of an action, including a practice, strategy, or policy.

4.17 Processors: Discrete or classes of enterprises that transform plant and/or animal raw materials into products for commercial purposes.

4.18 Publically available datasets: Publically available data are those that are either collected, vetted, or distributed by public agencies, available for nominal to no fee, for public use. Examples include data collected, vetted and distributed by US Environmental Protection Agency, US Geologic Survey, US Department of Agriculture (specifically National Agricultural Statistics Service and Economic Research Service data), and others.

4.19 Stakeholders: Interested and affected parties engaged in a process for making decisions.

4.20 Strategic goal: A goal that is numerically specific with regards to improvement of a specific outcome, and includes a timeline for achieving the numeric improvement.

4.21 Sustainability strategy: A process for improved decision-making that considers multiple facets of risk and impact across social, economic, and environmental dimensions.

4.22 Tactical goal: A goal that is numerically specific within an enterprise with regards to achieving strategic goals, including a timeline and a range of strategic options for achieving the desired numeric improvement.

5 Framework for Sustainable Agriculture

5.1 This Framework for Sustainable Agriculture is a process for continuous improvement that is similar in format and content to others, but simplified for more effective implementation (see for example Figure S-3 in Nesheim et al., 2015). The simplified framework is composed of three Actions: Define, Plan, and Implement. Each Action includes three elements (Figure 2).

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