Alternative Aviation Jet Fuel Sustainability Evaluation Report

Task 1: Report Evaluating Existing Sustainability Evaluation Programs

Contract No. DTRT57-11-C-10038

Report No. DOT-VNTSC-FAA-12-03

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Washington, DC

Task 1: **Report Evaluating Existing Sustainability Evaluation Programs**

Description: **Letter report summary of existing research and programs in MS Word format**

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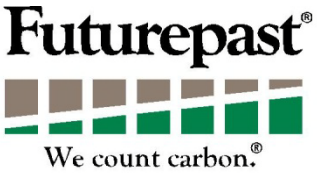

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Introduction

This report describes how existing biofuel sustainability evaluation programs meet requirements that are under consideration or are in early phases of adoption and implementation in various US and international contexts. Biofuel sustainability evaluation programs may be implemented voluntarily, as is the case when an industry alliance agrees to meet specified biofuel sustainability criteria. Biofuel sustainability evaluation may also derive from regulatory requirements, such as those imposed in the United States through the Renewable Fuel Standard 2 (40 CFR Part 80), or those that implement requirements defined in the European Union's Renewable Energy Directive.

Where regulatory requirements exist, two options present themselves to policy makers to ensure that rules are followed. The first option is to rely upon government resources to enforce compliance. This model has been used extensively by the United States Environmental Protection Agency, which manages compliance directly or through delegation to approved state regulators. Either way, enforcement of regulations is a direct responsibility of government officials.[1] The second option for policy makers is to outsource conformity assessment activities to nongovernmental bodies. A model for this approach is quality management assessment in medical device manufacturing. There the US Food and Drug Administration requires the regulated community to obtain and maintain certification to an International Standard, ISO 13485. The accreditation of certification bodies, and the provision of certification services, is largely left to the nongovernmental conformity assessment industry.

From a practical point of view, there is not necessarily a "bright line" that divides voluntary from regulatory approaches to conformity assessment. A regulatory program may recognize the use of standards and protocols that have been developed in the private sector,[2] and may rely upon nongovernmental bodies for accreditation and oversight,[3] while still reserving approval authority and ultimate oversight capability.

The evaluation of biofuel sustainability criteria is an emerging area of public policy interest. A sharp rise in food prices from April 2007 to April 2008 led to a request to the Congressional Budget Office to assess the extent to which the use of ethanol as a transportation fuel was a contributing factor.[4] CBO found that as much as 10-15 percent of the rise in the price of food between April 2007 and April 2008 could

[1] The US EPA relies upon its own officials, or those of delegated state programs, for enforcement of its laws and regulations. Members of the regulated community submit required reports to the agency, and are responsible to it for compliance. Agency personnel conduct on-site inspections to ensure compliance with requirements and issue notices of violation where deficiencies are observed.

[2] In the United States, the National Technology Transfer and Advancement Act of 1996 (Public Law 104-113) encouraged Federal agencies to consider the adoption of voluntary, consensus based standards where these existed and suited the purpose of the rule-making agency.

[3] In Massachusetts, the Department of Environmental Protection has partnered with The Climate Registry (TCR), a nongovernmental organization, for mandatory reporting of greenhouse gas emissions by regulated industry. In turn, TCR requires verification bodies to be accredited by the American National Standards Institute, another nongovernmental organization. In Europe, member states of the European Union, in implementing the Renewable Energy Directive, have likewise recognized voluntary standards and have approved third-party organizations to provide certification services.

[4] "The Impact of Ethanol Use on Food Prices and Greenhouse-Gas Emissions, A CBO Paper" (April 2009), Congress of the United States, Congressional Budget Office.

be attributed to the expanded production of ethanol.[5] The United States was not alone in experiencing rising food prices. Impacts of equal or greater extent around the world raised concerns that expansion of biofuel production might substantially impact food prices, with serious consequences for vulnerable populations, especially in areas of the world already experiencing food insecurity for other reasons.

Criteria for biofuel sustainability

Policy makers generally have recognized three types of sustainability criteria and indicators. These are classified as follows:

- Environmental:
  - Reduced life-cycle greenhouse gas emissions of biofuels compared to the use of fossil fuels;
  - Management of other environmental impacts, such as water scarcity and consumption, soil health, impacts from fertilizer use, depletion of biodiversity, and protection of high value lands for carbon sequestration.
- Social:
  - Respect for human and labor rights, adherence to fair employment practices, provision of safe and healthful working environments;
  - Food security; and
  - Rural economic development.
- Economic:
  - Improved economic and resource utilization;
  - Economic development;
  - Economic viability and competitiveness of biofuel cultivation and production.

As a result of worldwide concern, policy makers agreed to develop criteria that could be adopted by governments. This agreement took the form of the Global Bioenergy Partnership, an initiative administered by the United Nations Food and Agriculture Organization in Rome, Italy. Although this FAO-led work is strictly advisory, the participation of respected scientists and the support of leading governments around the world have made GBEP an influential voice on this subject.

Regulatory and policy approaches to biofuels sustainability and product certification

Regulatory and policy approaches to promote the sustainability of biofuels have been implemented in the United States at the Federal level, and in California at the state level. Regulatory initiatives also exist in Europe.

EISA and the RFS2 in the United States

The Energy Independence and Security Act (EISA) was enacted by Congress and signed into law on 2008-12-19. The purpose of the law was to improve transportation vehicle fuel economy and reduce US dependence on petroleum. EISA included provisions to increase the supply of renewable alternative fuel sources by setting a mandatory Renewable Fuel Standard, which requires transportation fuel sold in the United States shall consist of a minimum of 36 billion gallons of renewable fuels annually by 2022. In

[5] Ibid., p. vii.

addition, the law set the Corporate Average Fuel Economy (CAFE) standard at 35 miles per gallon for passenger cars and light trucks by the year 2020. EISA also included grant programs to encourage the development of cellulosic biofuels, plug-in hybrid electric vehicles, and other emerging electric vehicle technologies. The law was projected to reduce greenhouse gas emissions by 9 percent in 2030.[6]

Section 105 of the law required the US Department of Transportation (US DOT) to develop new rating systems for vehicles that make it easier for consumers to compare fuel economy and other information, including greenhouse gas emissions. As a result, US DOT and US EPA have developed a Fuel Economy and Environment label that will be required for all 2013 model year vehicles.[7]

White House Policy Initiatives

The administration of President Barack Obama has established a Biofuels Interagency Working Group to coordinate US federal agency initiatives on behalf of biofuel development. One recent development is the announcement of a memorandum of understanding (MOU) between the US Navy, the US Department of Energy, and the US Department of Agriculture to assist with the development of a sustainable biofuels industry in the United States. The MOU sets the objective to allocate $510 million over three years to support construction or retrofit of domestic commercial or pre-commercial scale advance drop-in biofuels plants and refineries. The plants would have the following characteristics:

- Capability to produce ready drop-in replacement advanced biofuels meeting military specifications at a price competitive with petroleum;
- Geographically diverse locations for ready market access, and
- No significant impact on the supply of agricultural commodities for the production of food.[8]

Civilian and Military Acquisition Policies

The Energy Policy Act of 2005 provided an initial impetus for acquisition of renewable transportation fuels by civilian and military agencies. Civilian agencies have supported flex fueled vehicles through acquisition rules.[9] Military acquisition is coordinated in large part by the Defense Logistics Agency's Defense Energy Support Center, which purchases biodiesel and small quantities of aviation biofuel.[10]

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[6] Alternative Fuels and Advanced Vehicles Data Center, US Department of Energy, Office of Energy Efficiency and Renewable Energy, "Federal & State Initiatives & Laws," accessed on 2011-08-13 at http://www.afdc.energy.gov/afdc/laws/eisa.

[7] See http://www.epa.gov/otaq/carlabel/gaslabelreadmore.htm, accessed on 2011-08-21 and Daniel P. Mach, "Fuel Economy Labels (EPA, DOT)" in Climate Change, Sustainable Development, and Ecosystems Committee Newsletter, Vol. 14, No. 3, American Bar Association, Section of Environment, Energy and Resources, August 2011, pg. 3.

[8] White House announcement on 2011-08-16, accessed on 2011-08-21 at http://www.whitehouse.gov/the-press-office/2011/08/16/president-obama-announces-major-initiative-spur-biofuels-industry-and-en.

[9] Patrick E. Meyer, citing D. Koplow, *"Biofuels – At What Cost? Government support for ethanol and biodiesel in the United States,"* in "Biofuel Review Part 6: Job Creation and Government Spending," accessed on 2011-08-21 at http://www.todaysengineer.org/2010/Dec/biofuels-pt6.asp.

[10] Department of Defense report to Congress "Energy for the Warfighter: Operational Energy Strategy (2011-03-01), accessed on 2011-08-21 at http://energy.defense.gov/.

Low Carbon Fuel Standard in California

As a consequence of signing into law Assembly Bill 32, the Global Warming Solutions Act, [11] the state of California developed regulations to hasten the deployment of bioenergy. The low carbon fuel standard is one aspect of the state's approach. Its goal is to reduce the overall carbon dioxide intensity of California's fuel pool by 10 percent in 2020.[12] It will achieve this by requiring regulated parties to register with the state and to meet carbon intensity targets for the amounts of fuel produced or imported into California. Exceeding compliance targets earns the regulated party credits; falling short generates a deficit that must be made up in a reconciliation period.

Bioenergy in California

An executive order from 2006 committed California to producing 20 percent of its renewable energy from biomass by 2010 and maintaining that proportion through 2020. It further committed the state to producing 20 percent of its biopower within the state by 2010, rising to 40 percent by 2020 and 75 percent by 2050. To plan for achieving these goals, the state first produced a Bioenergy Action Plan in 2006. In 2011 the Bioenergy Interagency Working Group delivered an updated 2011 Bioenergy Action Plan.[13] This action plan recognizes the critical importance of delivering "sustainable and affordable" supplies of biomass to bioenergy producers. The plan asserts that "the availability of sustainable biomass resources is an area where diverse state and federal rules, laws, and regulatory policies may operate at cross-purposes. Additional research and public outreach is needed by state agencies to define sustainability standards and continue to assess biomass feedstock potential throughout the state."

Renewable Energy Directive in the European Union (EU-RED)

A European Union directive requiring member states to implement renewable fuels regulations was promulgated in April 2009, with a target implementation date of 2011-01-01.[14] The EU-RED has now come into force in a number of European states, including the UK, Germany, Sweden and the Netherlands; other member states are still completing steps for complying with the EU-RED. EU-RED specifies that renewable fuel sold from 2011 should reduce greenhouse gas emissions by at least 35 percent compared with fossil fuels. The percentage of required savings increases to 50 percent from 2017-01-01 and to 60 percent on 2018-01-01 for biofuels sourced from facilities in which production started after 2017-01-01. Like RFS2, EU-RED imposes restrictions on the conversion of agricultural land and forests to biomass cultivation, and categorically excludes feedstock production on lands with high

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[11] Background and link to the legislation accessible from the California Air Resources Board website, at http://www.arb.ca.gov/cc/ab32/ab32.htm.

[12] Low Carbon Fuel Standard, Question and Answer Guidance Document (version 1.0, 2011-06-10), accessed on 2011-08-21 at http://www.arb.ca.gov/fuels/lcfs/LCFS_Guidance_(Final_v.1.0).pdf.

[13] O'Neill, Garry, John Nuffer. 2011. "2011 Bioenergy Action Plan." California Energy Commission, Efficiency and Renewables Division. Publication number: CEC-300-2011-001-CTF, accessed on 2011-08-21 at http://www.energy.ca.gov/2011publications/CEC-300-2011-001/CEC-300-2011-001-CTF.PDF.

[14] Directive 2009/28/EC of the European Parliament and of the Council, of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, accessed on 2011-08-21 at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF.

biodiversity values. EU-RED allows for the use of nongovernmental certification programs to demonstrate conformity with its requirements, and the conformity assessment industry has responded by launching biofuel certification programs in member states.

Description of existing sustainability evaluation programs

Existing biofuel sustainability programs range from voluntary initiatives (e.g. the labeling program of the Sustainable Biodiesel Alliance, see *infra*) to regulatory mandates (RFS2 in the United States; RED in the European Union). Existing programs vary in complexity. The most complex include a combination of verifying compliance with requirements of feedstock providers and production facilities and biofuel product certification relying on chain of custody records throughout the supply chain.

Global Bioenergy Partnership

The Global Bioenergy Partnership (GBEP) is an initiative intended to develop and promote consensus-based indicators for assessing the sustainable production and use of bioenergy for national governments and international institutions. The indicators, which are science-based and voluntary, are "intended to guide analysis of bioenergy at the domestic level with a view to informing decision making and facilitating the sustainable development of bioenergy in a manner consistent with multilateral trade obligations."[15] GBEP's 24 indicators address sustainability in three categories, environmental, social and economic. GBEP intends its work to provide measurements useful for informing national-level policy analysis and development. GBEP sustainability indicators do not feature directions, thresholds or limits and do not constitute a standard; nor are they legally binding on GBEP Partners. GBEP and its Partners now comprise 23 countries and 13 international organizations and institutions: Argentina, Brazil, Canada, China, Colombia, Fiji, France, Germany, Ghana, Italy, Japan, Mauritania, Mexico, Netherlands, Paraguay, Russian Federation, Spain, Sudan, Sweden, Switzerland, Tanzania, United Kingdom, United States of America, Economic Community of West African States (ECOWAS), European Commission, FAO, IDB, IEA, UNCTAD, UN/DESA, UNDP, UNEP, UNIDO, UN Foundation, World Council for Renewable Energy (WCRE) and European Biomass Industry Association (EUBIA). An additional 22 countries and nine international organizations and institutions participate in GBEP as Observers.

A table presenting the GBEP indicators is included in this document as Appendix A.

Roundtable for Sustainable Biofuels

The Roundtable for Sustainable Biofuels (RSB) is an initiative of the Ecole Polytechnique Fédérale de Lausanne in Switzerland. The project has developed a standard and certification system following several years of multistakeholder consultations. Currently at version 2.0, RSB's principles and criteria have been recognized by the European Union as meeting the requirements for certification of biofuels under the EU Renewable Energy Directive. The certification program offered by RSB has recognized numerous certification bodies and is in the process of developing memoranda of understanding with at least one national accreditation body to offer accreditation services and oversight for certification bodies. RSB certified biofuel will likely meet all regulatory program requirements implemented by European and other countries. It is the certification program endorsed by the Sustainable Aviation Fuel

[15] "The Global Bioenergy Partnership Agrees on a Set of Sustainability Indicators for Biofuels," press release (2011-05-24), accessed on 2011-08-21 and available at http://www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/pdf_folder/pressreview_11/GBEP_press_release_sustainability_indicators.pdf.

User's Group for aviation biofuel certification. RSB's Principles and criteria address 12 separate areas of sustainability criteria.

International Sustainability and Carbon Certification

The International Sustainability and Carbon Certification (ISCC) program was established in Germany to meet requirements for renewable energy established under German law. ISCC requires that certification bodies issuing its certificates have a legal presence in Germany; however, the cultivation of feedstock and the provision of certified biomass may take place in any country around the world. Certification bodies established in Germany to issue ISCC certificates are subject to the oversight of the Federal Ministry of Food, Agriculture, and Consumer Protection (BMELV), a regulatory body. ISCC certification of biomass is therefore specifically intended for biomass sold in Germany. A process for mutual recognition of certification programs among several European states has not yet been implemented. The ISCC Sustainability Requirements for the Production of Biomass were published as version 1.15 on 2010-04-19. They include six principles which provide significant overlap with those addressed by RSB.

REDcert

REDcert is a German biomass certification initiative that has taken the approach of issuing certificates for biofuel that meet the minimum requirements of the EU Renewable Energy Directive, with no additional requirements, unless these are required to enable verification of requirements and certification of biofuel.

Renewable Transportation Fuel Obligation Sustainable Biofuel Meta Standard

The Renewable Transportation Fuel Obligation Sustainable Biofuel Meta Standard (RTFO) was developed in the United Kingdom by the Renewable Fuels Agency to meet EU requirements for sustainable biofuels. In the UK, obligated suppliers of road transport fuel are required to produce Renewable Transport Fuel Certificates and to submit annual reports.

Sustainable Biodiesel Alliance

The Sustainable Biodiesel Alliance introduced in August 2011 a labeling scheme for biodiesel fuel that met its Baseline Principles for Sustainability.[16] The label is designed to communicate information to consumers about the level of sustainability of the biodiesel dispensed at the pump through ratings that include Bronze, Silver, Gold and Platinum. SBA is a nonprofit organization based in Austin, TX, and its members emphasize community-based fuel production and distribution. Three SBA member companies have affixed the label to retail pumps in three states, North Carolina, Oregon and Hawaii. The sustainability level of the biodiesel is determined through a numeric ranking process that takes into consideration feedstock type and origin, how the fuel was produced, and how far it traveled to point of sale.

[16] Sustainable Biodiesel Alliance, "Baseline Principles for Sustainability," accessed on 2011-08-21 at http://sustainablebiodieselalliance.com/dev/BPS%20V.1.pdf.

Corporate commitments to certification of sustainable biofuels

The Sustainable Aviation Fuel Users' Group (SAFUG) is a voluntary industry association comprised of twenty-two airline[17] members and four affiliates: Airbus, Boeing, Embraer, and Honeywell UOP (a biofuel refinery equipment provider). SAFUG members have signed a sustainability pledge that commits them to using biofuels deemed sustainable using criteria consistent with criteria developed by the Roundtable on Sustainable Biofuels. The pledge also commits members to encourage the development of government policies which support the development, certification and commercial use of sustainable, low-carbon aviation fuels. In March 2011, Boeing and the École Polytechnique Fédérale de Lausanne announced the creation of the Sustainable Biomass Consortium, a research initiative focused on increasing collaboration between voluntary standards and regulatory requirements for biomass used to create jet fuel and bioenergy for other sectors. Research projects were to commence in April 2011 and the scope of work over the next two years was planned to include projects in China, Africa, the EU, Latin America, North America and Australasia.[18]

Voluntary conformity assessment as an approach to product evaluation

"Conformity assessment," as defined in International Standards, refers to the "demonstration that specified requirements relating to a product, process, system, person or body are fulfilled."[19] The most widely used references in the world for voluntary conformity assessment are standards developed by the International Organization for Standardization (ISO), headquartered in Geneva, Switzerland. ISO is a worldwide federation of national standards bodies (member bodies) founded in 1947 to promote international trade through the adoption of voluntary, consensus-based standards. ISO is strictly a standards development organization. Its work is conducted in 222 technical committees and the Committee on Conformity Assessment.[20] As an organization, ISO does not perform product certification or any other conformity assessment activities. Instead, it publishes standards that are used by certification bodies, verification bodies, testing organizations, and laboratories.

ISO/CASCO and the International Accreditation Forum

Conformity assessment standards are developed and maintained in the ISO Committee on Conformity Assessment (ISO/CASCO). The main users of ISO/CASCO documents are accreditation bodies and the "conformity assessment bodies" they accredit. An accreditation body (AB), which typically is constituted on a national basis, and may be authorized by a national government, is defined as an "authoritative body that performs accreditation."[21] As the name implies, accreditation bodies accredit conformity assessment bodies on the demonstration of a conformity assessment body's adherence to ISO/CASCO and other relevant International Standards. An accreditation body, in other words, "watches the watchman."

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[17] Aero Mexico, Air France, Air New Zealand, Alaska Airlines, ANA, Avianca, British Airways, Cargo Lux, Cathay Pacific, Etihad Airways, Gol Airlines, Gulf Air, JAL, KLM, Lufthansa, Qantas, SAS, TAM, TUI Travel, Virgin America, Virgin Atlantic, and Virgin Australia. List of members downloaded from http://www.safug.org/information/members/ on 2011-08-13.

[18] Article by Jim Lane in Biofuels Digest, 2011-03-23.

[19] ISO 17000:2004, Conformity assessment – Vocabulary and general principles, 2.1. International Organization for Standardization, Geneva, Switzerland.

[20] As of 2011-07-05, ISO had created 265 technical, project, and joint committees and disbanded 42 of them. See www.iso.org /iso/standards_development/technical_committees.htm.

[21] ISO 17000:2004, 2.6.

There is a further level of oversight that has developed since 1993. A nongovernmental organization called the International Accreditation Forum (IAF) accepts national accreditation bodies as members. The IAF helps to limit the variance of its members from a common approach to accreditation decisions in two ways. First, the IAF provides additional guidance to its members on the technical bases for assessing the adherence of national accreditation programs to specific areas of conformity assessment. Second, in many areas of conformity assessment, the IAF facilitates the establishment of multilateral agreements (MLAs) among ABs. The purpose of an MLA is to recognize national AB that have implemented an accreditation program consistent with International Standards and the guidance issued by the IAF. The goal of an MLA, therefore, is to reduce the amount of peer assessment that national ABs would otherwise have to conduct in order to recognize each other as equivalent for any given accreditation program. This helps certification bodies to fulfill the IAF goal of "certified once, accepted everywhere."[22]

ISO/IEC Guide 65:1996

ISO/IEC Guide 65 was developed jointly with the International Electrotechnical Commission (IEC), though it is typically referred to as "ISO Guide 65." The document title is "General requirements for bodies operating product certification systems." The standard is widely used around the world as the basis for operating national product certification programs. The standard defines requirements for operating a certification body, for qualifying certification body personnel, and for the processes the body uses to evaluate and certify products. Some of the provisions in the standard must be imposed by the certification body upon applicants for product certification, such as requiring suppliers to agree to comply with the certification program rules, and setting parameters for how suppliers make claims based on their product certifications.

Other standards supporting product certification

ISO Technical Committee 207, Environmental management and tools, has developed a suite of standards relevant to the certification of the environmental attributes of products. The best known of these are frequently described as the "ISO 14020 series of standards" or the "environmental labeling" standards. The series includes four documents, ISO 14020:2000, Environmental labels and declarations – General principles; ISO 14021:1999, Environmental labels and declarations – Self-declared environmental claims (Type II environmental labeling), ISO 14024:1999, Environmental labels and declarations – Type I environmental labeling – Principles and procedures; and ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO 14020. ISO 14020, Environmental labels and declarations – General principles, sets forth nine principles applicable to all environmental labels and declarations. The principles support the notion that environmental labels should be accurate, verifiable, relevant and not misleading, that information supporting a claim or declaration should be available upon request to interested parties, and that environmental labeling information should be based on life cycle assessment. Other principles emphasize that environmental labeling is not intended to be a barrier to trade or inhibit innovation. Administrative requirements for labeling programs should be limited to the necessary minimum and subject to stakeholder consultation. Finally, information about environmental aspects of products or services relevant to an environmental label or declaration should be available to purchasers and prospective purchasers of products.

[22] IAF brochure "Certified Once, Accepted Everywhere," downloaded on 2011-07-05 from http://www.iaf.nu/.

ISO 14021. ISO 14021, Environmental labels and declarations – Self-declared environmental claims (Type II environmental labeling), as its title implies, was written to define requirements for organizations wishing to make claims about their products and to declare that the claim made conformed to the International Standard. In the United States the Federal Trade Commission, through its enforcement of the Federal Trade Commission Act, has legal authority to pursue organizations that make false or deceptive environmental claims. One of the chief tools that the FTC uses is its "Green Guides," which provide guidance to organizations who make environmental claims. The Green Guides are consistent with ISO 14021 in many respects although they are do not follow the International Standard's language exactly. Both ISO 14021 and the Green Guides have been recently revised. In December 2010 the FTC published a long-awaited revision of their document. In 2011 at mid year, ISO Technical Committee 207 was nearing the approval of an amendment to ISO 14021:1999.

ISO 14024. ISO 14024, Environmental labels and declarations – Type I environmental labeling – Principles and procedures, defines requirements for programs that certify products as meeting certain threshold environmental criteria, and confer a label along with that certification. More specifically, a Type I environmental labeling program is a "voluntary, multiple criteria-based third party programme that awards a license which authorizes the use of environmental labels on products indicating overall environmental preferability of a product within a particular product category based on life cycle considerations."[23] In the United States, a program that offers type I labels is Green Seal. Their logo can be found on household products, construction equipment and materials, paints and coatings, printing and writing paper, hotels and lodging properties, and several other product and service categories. The Sustainable Biodiesel Alliance label reproduced above is another example of a Type I label. Type I labeling programs also are offered by program operators in other countries and regions around the world.

ISO 14025. ISO 14025, Environmental labels and declarations – Type III environmental declarations – Principles and procedures, defines requirements for programs that authorize labeling of products with environmental information taken from standardized sets of "product category rules." Specifically, the standard defines a Type III environmental declaration as "an environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information."[24] This type of labeling has been compared to nutritional labels typically found on packages of processed food. A Type III environmental label describes the performance of the product in terms of life-cycle environmental impact information. So, instead of reading about calories, principal ingredients, vitamins and minerals, a Type III environmental label discloses data from life cycle inventory analysis of the product, such as the consumption of resources, including energy, water and renewable resources, and emissions to air, water and soil. The label may also disclose indicator results of the life cycle impact assessment, such as on climate change, depletion of ozone depleting substances, or depletion of fossil energy resources or mineral resources. Finally, the label may also disclose other data such as quantities and types of waste produced. A key to controlling the amount of information, and therefore resources expended to create the label, is "product category rules," which provide guidance on what predetermined parameters should be included in the declaration, rules on additional environmental information, and requirements for reporting. Although it was not developed in conformity with ISO 14025, the new US EPA/DOT fuel economy label that will be required for all 2013 model cars sold in the United States is similar in features to a Type III environmental label.

[23] ISO 14024:1999, 3.1. Definition of "Type I environmental labeling programme."
[24] ISO 14025, 3.2. Definition of "Type III environmental declaration."

ISO/CD3 14067. ISO Technical Committee 207 has included in its work program the development of an International Standard on the Carbon Footprint of Products. In mid 2011 the standard was at the third committee draft stage of development. It was anticipated to be balloted as a Draft International Standard in early 2012 and to be published in final form by late 2012 or early 2013. ISO/CD3 14067 specified quantification requirements for creating a carbon footprint or partial carbon footprint of a product. It drew heavily on the principles and practices of life cycle assessment as these are defined in ISO 14040:2006 and ISO 14044:2006. The draft standard also included a clause on communication of carbon footprint of products that defined requirements for verification when the carbon footprint of products was intended to be made publicly available. Many of the communication requirements were inspired by published ISO environmental labeling standards.

ISO/WD 13065. Project Committee 248 was created by the Technical Management Board of ISO to develop a new work item entitled "Sustainability criteria for bioenergy." In mid 2011 the Project Committee had developed a Working Draft—the first stage of ISO's multistage document development process. PC 248 had organized working groups in the following areas: Cross-cutting issues, including definitions and verification; Greenhouse gas quantification; Environmental, social and economic issues (except greenhouse gas quantification); and Indirect effects. Publication of a standard is not likely before 2013.

CEN Technical Committee 383. The European Committee for Standardization (CEN) is developing a European Standard, Sustainably produced biomass for energy applications, prEN 16214 in four parts: Terminology (part 1), Conformity assessment including chain of custody and mass balance (part 2), Biodiversity and environmental aspects (part 3), and Calculation methods of the greenhouse gas emission balance using a life cycle analysis (part 4). In addition, the committee is also developing Guidance towards definition of residue via a positive list. Part 1 is expected to be published in October 2012. The other parts are expected to be published in March 2013. The guidance document is scheduled for publication in March 2012.

The Conformity Assessment Industry

The sole mission of ISO is to publish standards. ISO itself does not engage in third-party certification or verification. Instead, the standards ISO publishes enable a conformity assessment industry to meet market demand for certification of products, of management systems, and persons. ISO standards also enable third-party providers to verify assertions, claims, and declarations. It is the third-party providers of certification and verification services that constitute a robust conformity assessment industry that operates in countries around the globe.

Many third-party conformity assessment bodies are international in scope and operations. Many have evolved from early beginnings as assessors of the seaworthiness of ships. In this category are the Norwegian firm Det Norske Veritas (DNV), Lloyds Register in the United Kingdom, and the American Bureau of Shipping (ABS). Other prominent names in the industry include SGS (Switzerland), Bureau Veritas (France), and TŰF SŰD (Germany), all of whom have international operations. The conformity assessment industry is not, however, limited to a small number of large international firms. Hundreds of small conformity assessment bodies operate around the world, often with relatively small customer bases. In the United States alone, the accreditation body ANAB (the initials derive from "ANSI-ASQ National Accreditation Board) has accredited 73 certification bodies for the sole market of certifying management systems. This number includes not only large international firms with thousands of clients, but also smaller firms serving only a few dozen customers. The American National Standards Institute

(ANSI) has accredited 58 product certification bodies and 25 greenhouse gas validation and verification bodies. These are but two types of accreditation offered by ANSI in the United States.

In short, the conformity assessment industry is a vibrant industry, conducting hundreds of thousands of audits per year around the globe, with a few dozen very large firms in different industry niches competing for business with hundreds of smaller national or regional, and even boutique firms. At the center of this conformity assessment activity are ISO standards, with management system certification, especially to ISO's flagship 9001 quality management standard, responsible for the largest number of certificates issued to organizations. Other widely adopted certification programs include ISO 14001 for environmental management system certification, and a plethora of sector-specific management system standards in such areas as food safety, automotive and aerospace quality management, and medical device manufacturing. Management system certification, product certification and laboratory certification easily comprise the largest segments of the conformity assessment market. Greenhouse gas validation and verification, sustainability certification, and social accountability certification represent much smaller segments.

Wherever a demand exists for certification, the conformity assessment industry has shown a readiness to respond. In the biofuel sector, certification bodies have not hesitated to offer services to certify biofuels and the economic partners in the biofuel supply chain. Examples include the Roundtable for Sustainable Biofuels' standard and national regulatory programs offered to meet compliance requirements in the European Union's Renewal Energy Directive. As is typical for emerging fields, standards and certification often precede the publication of an International Standard and early entrants in the conformity assessment business may obtain "recognition" from the developer of an emerging standard while accreditation bodies decide whether to enter the market. Moreover, as an alternative to accreditation by national bodies, governments may independently establish their own or hybrid processes for recognition of certification/verification bodies. Such is the case with the California Air Resources Board's regulation for mandatory reporting of greenhouse gas emissions and the EU's Renewable Energy Directive.

Conclusion

Policy makers and regulators interested in evaluation criteria for sustainability of biofuels have many existing approaches in the forms of standards and protocols to draw inspiration from. In addition, they have options with respect to establishing means for ensuring compliance with standards. Options include a regulatory approach, the mandated use of standards and conformity assessment mechanisms that are operated by the conformity assessment industry, and a hybrid approach.

The GBEP sustainability indicators announced in May 2011 are broadly consistent with early-to-market standards such as the principles and criteria published by the Roundtable for Sustainable Biofuels. This suggests that a global consensus is emerging on evaluation criteria for the biofuels sector. While the various standards and protocols vary in some details, and in the extent to which they assess sustainability, in the final analysis they are more consistent with each other than discordant.

Key policy choices to make, apart from the sustainability criteria themselves, are related to methods for verification of claims of sustainability along the supply chain and certification of biofuel as a product and its labeling.

Appendix A: Global Bioenergy Partnership Sustainability Indicators

In May 2011 the GBEP endorsed a set of principles and indicators developed by its Task Force on Sustainability. A summary table of pillars, themes and indicators follows.

PILLARS GBEP's work on sustainability indicators was developed under the following three pillars, noting interlinkages between them:		
ENVIRONMENTAL	**SOCIAL**	**ECONOMIC**
THEMES GBEP considers the following themes relevant, and these guided the development of indicators under this pillar:		
Greenhouse gas emissions, Productive capacity of the land and ecosystems, Air quality, Water availability, use efficiency and quality, Biological diversity, Land-use change, including indirect effects.	Price and supply of a national food basket, Access to land, water and other natural resources, Labour conditions, Rural and social development, Access to energy, Human health and safety.	Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use, Economic development, Economic viability and competitiveness of bioenergy, Access to technology and technological capabilities, Energy security/Diversification of sources and supply, Energy security/Infrastructure and logistics for distribution and use.
INDICATORS		
1. Life-cycle GHG emissions	9. Allocation and tenure of land for new bioenergy production	17. Productivity
2. Soil quality	10. Price and supply of a national food basket	18. Net energy balance
3. Harvest levels of wood resources	11. Change in income	19. Gross value added
4. Emissions of non-GHG air pollutants, including air toxics	12. Jobs in the bioenergy sector	20. Change in consumption of fossil fuels and traditional use of biomass
5. Water use and efficiency	13. Change in unpaid time spent by women and children collecting biomass	21. Training and re-qualification of the workforce
6. Water quality	14. Bioenergy used to expand access to modern energy services	22. Energy diversity
7. Biological diversity in the landscape	15. Change in mortality and burden of disease attributable to indoor smoke	23. Infrastructure and logistics for distribution of bioenergy
8. Land use and land-use change related to bioenergy feedstock	16. Incidence of occupational injury, illness and fatalities	24. Capacity and flexibility of use of bioenergy

production		

The indicators are described in more detail in the following table.

ENVIRONMENTAL PILLAR	
THEMES GBEP considers the following themes relevant, and these guided the development of indicators under this pillar: Greenhouse gas emissions, Productive capacity of the land and ecosystems, Air quality, Water availability, use efficiency and quality, Biological diversity, Land-use change, including indirect effects.	
INDICATOR NAME	**INDICATOR DESCRIPTION**
1. Lifecycle GHG emissions	Lifecycle greenhouse gas emissions from bioenergy production and use, as per the methodology chosen nationally or at community level, and reported using the GBEP Common Methodological Framework for GHG Lifecycle Analysis of Bioenergy 'Version One'
2. Soil quality	Percentage of land for which soil quality, in particular in terms of soil organic carbon, is maintained or improved out of total land on which bioenergy feedstock is cultivated or harvested
3. Harvest levels of wood resources	Annual harvest of wood resources by volume and as a percentage of net growth or sustained yield, and the percentage of the annual harvest used for bioenergy
4. Emissions of non-GHG air pollutants, including air toxics	Emissions of non-GHG air pollutants, including air toxics, from bioenergy feedstock production, processing, transport of feedstocks, intermediate products and end products, and use; and in comparison with other energy sources
5. Water use and efficiency	● Water withdrawn from nationally-determined watershed(s) for the production and processing of bioenergy feedstocks, expressed as the percentage of total actual renewable water resources (TARWR) and as the percentage of total annual water withdrawals (TAWW), disaggregated into renewable and non-renewable water sources ● Volume of water withdrawn from nationally-determined watershed(s) used for the production and processing of bioenergy feedstocks per unit of useful bioenergy output, disaggregated into renewable and non-renewable water sources
6. Water quality	● Pollutant loadings to waterways and bodies of water attributable to fertilizer and pesticide application for bioenergy feedstock cultivation, and expressed as a percentage of pollutant loadings from total agricultural production in the watershed ● Pollutant loadings to waterways and bodies of water attributable to bioenergy processing effluents, and expressed as a percentage of pollutant loadings from total agricultural processing effluents in the watershed
7. Biological diversity in the landscape	● Area and percentage of nationally recognized areas of high biodiversity value or critical ecosystems converted to bioenergy production ● Area and percentage of the land used for bioenergy production where nationally recognized invasive species, by risk category, are cultivated ● Area and percentage of the land used for bioenergy production where nationally recognized conservation methods are used
8. Land use and land-use change related to bioenergy feedstock production	● Total area of land for bioenergy feedstock production, and as compared to total national surface and agricultural and managed forest land area ● Percentages of bioenergy from yield increases, residues, wastes and degraded or contaminated land ● Net annual rates of conversion between land-use types caused directly by bioenergy feedstock production, including the following (amongst others): o arable land and permanent crops, permanent meadows and pastures, and managed

	forests; o natural forests and grasslands (including savannah, excluding natural permanent meadows and pastures), peatlands, and wetlands

SOCIAL PILLAR	
THEMES GBEP considers the following themes relevant, and these guided the development of indicators under this pillar: Price and supply of a national food basket, Access to land, water and other natural resources, Labour conditions, Rural and social development, Access to energy, Human health and safety	
INDICATOR NAME	INDICATOR DESCRIPTION
9. Allocation and tenure of land for new bioenergy production	Percentage of land – total and by land-use type – used for new bioenergy production where: ▪ a legal instrument or domestic authority establishes title and procedures for change of title; and ▪ the current domestic legal system and/or socially accepted practices provide due process and the established procedures are followed for determining legal title
10. Price and supply of a national food basket	Effects of bioenergy use and domestic production on the price and supply of a food basket, which is a nationally-defined collection of representative foodstuffs, including main staple crops, measured at the national, regional, and/or household level, taking into consideration:
11. Change in income	Contribution of the following to change in income due to bioenergy production: ▪ wages paid for employment in the bioenergy sector in relation to comparable sectors ▪ net income from the sale, barter and/or own-consumption of bioenergy products, including feedstocks, by self-employed households/individuals
12. Jobs in the bioenergy sector	● Net job creation as a result of bioenergy production and use, total and disaggregated (if possible) as follows: o `skilled/unskilled` o `temporary/indefinite` ● Total number of jobs in the bioenergy sector and percentage adhering to nationally recognized labour standards consistent with the principles enumerated in the ILO Declaration on Fundamental Principles and Rights at Work, in relation to comparable sectors
13. Change in unpaid time spent by women and children collecting biomass	Change in average unpaid time spent by women and children collecting biomass as a result of switching from traditional use of biomass to modern bioenergy services
14. Bioenergy used to expand access to modern energy services	● Total amount and percentage of increased access to modern energy services gained through modern bioenergy (disaggregated by bioenergy type), measured in terms of energy and numbers of households and businesses ● Total number and percentage of households and businesses using bioenergy, disaggregated into modern bioenergy and traditional use of biomass
15. Change in mortality and burden of disease attributable to indoor smoke	Change in mortality and burden of disease attributable to indoor smoke from solid fuel use, and changes in these as a result of the increased deployment of modern bioenergy services, including improved biomass-based cookstoves
16. Incidence of occupational injury, illness and fatalities	Incidences of occupational injury, illness and fatalities in the production of bioenergy in relation to comparable sectors

ECONOMIC PILLAR	
THEMES GBEP considers the following themes relevant, and these guided the development of indicators under this pillar: Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use, Economic development, Economic viability and competitiveness of bioenergy, Access to technology and technological capabilities, Energy security/Diversification of sources and supply, Energy security/Infrastructure and logistics for distribution and use	
INDICATOR NAME	INDICATOR DESCRIPTION
17. Productivity new bioenergy production	● Productivity of bioenergy feedstocks by feedstock or by farm/plantation ● Processing efficiencies by technology and feedstock ● Amount of bioenergy end product by mass, volume or energy content per hectare per year ● Production cost per unit of bioenergy
18. Net energy balance	Energy ratio of the bioenergy value chain with comparison with other energy sources, including energy ratios of feedstock production, processing of feedstock into bioenergy, bioenergy use; and/or lifecycle analysis
19. Gross value added	Gross value added per unit of bioenergy produced and as a percentage of gross domestic product
20. Change in the consumption of fossil fuels and traditional use of biomass	● Substitution of fossil fuels with domestic bioenergy measured by energy content and in annual savings of convertible currency from reduced purchases of fossil fuels ● Substitution of traditional use of biomass with modern domestic bioenergy measured by energy content
21. Training and re-qualification of the workforce	Percentage of trained workers in the bioenergy sector out of total bioenergy workforce, and percentage of re-qualified workers out of the total number of jobs lost in the bioenergy sector
22. Energy diversity	Change in diversity of total primary energy supply due to bioenergy
23. Infrastructure and logistics for distribution of bioenergy	Number and capacity of routes for critical distribution systems, along with an assessment of the proportion of the bioenergy associated with each
24. Capacity and flexibility of use of bioenergy	▪ Ratio of capacity for using bioenergy compared with actual use for each significant utilization route ▪ Ratio of flexible capacity which can use either bioenergy or other fuel sources to total capacity

Appendix B: EU-RED Sustainability Requirements Compared to RFS2

Sustainability Criterion	EU RED	RFS2
Biofuels regulatory compliance	√	√
GHG emissions savings of at least 35 percent	√	
Conversion of forestland not allowed	√	√
Conversion of agricultural land not allowed		√
Natural/other grasslands excluded	√	
Land with high stocks of carbon excluded	√	
Wetlands excluded	√	*
Peatlands excluded	√	
Production on EU ag lands meets EU standards	√	
* Other legal requirements (e.g. § 404 of the Clean Water Act) may apply		

Sustainability Criterion	EU RED	RFS2
IUCN protected or ecologically sensitive lands protected	√	√
Supply chain operators meet legal requirements and standards for air, water and soil protection	√	
Operators demonstrate sustainability compliance	√	√
Sustainability criteria applied in Third Countries	√	√
Classified domestic ag lands deemed compliant	√	√
Mass-balance approach for mixed biofuels	√	√
Independent verification required	√	√
All batches in blend must meet min. GHG 35 percent reduction	√	

Appendix C: Sustainability Criteria of Three Protocols Compared

Sustainability Criteria	RSB	ISCC	REDcert
Comply with laws and regulations	√	√	√
Engage in stakeholder consultation	√		
Meet GHG threshold requirements	√	√	√
Uphold labor rights	√	√	*
Provide for rural & social development	√		
Ensure local food security	√	√	
Conserve land, species & ecosystems	√	√	√
Protect and enhance soil	√	√	*
Conserve and protect water resources	√	√	*
Meet standards for air emissions	√	√	*

Sustainability Criteria	RSB	ISCC	REDcert
Use technologies (GMO, fertilizers) safely	√	√	*
Manage wastes properly	√	√	*
Respect land rights	√	√	
* Compliance with these sustainability requirements may be covered by German law			