



## The many faces of biofuel sustainability

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### Introduction

Biofuels were the most important source of energy for *Homo sapiens* since our species first evolved, with biomass burning for cooking, heating, and other purposes. With the growth of fossil fuels at the beginning of the Industrial Revolution, this traditional use of biomass for energy faded in importance for newly industrializing countries. When biomass returned to the global energy mix in 2004 in the form of liquid fuels, primarily in response to climate change, they were seen by some as a way to produce energy while also storing carbon, a replacement for increasingly expensive oil as well as finding a use for the agricultural over-production facing much of Europe and North America. The Brazilian success in using sugarcane to produce bioethanol and significantly incorporate it in their domestic energy system was seen as an inspiration that could be widely replicated. However, this policy push happened quicker than science could keep up. In the rush to promote more sustainable biofuels, two main approaches have developed: penalties/bonuses/subsidies; and standards, either voluntary or compulsory. Both of these have their strengths and weaknesses.

### What is sustainability?

One of the first sustainability impacts to be associated with biofuel policies and production was the exacerbation of deforestation in tropical forest areas. The habitats of a range of species, including the highly endangered orangutans that occupied forests in Sumatra and Borneo, was already being converted to oil palm for a range of markets, and increasingly for biodiesel. Subsequent research evaluating the GHG reduction of different biofuel feedstock and production methods questioned the validity of claims that biofuels always reduced GHG emissions. In some cases, emissions were much higher than some fossil fuels. Then, accompanied by extensive droughts, increases in the price of oil and its associated agricultural outputs, biofuel demand helped to drive food prices even higher; the FAO estimated 30% of the increases to have resulted from biofuel demand from biomass that otherwise might have been used for food. The food versus fuel debate highlighted one of the “indirect effects” of biofuel production. Another more recent issue to emerge is indirect land use change, through the displacement of people (sometimes forcibly) and their associated impacts on biodiversity and greenhouse gas emissions.

In short, sustainability can be considered along the “triple bottom line” of environment (including GHG emissions), social and economic factors. Both policies and initiatives have been developed to respond to these in different ways: for example the US government is focusing on GHG emissions, energy security, and indirect impacts, while the European Commission goes further to include some biodiversity concerns, but not social issues or the environment more broadly. Civil society has stepped up and established multiple-stakeholder-led roundtables, which were designed to consider a broader sweep of sustainability concerns.

## **A multi-stakeholder approach**

Traditional bioenergy sources include wood and dung (widely used in much of south Asia). Biofuels are currently made from a wide range of different food crops, including corn and sugar for bioethanol, and soy and palm oil for biodiesel. Roundtables for soy (Roundtable on Responsible Soy (RTRS)) and palm oil (Roundtable on Sustainable Palm Oil (RSPO)) were already under development even before substantial biofuel markets were established due to the increasingly visible environmental and social impacts of their respective commodities. Similarly the Better Sugarcane Initiative (BSI) had just started. However, corn and other feedstocks including sorghum and jatropha, as well future potential feedstocks, did not have specific roundtables.

In response to these broader concerns, the Roundtable on Sustainable Biofuels<sup>i</sup> was launched in 2007 at the EPFL (Swiss Federal Institute of Technology) as a truly multi-stakeholder initiative with members including environmental organisations such as UNEP, WWF, FAO and IUCN; companies such as Boeing, BP and Shell; and research institutes such as TERI, Berkeley and Imperial. RSB also collaborates with several governments and inter-governmental initiatives.

Taking a “meta-standard” approach and building on the work of the existing roundtables above (as well as the Forest Stewardship Council<sup>ii</sup>) the RSB established several working groups to address concerns around social, environmental and greenhouse gases emissions. Following numerous meetings, conference calls, and email consultations over a period of about two years involving over 900 institutions and individuals, the Steering Board agreed to “Version 1.0” of the standards in November 2009.

The current **Version 1.0** of the **RSB Standard** is structured around 12 principles (see <http://cgse.epfl.ch/page84341.html> for further details):

- Principle 1: Legality
- Principle 2: Planning, Monitoring and Continuous Improvement
- Principle 3: Greenhouse Gas Emissions
- Principle 4: Human and Labour Rights
- Principle 5: Rural and Social Development
- Principle 6: Local Food Security
- Principle 7: Conservation
- Principle 8: Soil
- Principle 9: Water
- Principle 10: Air
- Principle 11: Use of Technology, Inputs, and Management of Waste
- Principle 12: Land Rights

It is the only Standard covering the entire value chain, from farm to the end-user. The Standard also applies to all feedstock and all regions in the world, though it can be adapted locally, such as the case in New South Wales (Australia).

The RSB standards are designed to provide guidance to feedstock producers, feedstock processors, biofuel producers, and distributors/blenders. It is composed of many documents, including Principles & Criteria (binding requirements for operators), Compliance Indicators (used by auditors to verify compliance of operators), and Guidelines and Standards for implementation.

For practical reasons, the Standard currently covers only direct impacts, though a working group on indirect effects has been established. In the meantime, the approach to greenhouse gas emission reduction includes a two-track approach: comply with regulations on operating markets; and comply with RSB methodology and thresholds. Minimum requirements and progress requirements are also recommended, though of course these are voluntary, as the RSB has no powers of enforcement.

### **Looking ahead**

Many challenges remain. Perhaps the most important is exactly *how* to implement more sustainable biofuels. This challenge will undoubtedly have numerous responses, depending on the biofuel. Cellulosic and algae based biofuels, for example, will pose quite different challenges than the first generation biofuels that directly competes with food.

RSB Version One will be revised in November 2010 based on feedback obtained from field testing with 10-15 pilot projects and expert discussions, particularly on indirect effects. A decision will then be taken whether to implement a certification system, based on version 2.0, with certification of sustainable biofuels hopefully possible by early 2011.

More broadly, as food, feed, fiber, fuel and even chemical markets merge in the future, biofuel sustainability policies should be expanded into broader sustainable agricultural policies and practices. However, the ultimate question remains whether enough biomass can be produced in the future and production systems designed in an intelligent way to support multiple societal aims, including that of nature conservation.

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<sup>i</sup> The RSB membership is open to all stakeholders with an activity related to biofuels. For more information, please write to [rsb@epfl.ch](mailto:rsb@epfl.ch).

<sup>ii</sup> Second generation biofuels which harness the energy contained within cellulose mean that forest biomass is likely to become a feedstock too. This brings into question how biofuels and climate change are likely to relate to sustainability. At the Copenhagen Conference of Parties of the UN Framework Convention on Climate Change, governments were broadly supportive of an initiative known as REDD+, Reduced Emissions from Deforestation and forest Degradation, but with a biodiversity conservation component attached as well. Relatively little attention was given to the biofuel issue when REDD+ was being discussed. The Forestry Stewardship Council, is not currently directly relevant for biofuel production, but its practices are valid for future advanced biofuel production made from lignin materials such as wood. As the debate moves to solid biomass for heating and electricity production, the FSC guidelines will become more relevant to the discussion on sustainability.