



GHG Accounting in the RSB Standard



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Forestry, Agriculture, and Climate Change:
Modeling to Support Policy Analysis Sept 26-29,
2011



What Biofuels are Expected to Deliver



Economic Development
Employment

Climate Change
Mitigation



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Energy Security



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What Biofuels Might also Cause



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**Increased deforestation
and loss of ecosystems**

Increased GHG



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Pollution



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**Increased conflicts over land and
resources**

Trade Offs -

- Rural Development/Poverty Reduction - requires protection of small producers

vs

- Significant Fuel Substitution - requires massive incentives for large scale producers

- High Production Per Acre - Requires Use of Good Farm Land, Water, Fossil Fuel Fertilizers

vs

- Reduction of GHG, Food / Fuel Competition - Requires use of Marginal Land/Wastes/Low inputs.

Biofuels – the New Kid on the Block

- In the spotlight for land use pressure
- Adds to the impossible Rubik's cube:
 - Agriculture expansion for export commodities is greatest cause of deforestation, resulting in high GHG emissions
 - Population growth to over 10 Billion will need MORE
 - Climate change will challenge current production
 - And now here comes – not just liquid biofuels – but also ramped up biomass for power
- All putting pressure on forests and all other ecosystems

photo by Genocide Intervention Network



Image by: Aidenvironment, Flickr



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Biofuels – The Land Pressure is Real

- Energy Information Administration projects tripling of biofuels production from 2007 to 2035
- Ecofys estimates the land area needed by 2050 for renewable energy scenarios:



- 250 million hectares of agricultural land (about 1/6 of global cropland) for biofuels
- Plus 4.5 billion cubic meters of biomass for power from already disturbed forests
- Assumes meat consumption by wealthy cut in half, and the poor increase meat by no more than 25% from today
- Assumes increase in intensively managed forests and agricultural yields



Any Land Use is in Competition with All Other Land Use

- All land uses are expanding, not just bioenergy:
 - Pasture and crop land, cities and suburbs, factories and mines, shopping malls, highways, sports arenas...
- Providing resources for future populations should use essentially the current land base – freezing the human footprint in place:
 - That means intentional land use planning – using land for what it's most suited for!
 - Responsible Cultivation Areas concept for agricultural expansion.
 - In particular, bioenergy should only be produced without conversion of forests and other ecosystems.

Indirect Impacts of Biofuel Production

- Indirect impacts occur when any “provisioning service” (e.g. food, fiber, feed or other harvestable goods such as firewood, pasture, etc.) is diverted to a new use, leaving a “gap” for that product in the global market , which can cause short-term price increases. ^{1/}
- 1/ Summary: Indirect Impacts and the RSB, Sept. 2011.

Indirect Impacts of Biofuel Production

- There are 3 main ways to close this gap:
 - Converting additional land to production (extensification)
 - Increasing yield and/or efficiency increases (intensification and new technology);
 - Demand might decrease due to the price increase, depending on the price elasticity of the product.

Indirect Land Use Change (ILUC)

Few « Escapes » from the ILUC Box.

- Wastes and residues that need disposal
- Restoration of depleted land through biofuels
- Multiple products from the same land area
- Higher yields from crops and dedicated biofuel lands
- Innovative technologies to use less land (algae, etc.)

So What is to be Done?



Option – Law and Policy

- **US EPA – ILUC Factors for each Feedstock**
- **California – Considering ILUC Factors**
- **EU – Considering Other Options:**
 - **Raising minimum GHG saving threshold**
 - **Introducing new sustainability requirements**
 - **Introducing ILUC Factors**
 - **Delay action / Monitor impacts**

Option – Voluntary Certification

- **Commodity Specific Roundtables (Soy, Palm Oil, Sugarcane, Timber/paper) – not yet considering solutions.**
- **Roundtable on Sustainable Biofuels (RSB) – Expert Group debating appropriate responses.**



Addressing Indirect Impacts in the RSB

Add “Module” for Low Indirect Impact Biofuels:

- Could be mandatory or optional
- Use measures to increase yield
- Use co-products and residues to increase the system efficiency
- Reduce Land Requirements – use feedstock
 - From degraded/unused land/restore productivity
 - Grown on non-arable land without displacing existing provisioning services (e.g., certain algae)
 - From residues (to sustainable levels of removals) and end-of-life products (wastes without alternative uses).

Addressing Indirect Impacts in the RSB, cont'd.

- Use ILUC “Factor” in the GHG Calculation:
 - ILUC per volume of production
 - ILUC per hectare of land used
- Address Indirect Impacts in the RSB Standard for Risk Management
- Contribute to other operators’ increased yields or efficiency
- Indirect Impacts Fund – to facilitate investments in agricultural productivity gains in developing countries.

Sustainability and Biofuels: The RSB Standard

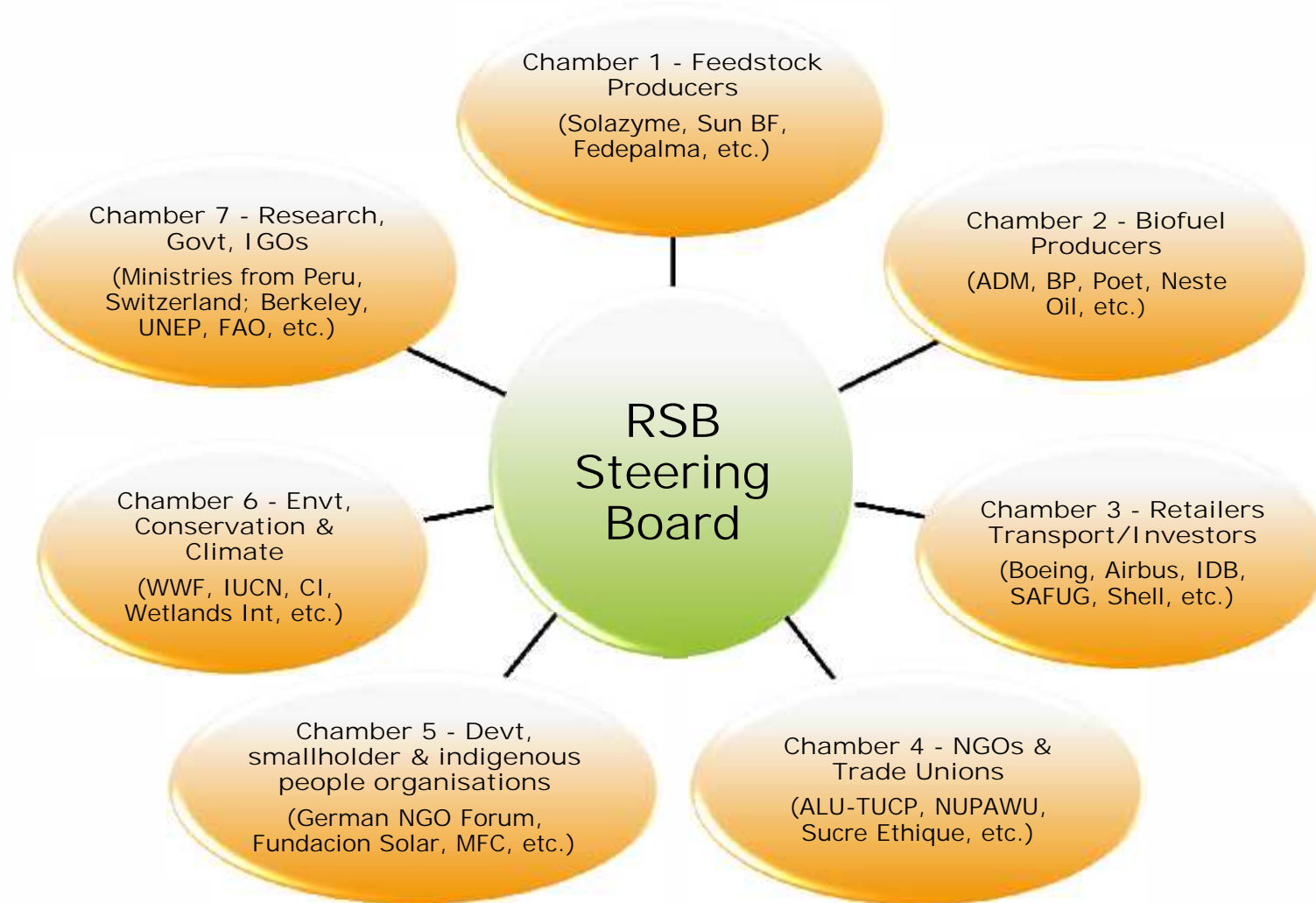
Global, voluntary, multi-stakeholder standard on sustainability and biofuels – Certification System now open

- Enables producers and purchasers to **differentiate** better biofuels
- **Covers entire supply chain**
- **Covers all feedstocks and biofuels**
- **“Benchmarking”**: working with other standards & regulations
- **Fulfills “market access standards”** for specific regulated markets, i.e. EU

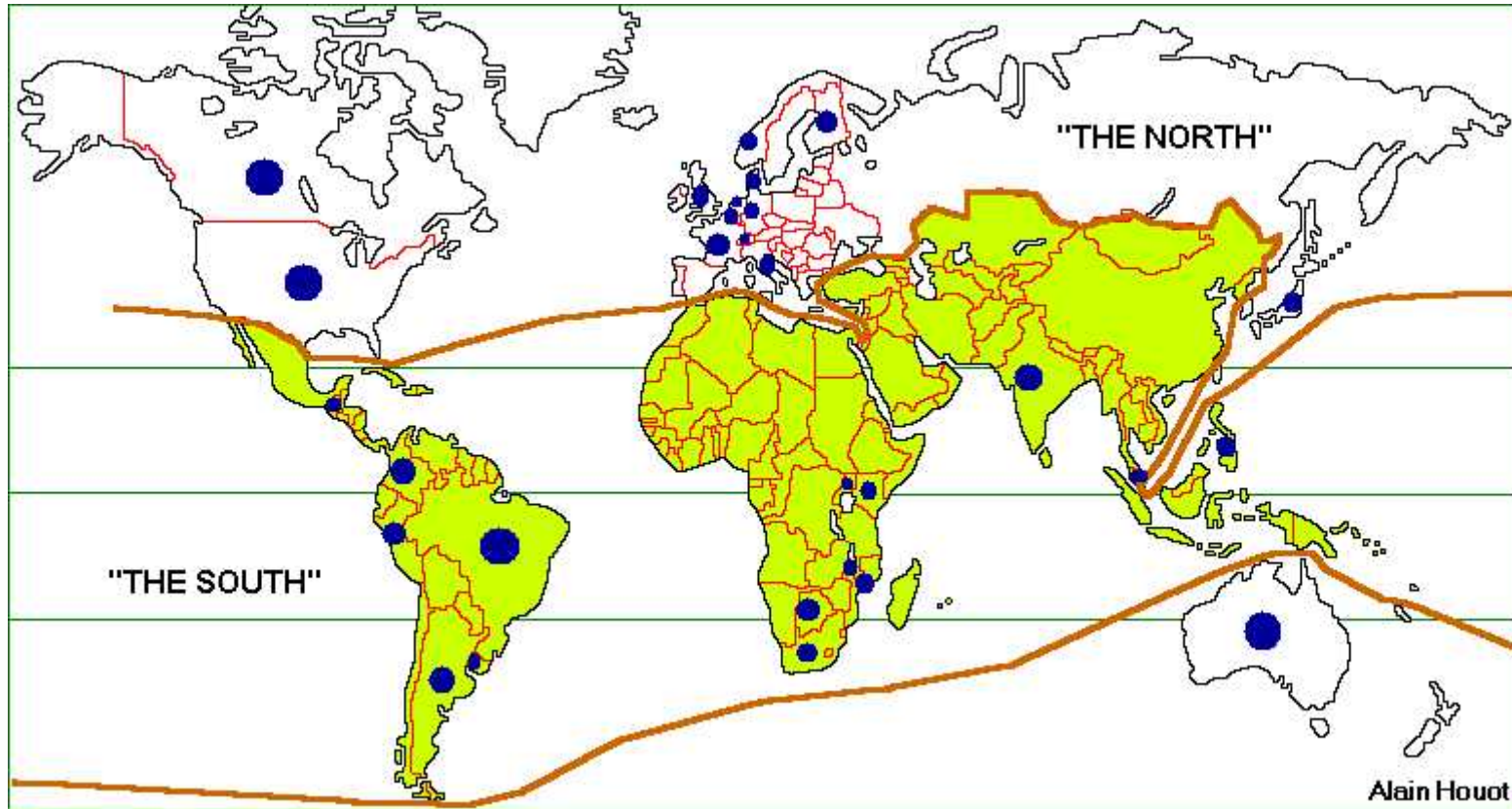


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The RSB Governance



A global discussion: RSB members



RSB Principles & Criteria

Principle 1:
Legality

Principle 2:
Planning,
Monitoring &
Continuous
Improvement

Principle 3:
Greenhouse
Gas
Emissions

Principle 4:
Human & Labor
Rights

Principle 5:
Rural &
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, &
Management of
Waste

Principle 12:
Land Rights



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Stakeholder Consultation and FPIC

Principle 2:

- Stakeholder consultation is essential for the successful application of the RSB standard
- Social and Ecological Impact Assessment/management plans
 - To identify and protect rights and natural resources
- Consultation and participation take place at all stages of the process (development and implementation)
- Scope is dependent on the potential impacts of the operations and must be:
 - Open and transparent
 - In line with the principle of FPIC



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RSB Principles & Criteria

Principle 7.

“Biofuel operations shall avoid negative impacts on biodiversity, ecosystems, and conservation values.”

Criterion 7a

Criterion 7.a – “Conservation values of local, regional or global importance within the potential or existing area of operation shall be maintained or enhanced.”

- Covers all ecosystem types – not limited to forests.
- No conversion of areas with identified conservation values of global, regional or local importance after cut off date of January 1, 2009.
- No use of such areas without adequate management practices to maintain or enhance such values.

Criterion 7.b – “Ecosystem functions and services that are directly affected by biofuel operations shall be maintained or enhanced.”

Food security, livelihoods and rural development

- Principle 5 – rural and social development
 - Creation of jobs, development of SMEs and out-grower schemes
 - Improve the quality of life of stakeholders
- Principle 6 – local food security
 - Ensuring that local food security is protected and enhanced
 - Links with rural development
- Principle 9 - Ensuring that water rights are protected
 - Formal and informal rights
 - Water for subsistence purposes

Land and Land Use Rights

- Principle 12: Evaluate and respect existing land rights and land-use rights, formal and informal
 - No involuntary relocations and all land disputes must be settled prior to biofuel development
- RSB Guidelines based on best practise that assist operators to do:
 - Comprehensive stakeholder Engagement
 - Gender sensitive
 - Screening process
 - Land Rights Evaluation if needed



RSB Principles & Criteria

Principle 3.

“Biofuels shall contribute to climate change mitigation by significantly reducing lifecycle GHG emissions as compared to fossil fuels.”

Criterion 3a

- Criterion 3a – Comply with GHG regulations.
- Biofuel operators must meet GHG regulations in the markets where they operate, e.g.
 - U.S. RFS II
 - California LCFS
 - EU Renewable Energy Directive (EU RED)
 - RSB has begun benchmarking of existing biofuel regulations & GHG requirements

Criterion 3b

- ❖ Criterion 3b – GHG Emissions: Operators must use RSB GHG methodology to calculate lifecycle GHG emissions associated with their operations
 - RSB/EMPA developed GHG accounting methodology; final version published in **July 2011**
 - For energy & material inputs – operators report actual use not default values
- ❖ In RSB system all Operators must calculate GHG contribution of their operations—enter into RSB Tool
- ❖ RSB Tool enables GHG number from each stage of production to be passed along from operator to operator down the chain of production
- ❖ Biofuel Blender reports on the Total (lifecycle) GHG emissions

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RSB
 RESPONSIBLE ON SUSTAINABLE BIOFUELS

RSB GHG Calculation Methodology

4 Agriculture: modelling of ammonia emissions

4.1 Structure of ammonia (NH₃) computation

Modeling follows the guidelines of Timmerink et al (Nemesek and Kagi 2007).

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    graph TD
      MFN[Mineral fertilizer N] --> T1[Table: NH3 emission factor of mineral fertilizer]
      SM[Solid manure] --> C[Computation: NH3 emissions from organic fertilizer]
      LMW[Liquid manure without water] --> C
      DW[Dilution water] --> C
      T1 --> NH3E[NH3-Emissions]
      C --> NH3E
      Y[yield] --> NH3E
      E[ecoszone] --> NH3E
      TO[Table: Table_NH3_organic] --> C
      SD[Table: Saturation_deficit] --> C
    
```

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4.2 Ammonia (NH₃) computation

$$NH_3 \text{ (kg NH}_3\text{ kg}^{-1}) = NH_3 \text{ organic loss strategy} + NH_3 \text{ organic soil strategy} + NH_3 \text{ soil} + NH_3 \text{ soil} + NH_3 \text{ soil} + NH_3 \text{ soil} + NH_3 \text{ soil}$$

via Yield

GHG Methodology

- Attributional lifecycle methodology
- Follows economic allocation for co-products
- Users enter their own data
 - Material use (e.g., type and amount of fertilizer)
 - Energy use (e.g. amount of diesel, natural gas or electricity used, etc.)
 - Location (which affects some emission factors)
- Embedded emission factors come largely from the LCA database Ecoinvent (e.g., CO₂ emissions per kg methanol used in biodiesel production)

GHG Methodology (Cont'd)

- The methodology uses a database of options for materials, chemicals and energy types, and associated emission factors
 - For example, RSB Tool contains a drop-down list of fertilizers
- Land use and land use change information is largely based on IPCC methodology with some modifications
 - uses specific data (e.g., carbon stocks) for certain crops (e.g., miscanthus, sugarcane)
- All documentation is available in the RSB GHG Methodology document -- see www.rsb.org

Criterion 3c

- **Criterion 3c – GHG Threshold:** Biofuel blends must reduce GHG emissions by 50% compared to the fossil fuel baseline of the fuel they would replace
 - Fossil fuel baseline:
 - Global average
 - Recalculated every 5 years
 - Different for gasoline, diesel, jet
 - Final biofuel or physical blend of biofuels must meet the 50% GHG emission requirement
- ❖ Operators who must meet GHG Threshold: Final Biofuel Blenders

- **RSB Tool (online, freely available)**
 - User friendly application tool
 - Operators can self-assess their compliance with RSB Standards
 - Check compliance with other GHG & Sustainability Regulations
 - Enables GHG calculations (RSB, EU RED, etc.) – user enters own data

The screenshot displays the RSB Tool interface. At the top, it says "Roundtable on Sustainable Biofuels Tool" and features the RSB logo. A navigation bar includes links for HOME, RSB APPLICATION, PRINCIPLES AND CRITERIA, RISK ASSESSMENT, GREENHOUSE GAS CALCULATION (GHG), ACKNOWLEDGMENTS, and FEEDBACK. The main content area is titled "Cultivation" and lists various input categories: Information on the cultivation module, Location information, Land Use Change, Mechanical Work, Mineral Fertilizer, Organic Fertilizer, Pesticides, and Transport and on-Cultivation Validation. A "Logout" button is also present. The "Mineral Fertilizer" section is active, showing a "N fertilizer data" form. This form has two radio buttons: "No N fertilizer used" (unchecked) and "N fertilizer used" (checked). Below, there is a dropdown menu for "N fertilizer" with "ammonium nitrate, as N" selected, and a text input field for "Amount" with the value "80". A small note indicates "Amount of mineral fertilizer used in kg/ha". A "+" button is at the bottom right of the form.

Research Needs for Improved Models

- Assess options for RSB ILUC tools:
 - What is validity of per hectare vs per volume ILUC “factors”?
 - What are effective “ILUC mitigation” incentives”?
 - What is relationship between “ILUC mitigation” and “land sparing”?
- Are there effective incentives that would work for smallholders?

Thank you!



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<http://www.rsb.org>