Chapter 2

Global Discussions on Sustainability of Biomass Derived Fuel

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2. GLOBAL DISCUSSIONS ON SUSTAINABILITY OF BIOMASS DERIVED FUEL

2.1 Introduction

Global energy demand is propelled by two main sectors namely electricity generation and transportation. Net electricity generation has been forecasted to increase from 18 trillion kWh in 2006 to 31.8 tillion kWh by 2030[2]. Transportation sector is projected to consume 127.7 quadrillion Btu of energy by 2030, an increase of about 39% from 2006[2]. At the same time, projection of increase in world energy-related CO_2 emissions will accelerate from 29 billion metric ton in 2006 to 40.4 billion metric ton in 2030[2].

It is against these two scenarios of escalating energy demand and global warming that energy security and greenhouse gas (GHG) reduction have become global concerns and the global approach seems to be targeted at renewable energy (RE). For example, policy targets for renewable energy exist in at least 66 countries worldwide[3] among the more challenging ones is the EU-wide target of 20% RE target in the final energy demand, and 10% biofuel target in the transport energy demand by 2020. Aside from the target-setting policies, there are other forms of RE promotion policies broadly categorised[3] under:

- Feed-in tariff
- Renewable portfolio standard
- Capital subsidies, grants or rebates
- Investment or other tax credits
- Sales tax, energy tax, excise tax, or VAT reduction
- Tradable renewable energy certificates

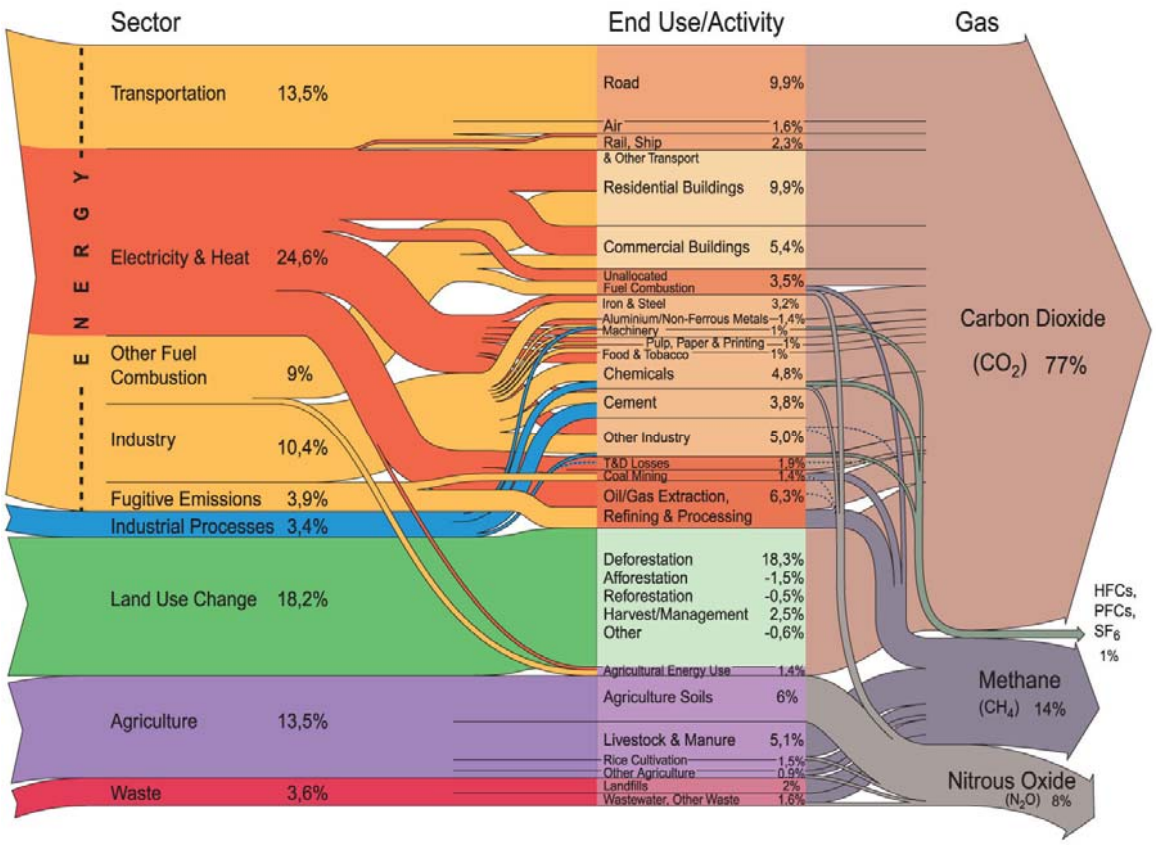
[2] Energy Information Administration, International Energy Outlook 2009, http://www.eia.doe.gov/oiaf/ieo/index.html.

[3] REN21.2008 "Renewables 2007 Global Status Report" (Paris:REN21 Secretariat and Washington, DC:Worldwatch Institute)

- Energy production payments or tax credits
- Net metering
- Public investment, loans or financing
- Public competitive bidding

In terms of the two major energy-consumption sectors i.e. power generation and transport, bioenergy or biofuel has made greater in-roads into the transport sector evident by the biofuel policies with mandates for blending biofuels ranging from E1 (1% blend) to E25 (25% blend) for bioethanol and B1 to B20 for biodiesel with target time frames of up to 2015.

While policies to support growth of the biofuel industry is on the rise especially among the developing countries that have seen RE as a potential fast-growing economic sector. There is also an increasing awareness that the 'carbon neutral' perspective of biofuel at the point of combustion may be negated by emissions from the production process, especially when viewed from a life cycle perspective beginning with the biomass feedstock material and land-use change. Figure 1 shows that transportation and electricity (& heat) sectors account for about 40% of the world GHG emission. The prospect of capping or reducing GHG emission through RE to fulfil obligations of Annex I countries under Kyoto Protocol is also one of the drivers for the RE growth.



[4]Figure 2-1: World greenhouse gas emission by sector, power and transportation sectors account for ~40% of the world GHG emission.

Central to the discussion of environmental sustainability versus energy security or the carbon and energy balance is the rising concern that the reduction in the life cycle GHG emission of bioenergy may not be significant enough to warrant the investment, exemptions and subsidies that have propelled the growth of the RE sector, including the biofuel industry.

As natural disasters attributed to global warming and climate change become more evident, the pressure to reduce GHG emissions has transcended from policy makers to society at large, especially in the developed countries where awareness of these phenomenon are higher. This has given rise to strategies such as developing carbon footprint or ecolabelling of products that will enable purchasers to exercise

[4] Source: UNEP G.R.I.D Arendal, http://maps.grida.no.go.graphic/world-greenhouse-gas-emissions-by-sector

their purchasing power for goods that emit less GHG or has less environmental impact.

However quantification of GHG emissions to provide the size of the carbon footprint or other forms of environmental impacts is not standardized among the various labelling schemes, guidelines or regulations. At the same time, there are a number of initiatives undertaken by various international and regional organisations to develop standards, guidelines and directives on the quantification and communication of GHG emissions data. Among them are:

- ISO 14064-1:2006 - Greenhouse gases- Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals (Organisation level)
- ISO 14064-2:2006 Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements (Project level)
- ISO 14064-3:2006 Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (reviewer in LCA)
- ISO 14067-1 (New Project Approved) Carbon footprint of products – Part 1:Quantification
- ISO 14067-2 (New Project Approved) Carbon footprint of products – Part 2: Communication
- PAS 2050:2008 Specification for the assessment of the life cycle greenhouse gas emissions of goods and services
- Global Bioenergy Partnership (GBEP) Framework for GHG Measurement
- Proposed Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources
- ISO New Work Item Proposal (NWIP) for Sustainability Criteria for Biofuel
- Roundtable on Sustainable Palm Oil (RSPO) and Roundtable on Sustainable Biofuels (RSB)

The coverage of these initiatives are listed in Table 2-1.

Table 2-1: Summary of Documents Related to GHG Estimation, Measurement and Reporting

No.	Name of Document	Publisher	Coverage
1.	ISO 14064-1:2006	ISO	Quantification of GHG at organisation level
2.	ISO 14064-2:2006	ISO	Quantification of GHG at project level Considers sinks and reservoirs
3.	ISO 14064-3:2006	ISO	Verification of GHG measurement
4.	ISO 14067-1 ISO 14067-2 (New Projects)	ISO	Quantification of carbon footprint of products based on life cycle and communicating them
5.	Sustainability Criteria for Biofuel	ISO	Expected to cover economic, social and environmental criteria including GHG emission.
6.	PAS 2050:2008	BSI, Carbon Trust, Defra	Based on LCA, covering every stage including landuse change, default values given Allows for offsets New term on biogenic carbon and its inclusion in the GHG estimation
7.	Global Bioenergy Partnership	FAO, United Nation (as Secretariat)	Exclusively on transport fuels and the biomass used in the production
8.	UK RTFO Carbon and Sustainability Reporting within the Renewable Transport Fuel Obligation	UK Department of Transport	Provides default values and fuel chains for carbon reporting on batch production basis of biofuels used for transportation.

9.	Directive for Promotion of the Use of Energy from Renewable Sources	European Commission	Applies to all applications and forms of biofuel, provides comprehensive formulae, default values and cut-off criteria. Does not consider capture of CO_2 in the cultivation of raw materials.
10.	Round Table for Sustainable Palm Oil (RSPO) Roundtable on Sustainable Biofuels (RSB)	International NGO Higher Research Institution	RSPO is an established third party certification system for sustainable palm oil that includes GHG estimation/quantification. RSB is also based on principles that can be verified and reported. The group has initiated discussions to develop indicators for certification related to the GHG criteria.

2.2 Salient features of guidelines and directives

The ten listed documents are among the most commonly referred guidance document for quantification and communication of GHG. While some are fully established documents, some have yet to commence work although their objectives, scope and justifications have been announced. Among the established, 'yet-to-be-finalised' and 'yet-to-commence documents, it was noted there exist commonalities and differences:

(a) Common Items

- All aimed at providing quantification methodology for GHG profile of product system/ organisation/ project
- Specify reporting format for communication
- Considers life cycle perspective and product system coverage in the case of products (biofuel)

(b) Differences

- Coverage of GHGs numbering 3 (CO_2, CH_4, N_2O) to 6 (+ HFCs, PFCs, SF_6)
- Stages of the life cycle e.g. cradle to grave or cradle to gate (plantation to wheel, plantation to mill)
- Differences in default values (although IPCC values are mentioned in some documents) and conversion factors
- Differences in handling of offsets, carbon payback period, carbon sequestration
- Differences in handling of co-products, including parameters used to prorata the emissions such as by mass, energy or economic value
- Reporting of final data e.g actual GHG value, GHG emission savings, carbon credits

The list of differences is based on the information available in the public domain for each of the document. The different approach will be a burden to the biofuel industry when required to show compliance to reporting the GHG profile according to the specification adopted by a country. Hence the ERIA joint research project is timely in providing a platform among member countries of East Asia to investigate and recommend the appropriate assessment methodology for the sustainability of the bioenergy industry in the region.