

Bioenergy: resources, opportunities and impacts; where are we now?

COMPETE; International Conference and Policy Debate on Bioenergy Sustainability Schemes – An African Perspective.

Arusha - Tanzania, June16-18, 2008.

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Topics

- State of the art on global biomass resource outlook.
- Certification developments
- Science base; modelling and quantifying impacts.
- Market activity...

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All in 20 minutes ③





WAB (Wetenschappelijk Assessment en Beleidsanalyse klimaatverandering): Global biomass potentials and their links to food, water, biodiversity, energy demand and economy

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Research objectives

- Insight in links between biomass for energy and:
 - Food supply
 - Water use
 - Nature & biodiversity
 - Economic mechanisms
 - Energy system
- Not included:
 - social, legal and institutional aspects
- Overview knowledge, knowledge gaps and their impacts
- Policy recommendations for biomass development



Integration...



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Total bioenergy production potential in 2050 based on system 1 to 4 (EJy⁻¹; the left bar is system 1, the right bar is system 4

rest land

Other

Integrated assessment Abandoned cropland Abandoned cropland Inter- modelling results (IMAGE) B2 2050

rest land Abandoned cropland low-productive Land

A2 2050

rest land andoned cropland -productive Land

rest land handoned cronland w-productive Land

Potential land-use pattern changes (IMAGE)

[Hoogwijk, Faaij et al., Biomass & Bioenergy, 2005]

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Yields: perennials ~3x annual

Crop	Biomass yield (odt/ha* yr)	Energy yield in fuel (GI/ha*yr)
Wheat	4 - 5	~ 50
Corn	5-6	~ 60
Sugar Beet	9 – 10	~ 110
Soy Bean	1 – 2	~ 20
Sugar Cane	10 - 20	~ 180
Palm Oil	10-15	~ 160
Jathropha	5-6	~ 60
SRC temperate climate	10 – 15	100 - 180
SRC tropical climate	15 - 30	170 - 350
Energy grasses good conditions	10 - 20	170 - 230
Perennials marginal/degraded lands	3 - 10	30 - 120

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Limitations in potentials: agri yields

0.2 - 0.4

Existing protected areas

Impacts on (woody) crop potentials

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Dornburg et al., 2008

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Global cost-supply curve for energy crops for four scenarios for the year 2050 B1 at abandoned agricultural land in 2000 ÷ G Production cost of energy crops (\$ At abandoned agricultural land At rest land 3 A1 at abandoned agricultural land A2 at abandoned agricultural land B1 at abandoned agricultural land B2 at abandoned agricultural land A1 at rest land A2 at rest land B1 at rest land B2 at rest land B1 2000 50 100 150 0 200 250 350 400 300 Geographical potential of energy crops (EJ y⁻¹)

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Hoogwijk, Faaij, Biomass & Bioenergy, 2008

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Key uncertainties biomass potentials

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Issue/effect

Importance

Supply potential of biomass

Improvement agricultural management	***
Choice of crops	***
Food demands and human diet	***
Use of degraded land	***
Competition for water	***
Use of agricultural/forestry by-products	**
Protected area expansion	**
Water use efficiency	**
Climate change	**
Alternative protein chains	**
Demand for biomaterials	*
Demand potential of biomass	
Bio-energy demand versus supply	**
Cost of biomass supply	**
Learning in energy conversion	**
Market mechanism food-feed-fuel	**

So...

- Investment in agriculture (and livestock) is essential (2nd green revolution)
- This is feasible (FAO)...
- ...with increased water use efficiency, less land, protection of soils and better incomes.
- ...and essential for food security.
- Bioenergy can get the money and sustainable economic activity into the rural regions...

A future vision on global bioenergy...

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[GIRACT FFF Scenario project; Faaij, 2008]

Certification bioenergy: ongoing initiatives

- Governments: UK, NL, D, B, and more EU nations...; EC.
- NGO's:
- International bodies: UNEP, UNCTAD, FAO,...
- Market initiatives/multistakeholder: roundtables on palm, soy, sugar and biofuels, utilities,...

IEA Task 40:Van Dam et al., 2008; Biomass & Bioenergy.

www.bioenergytrade.org

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Cramer Cie.: minimum safeguard-> stabilisation-> improvement...

- 1. GHG balance -> Chain performance (30-80%+..)
- 2. Land-use/competition with food: reporting; to be developed.
- **3. Biodiversity** -> reporting/FSC/RSPO; to be developed.
- 4. Wellfare -> Reporting EPI; to be developed further.
- 5. Well being -> ILO, Social accountability standards, etc.
- 6. Environment
 - Waste; law, GPG's
 - Agrochemicals; law, GPG's (further development).
 - Soil quality; reporting/monitoring (further development).
 - Water quality & quantity; law, reporting/monitoring (further development).

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Cramer et al., 2007

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Certification bioenergy: concerted action...

- First time that governments actually try to set 'sustainability criteria' for a commodity! -> Paradigm shift with implications for food products, fodder, materials etc.
- This takes time (allow for learning).
- Concerns differ: palm oil/soy bean/corn... most debated, other (residues, wood) largely approved
- Methodological issues to be resolved: competition, biodiversity, a.o.
- Global convergence, dialogue and deployment priority (leadership needed).

Operationalisation of sustainability criteria Criteria

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Indicative cost impacts of applying sustainability criteria...

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Core objectives AF

 The objective of the framework is to facilitatie the analysis of the nexus bioenergy and food security, namely to analyze the impact of possible national and sub-national bioenergy developments in developing countries on food security. This analytical framework is to provide the **best possible** quality but also manageable information for national policy makers and other key stakeholders on the impacts of biomass production for energy under different settings.

Key characteristics

- AF should allow for analysing impacts of different strategies for deployment of bioenergy (policy options).
- AF should realize a link between bio-energy scenario's and food security (new!).
- Overview of impacts ('dashboard') should allow for (more) targeted decision making and planning.
- First order (and urgent) attempt: based on **existing** tools & models.

Main structure of an analysis procedure for a case study country

Summarizing key needs for sustainable biomass resources

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- Resources need to meet criteria in broad sense.
- Resource base needs to be diversified (lignocellulose, cultivated, marginal & degraded lands).
- Real market experience needs to be built in different settings.
- Sustainable (international) markets and certification to be established.

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BIOPEC Partnership: market & government; open structure and mutual needs!

 Steering group: Rabobank, Essent, Copernicus Institute-UU, Solidaridad; supported by UCE.

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- Market Players: Rabobank, Essent, EON, Electrabel, EPZ, Nuon, VNPI. BioX Group B.V., Abengoa
- Logistics, Trade, certification: CEFETRA, Peterson Bulk Logistics Havenbedrijf Rotterdam, Control Union, Nidera,...
- Knowledge: Copernicus Institute-UU, WUR, ECN, LEI, Probos, IMSA-OASE,...
- NGO's: Solidaridad, WWF, OXFAM-NOVIB,...
- **Other:** Platform Groene Grondstoffen, FMO, PBE,...

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Key objectives of BIOPEC

- Realize full scale certification in the market according to Cramer Principles.
- Build market experience with new and sustainable produced biomass supplies via diverse AND coherent range of pilots.
- Pilot experiences should demonstrate full 'Cramer compliance'.
- Portfolio of pilots should deliver according to the vision of the energy transition strategy.

Contents of BIOPEC

- **WG Certification** (short term demonstration procedure).
- WG Pilots (residues, agricultural and pasture lands, marginal & degraded lands; diverse set of regions)
- WG Research (supportive and fundamentals)
- WG Campaigning (from local to international).

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Current Status BIOPEC Initiative

- Supported by Ministers Cramer, Koenders, Verhoeven and Verburg.
- Consortium signed the 'Schokland treaty' with Minister Koenders and financially supported by Foreign Affairs
- Content matter, finance base and organisation worked on in close collaboration with Government (Foreign Affairs, Environment, Agriculture, Economic Affairs).
- Certification procedures addressed.
- Full kick-off summer 2008 ?

On 30 june 2007 the minister of development cooperation, mr. Koenders on behave of the Dutch government and mr. Boersma, CEO of Essent on behave of the BIOPEC consortium signed the Schokland agreement on the so-called millennium goal number 7 on sustainable biomass.