



Sustainable international bioenergy markets

Compete - Workshop, 21-22 June 2007, Mauritius

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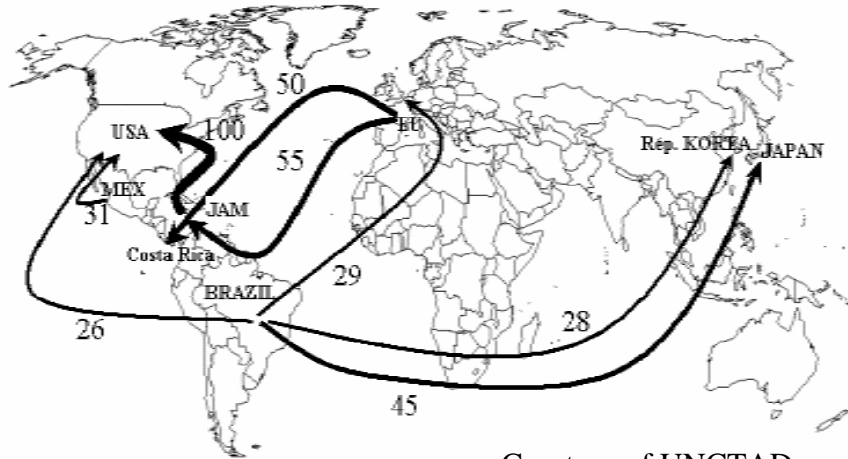
International bio-energy markets developing fast...

- Growing bio-energy demand and international supply chains create unique opportunities for both producer regions and importers.
- Concerns, e.g.:
 - Fierce international debate on sustainability
 - Different perspectives (and interests) on governance, policy and priorities
 - Many barriers remain

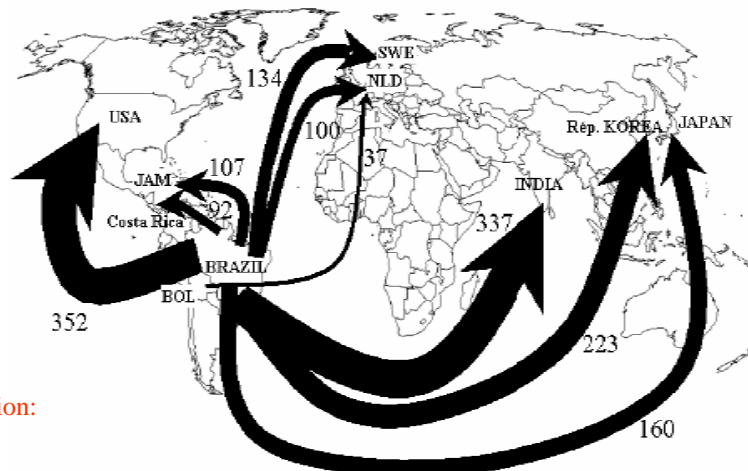


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Bio-ethanol flows 2000 (kton)

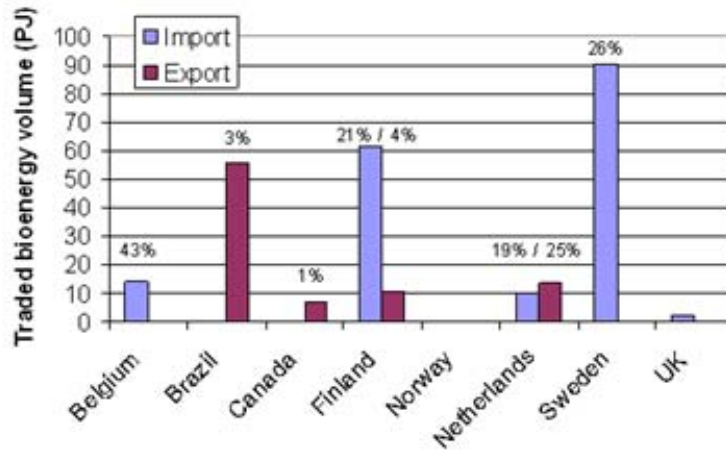


Bio-ethanol flows 2004 (kton)



Traded:
3 billion litres
Global production:
32 billion litres

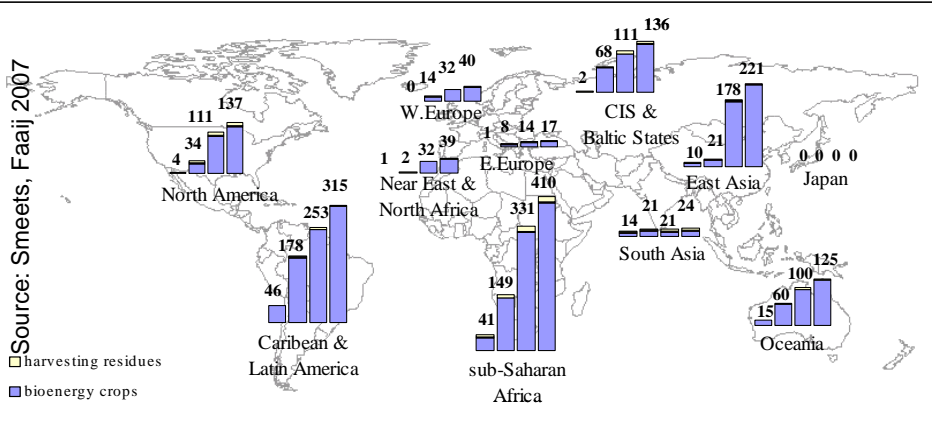
Overview of bioenergy imports and exports of example countries in 2004



Bio-energy use worldwide

- Global Energy Demand: ~420 EJ
- About 10-15% (or 45 ± 10 EJ) of this demand is covered by biomass resources.
 - Traditional biomass: ~29
 - Commercial non-modern: 9 ± 6 EJ
 - Commercial: ~7 EJ
 - Liquid Biofuels ~0.5 EJ

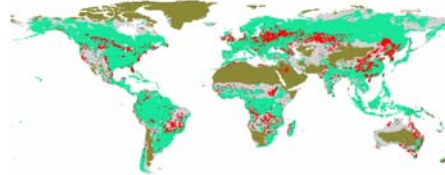
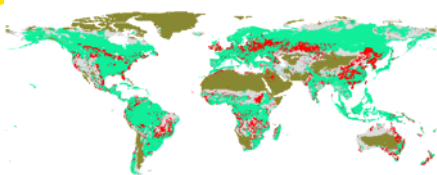
Bioenergy production potential in 2050 for different levels of change in agriculture and trade (EJ/yr)



Bioenergy production potential based on **system 1** (rain-fed, mixed animal production) to **system 4** (irrigation, very high technology level, landless animal production)

B1 2050

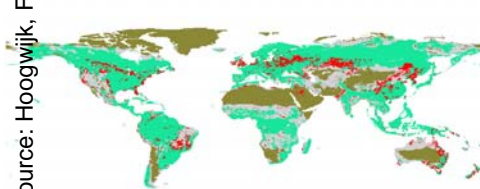
A1 2050



Integrated assessment modelling results (IMAGE)

B2 2050

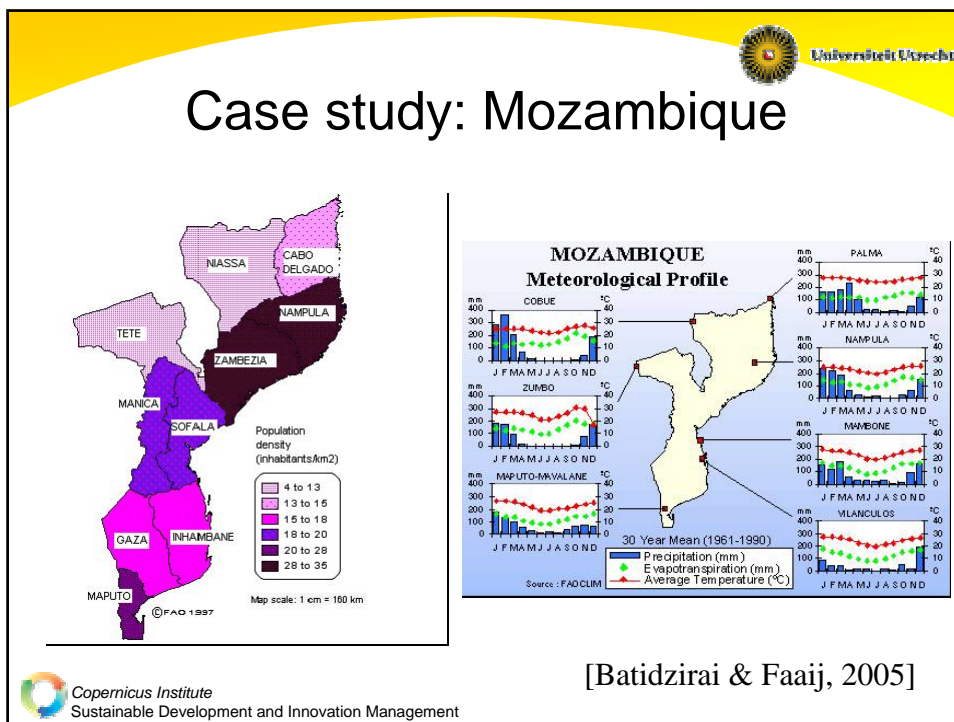
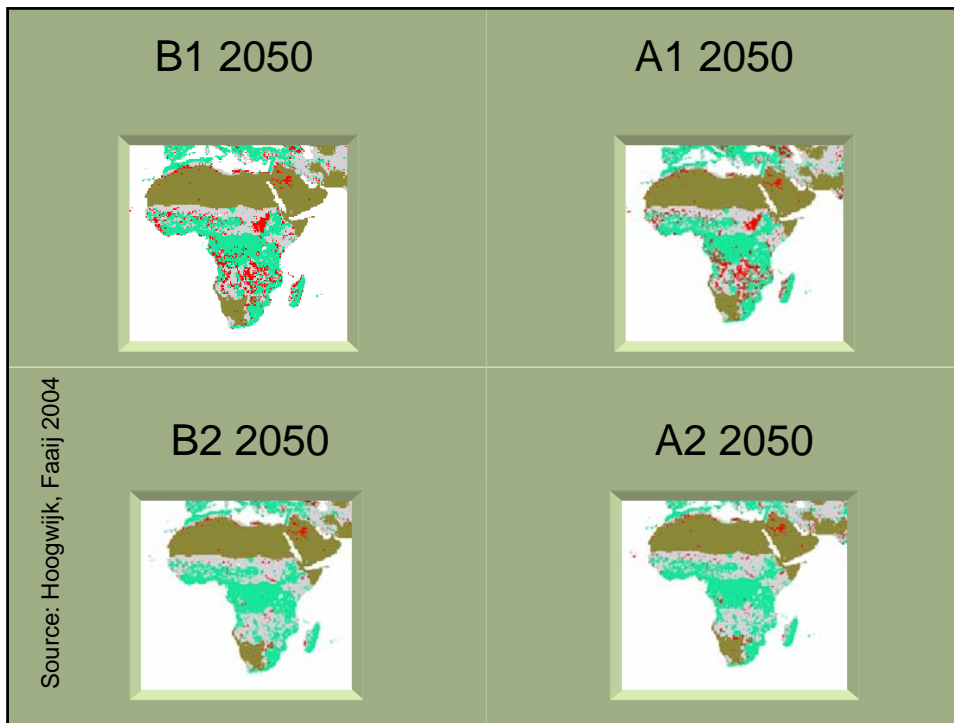
A2 2050



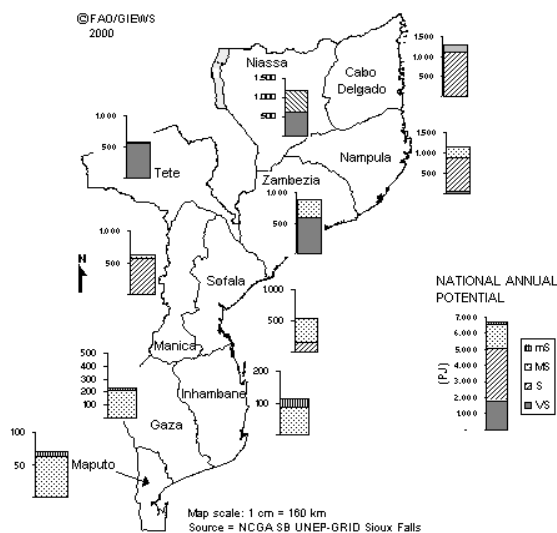
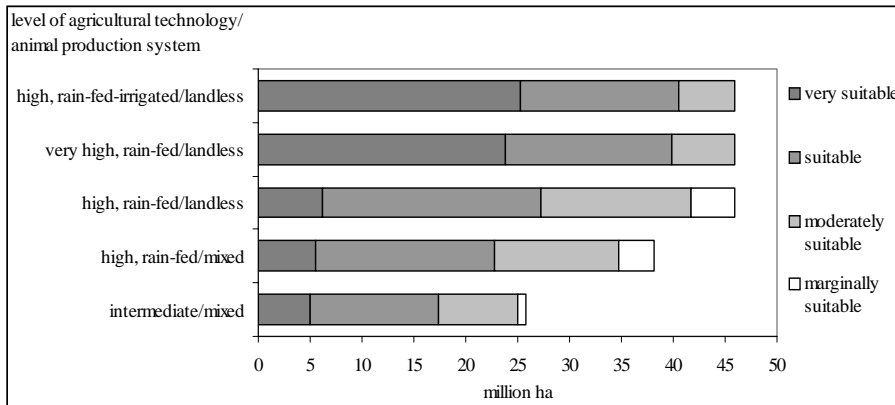
Source: Hoogwijk, Faaij 2004

high land
 abandoned cropland
 low-productive Land
 Other

high land
 abandoned cropland
 low-productive Land
 Other



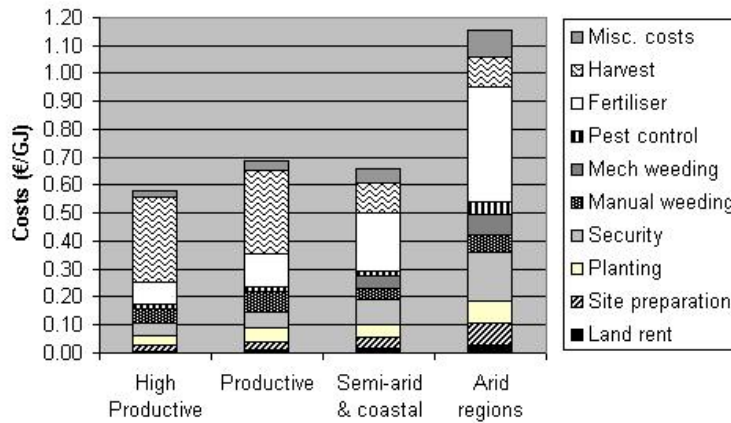
Potential surplus agricultural land in 2015 in Mozambique, dependant on the level of advancement of agricultural technology



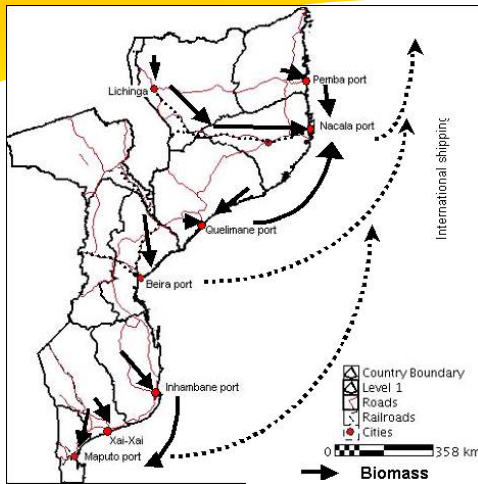
Regional annual biomass production potential in Mozambique

PJ_{HHV} (2015)

Comparison of bioenergy growing costs by region type (€/GJ)



Logistics for export....



[Batidzirai & Faaij, 2005]

Radius is average transport distance from field to processing unit based on 1/2 area

Field farmers are spread in delivery area

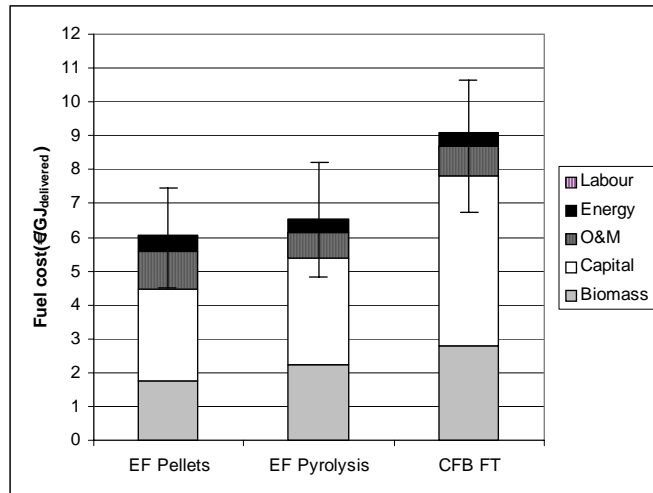
Delivery area based on biomass distribution density and % area under energy crops

CGP - conversion facility

Range of costs for FT fuel delivered at Rotterdam Harbour



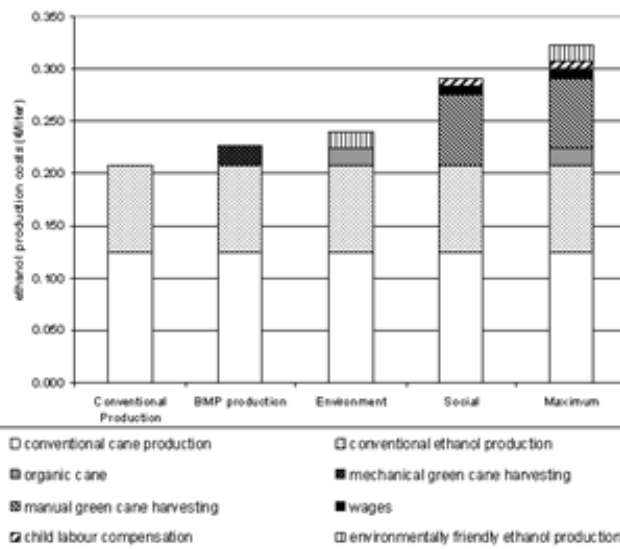
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[Batidzirai & Faaij, 2005]

Ethanol in Brazil; the costs of compliance with various sustainability criteria compared to the reference situation



[Smeets, Junginger, Faaij, Walter, Dolzan, 2006]

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Uncertainties and key issues concerning biomass potentials

- Water resources
- Management of biodiversity
- Interaction with conventional markets (food, forestry)
- Proper GHG accounting and land-use management
- Balanced economic development (macro & micro scale)



Essentials of future global biomass availability...

- Major contribution of bio-energy to global energy supply possible
⇒ major transitions required to exploit potentials
- Improved food production systems & rate of deployment in developing countries are essential
⇒ Integration of biomass production into agriculture (implying integrated rural development schemes targeting traditional agriculture)
- Use of marginal/degraded land & biomaterials.
- (Net) biomass supply per region strongly determined by local factors; large differences between regions.
- Economic potential depends on production cost reductions, policy and fossil fuel price developments





IEA Task 40: Sustainable Bioenergy Trade

Task Leader: Copernicus & Essent, NL

Members: Netherlands, Belgium, Brazil,
Canada, Finland, Germany, Italy, Norway,
Sweden, UK, (FAO and Worldbank as
affiliated international bodies)



IEA Task 40: Key issues

- Development of *working* biomass markets is crucial for any market initiative.
- Contribute to the development of *sustainable* bioenergy markets on short and on long term and on different scale levels.



Current issues in international bioenergy trade...

- Many opportunities for trade (and stabilizing markets).
- Many barriers remain (T40 analyses).
- Transparency (and thus information) vital to market parties (and govt.).
- Fierce international debate on sustainability; intensive dialogue and interaction (T40 a.o.).
- Different perspectives (and interests) on governance, policy and priorities; overview is needed (T40 a.o.)
- Entrepreneurs and policy makers are now dealing with development of regional or national biomass markets in a rapidly developing international context.

Deliverables IEA Task 40 2004-2006

1. Mapping market experience.
2. Advice on trade, e.g. (removal of) barriers, opportunities and policy actions
3. Improve understanding of markets (modelling).
4. Supply chain analyses
5. Certification systems
6. Initiate pilot projects
7. Case studies and impact analyses
8. Evaluation of markets (Bio-ethanol, pellets, bio-oil)
9. Dissemination (website, leaflets, numerous lectures)

Sustainable biomass production and certification

Background: the implications for trade

- Negative side-effects of rapidly expanding commodities such as palm oil in Malaysia and Indonesia, or soy cultivation in Argentina, also ethanol from sugarcane under investigation
- Overexploitation should be avoided and sustainability criteria implemented
- Sustainability criteria will have a direct impact on international bioenergy trade

NL proposal: minimum safeguard-> stabilisation-> improvement...

1. **GHG balance** -> Chain performance (30-80%+..)
2. **Land-use/competition with food**: reporting
3. **Biodiversity** -> reporting/FSC/RSP0
4. **Welfare** -> Reporting EPI
5. **Well being** -> ILO, Social accountability standards, etc.
6. **Environment**
 - Waste; law, GPG's
 - Agrochemicals; law, GPG's
 - Soil quality; reporting/monitoring
 - Water quality & quantity; law, reporting/monitoring



The key linkages ...

- Agriculture the key for bio-energy...
- Bio-energy could be the key lever for rural development.
- Bio-energy is (and will be) propelled by sound economics; market almost unlimited (and uncontrolled)
- Sustainability to be secured in a global setting.



Closing remarks (I)

- **Diversity in ecological and socio-economic conditions to be recognized** (asking for regional approaches in a global setting; stakeholder approaches).
- **Sense of urgency is needed**; market forces are already steering development of international bio-energy markets.





Closing remarks (II)

- **Flagship projects** (to demonstrate multiple benefits and framework(s) under different conditions; solid fuels... multiple markets with international focus...)
- **Promising future; but policy needs to choose and coordinate** (agriculture, trade, climate, energy and development are interlinked here).
- **Strong need** for international collaboration and action: IBEP, Biofuels Init., IEA, G8 partnership, WTO, etcetc.



Thanks to:

Andre Faaij, Martin Junginger (IEA T40)

For more information, see:

www.bioenergytrade.org

- Detailed activities
- Background information
- Results (e.g. country reports, analyses)
- Events

