

Potential for Sustainable Production of 2nd-Generation Biofuels in Emerging and Developing Countries

Anselm Eisentraut
Renewable Energy Division

Vancouver, 26 August 2009

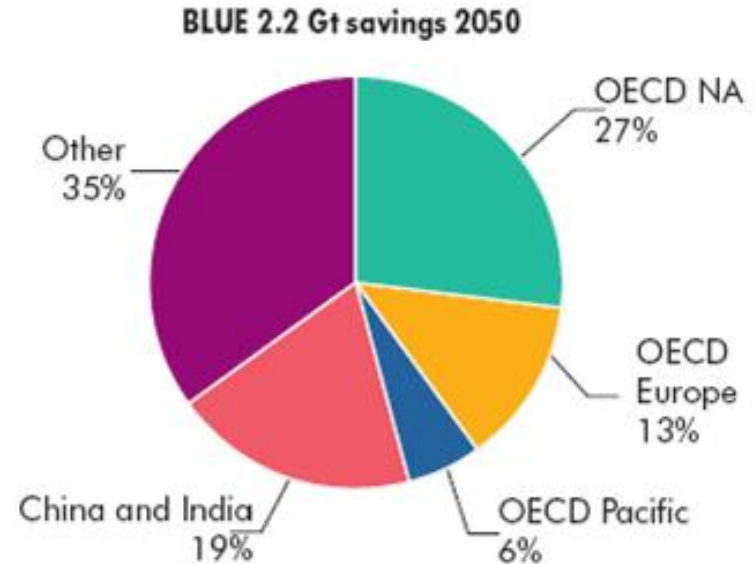
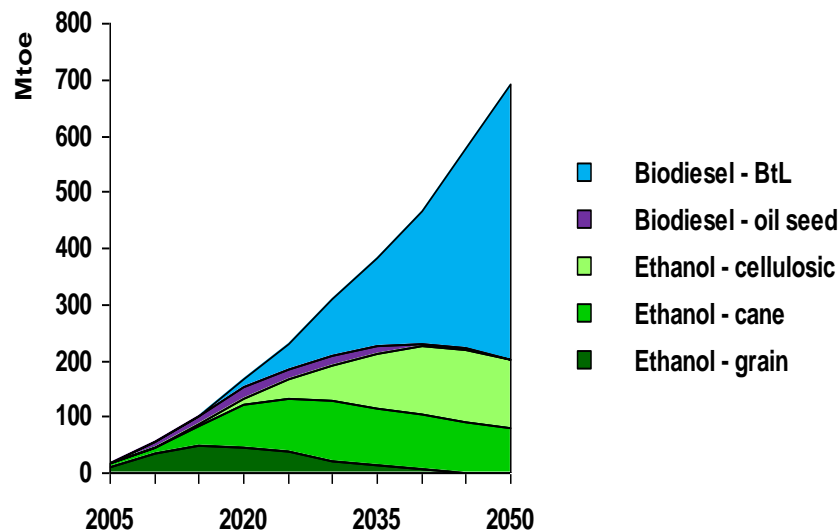
Background & Scope of the Study

- Main projects at the IEA Renewable Energy Division
 - Global Renewable Energy Markets and Policies Programme
 - Review of Life Cycle Assessment studies on biofuels
 - Good practice guidelines for Bioenergy Project Development and Biomass Supply
- Networks: REN21, GBEP
- IEA informal *Bioenergy Workplan of Action* to undertake detailed studies on biomass utilisation, including production of biofuels
 - Nov. 2008 – Joint IEA & IEABioenergy Task 39 study “**From 1st- to 2nd-Generation Biofuel Technologies**”, a review of current industry and RD&D activities (available on www.iea.org)
 - Current study on sustainable 2nd-generation biofuel production in developing and emerging countries
 - Funded by **Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)**
 - Available for free on www.iea.org by the end of 2009

Background & Scope of the Study

IEA Projections – BLUE Map Scenario

- Assumes 50% emission reduction by 2050; USD 200/t Co₂
- Biofuel demand : 1 103 bn l/yr (29 EJ/yr) in 2050
- Share of 23% of total transport fuel by 2050
 - 88% 2nd-generation biofuels
 - >50 % of 2nd-generation production outside the OECD

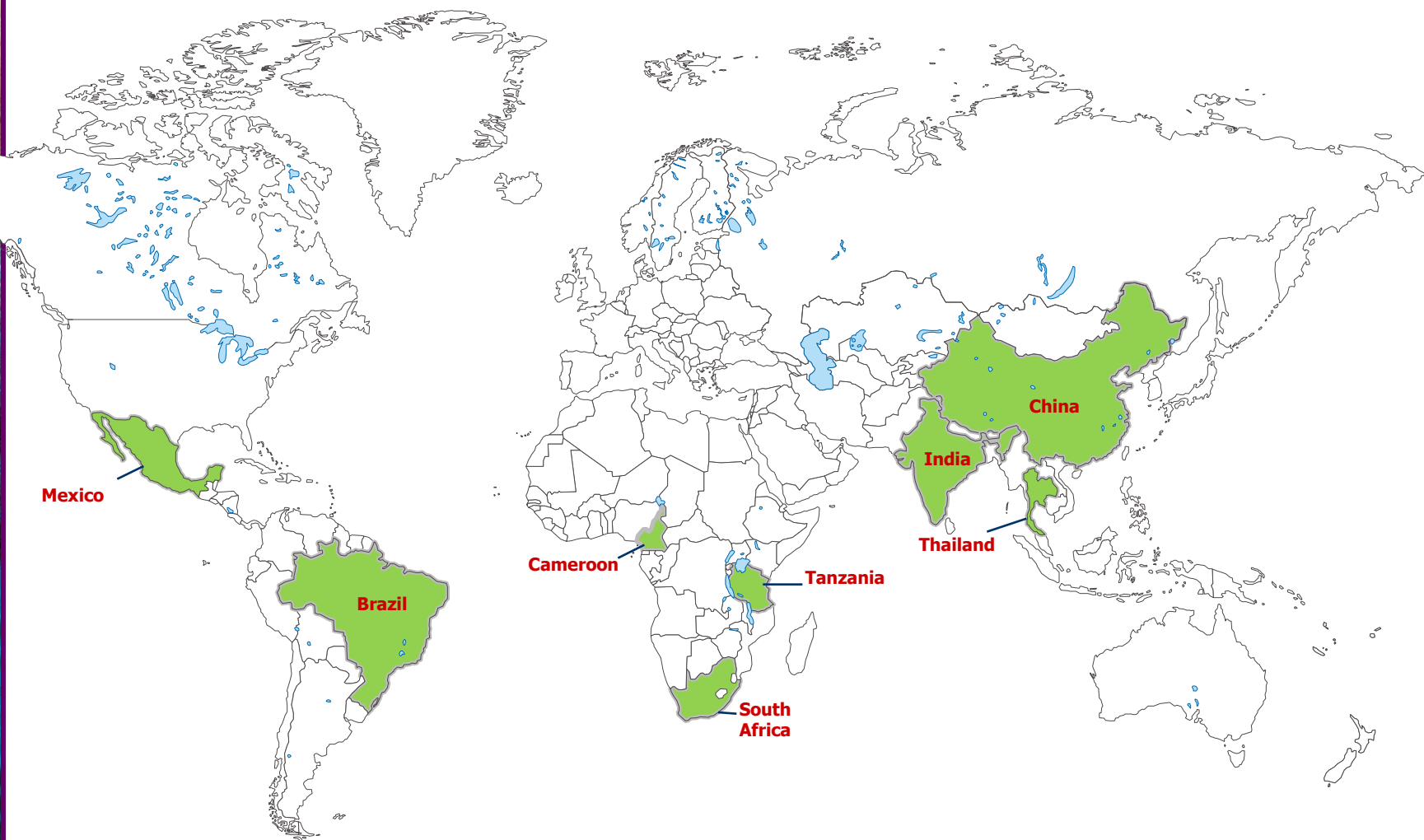


Source: IEA – Energy Technology Perspectives 2008

Background & Scope of the Study

- 2nd-generation biofuels are currently not seen as priority in many developing countries; but considerable promises:
 - Diversification of energy / fuel supply
 - New employment and income opportunities → boost rural development
 - Utilisation of marginal and degraded land
 - Possibility to use crop residues → avoid competition between food and biofuel production
- Key questions:
 - Can 2nd-generation biofuels be produced sustainably in developing countries?
 - What opportunities and risks exist?
 - Global drivers for 2nd-generation biofuels and their impact on developing countries?
 - What could be the potential for 2nd-generation biofuels and which key barriers exist to mobilise them?
 - Is the new technology more sustainable than the 1st-generation?

Selected countries



Drivers for 2nd-generation biofuels

- Criticism on environmental performance and sustainability of 1st-generation
- Ambitious biofuel support policies in the EU and US
 - expected to boost 2nd-generation biofuel production, but mainly domestical production in the regions
- Funding for bioenergy including 2nd-generation RD&D
 - US: USD 2 bn; Canada: CAD 500 mn; Australia: AUD 15 mn; EU: Research Framework Programme (FP7): EUR 2.5 bn
 - In developing countries → No domestic funding for 2nd-generation (yet)
 - Considerable amounts of foreign direct investment in other industry branches *e.g.* in Brazil, China, India, South Africa, Mexico, Thailand
 - Less developed countries → unstable markets are disadvantageous to attract foreign investments in 2nd-generation biofuels

Current status of 2nd-generation biofuels

- 2nd-generation biofuel projects in emerging and developing countries
 - Many projects announced in emerging countries, in cooperation with foreign investors from OECD-countries
 - **Brazil** – 800 t/yr, operating; **China** – 1.2 t/yr + 500 t/yr, both operating; **Singapore** – 800 000 t/yr, under construction; **Argentina** – 250 000 t/yr (feedstock), planned; **India** – pilot plant, planned
 - Cooperation on R&D
 - Forschungszentrum Karlsruhe (Bioliq) with China and Thailand
 - Novozymes, Denmark - Centro de Tecnologia Canavieira, Brazil
→ Funded through EU FP7
 - No projects or R&D cooperation in less developed countries

A photograph showing five people from behind, walking away on a wide, reddish-brown dirt road. Each person is carrying a large, round, golden-brown hay bale balanced on their head. The person in the foreground is wearing a blue and white striped shirt and light-colored shorts. The person next to them is wearing a red shirt and dark pants. The landscape is arid, with sparse green bushes and dry, reddish soil. In the background, there are rolling hills and a prominent, dark, rocky cliff face under a hazy sky.

60 000 t per year?

Key findings from studied countries

- Environmental impacts

- Energy crop plantations

- Potential to decrease erosion and increase of soil carbon
 - same risks as 1st-generation → landuse change, biodiversity concerns, land-tenure
 - Considerable potential in Brazil to use extensive pasture areas

- Agricultural residues

- no additional land required
 - utilisation of residues can affect nutrient level, water retention, a.o.

Key findings from studied countries

- Job opportunities
 - Considerable number of jobs for cultivation of dedicated energy crops
 - Limited for collection of agricultural residues
 - Biofuel production requires high-skilled labour which is lacking in some of the studied countries (Cameroon, Tanzania, (*Thailand*))
- Smallholder integration
 - Vast amounts of feedstock are needed to supply a 2nd-generation refinery → Cooperatives could be a useful measure, but bad equipment and poor infrastructure are serious constraints
 - Subsistence farmer could be effected by increasing opportunity costs for residues, if used for 2nd-generation production

Conclusions

- 2nd-generation biofuels have the potential to be produced sustainably in emerging and developing countries
 - Risks have to be considered carefully!
- The potential depends on various parameters and has to be assessed on regional level
- Experiences with commercial production are required to better understand social, economic and environmental impacts
- Technical development mainly in OECD countries and emerging economies with sufficient RD&D capability
 - Cooperation and technology transfer should be encouraged to build capacities and avoid conflicts with intellectual property rights

Conclusions

- Developing countries should use time until commercialisation of 2nd-generation biofuels to:
 - Assess sustainable biomass resources (regardless for which bioenergy option they will be used)
 - Evaluate country-specific benefits and risks of 2nd -generation biofuel production (compared to other bioenergy / biofuel options)
 - Explore possibilities to promote agricultural production and improve rural infrastructure
 - Build capacities slowly but constantly to avoid bottlenecks in the implementation of this new technology

Acknowledgements

- Thanks to:
 - Jack Saddler and his team for organising this conference
 - Deutsche Gesellschaft zur Technischen Zusammenarbeit (GTZ) for funding the project
 - Local consultants in the selected countries
 - Participants of the project workshop in February 2009, Paris

**You,
for your kind attention!**

Questions?

anselm.eisentraut@iea.org