



Economic, Environmental and Social Sustainability

The EU Global-Bio-Pact Project



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WIP – Renewable Energies, Germany

First Canada-Europe-Australia-New Zealand
Workshop on Biotechnologies for Biorefineries and Biobased Materials

6-7 October 2010, Saskatoon, Canada



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- **The EU FP7 Project Global-Bio-Pact**
- **Case Studies for Socio-economic Impact Assessments**
- **Revenue Potential of Biorefineries**
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Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and Sustainability (Global-Bio-Pact)

- Supported in the 7th Framework Programme of the European Commission
- Coordinator: WIP Renewable Energies
- Duration: 3 years
- Start: February 2010










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Global-Bio-Pact Partners





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Global-Bio-Pact – Partnership

- **WIP – Renewable Energies**, Germany
- **Imperial College London**, United Kingdom
- **Utrecht University**, The Netherlands
- **BTG Biomass Technology Group**, The Netherlands
- **Institute for Energy and Environmental Research**, Germany
- **ProForest**, United Kingdom
- **Ecole Polytechnique Fédérale de Lausanne**, Switzerland
- **Universidade Estadual de Campinas**, Brazil
- **National Institute for Agricultural Technology**, Argentina
- **Tropical Agricultural Research and Higher Education Center**, Costa Rica
- **Tanzania Traditional Energy Development and Environment Organization**, Tanzania
- **Mali-Folkecenter**, Mali
- **Greenlight Biofuels Indonesia**, Indonesia





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Objectives

- Identify socio-economic impacts of **feedstock production**
- Identify socio-economic impacts of **conversion chains**
- Analyse impacts on **food security**
- Investigate link: socio-economic and **environmental impacts**
- Review current and future **trading** schemes
- Analyse **public perception**
- Make recommendations for **certification**

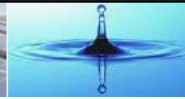




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Case Studies

- **Argentina:** Soy production and conversion
- **Indonesia:** Palm oil production and conversion
- **Tanzania / Mali:** Jatropha cultivation
- **Costa Rica / Brazil:** Bioethanol production from sugarcane
- **EU / N-America:** 2nd generation Biofuels



Case study selection

- 2 case studies on local/company level
- Regional study
- National study



Socio-economic Impacts of Biomass Production

- **Gender**
- **Employment opportunities**
- **Working conditions**
- **Health**
- **Food security**
- **Food and feed prices**
- **Land issues: competitive uses**
- **Land issues: conflicts**
- **Transitions from small to large production**
- **Change in traditional use and knowledge**
- **Local energy provision**

Global-Bio-Pact Publications

- Report on Socio-economic impacts, by Jinke van Dam, Utrecht University
- Paper on Global socio-economic impact assessment (18th EU Biomass Conference, Lyon, May 2010), by D. Rutz, J. van Dam, R. Janssen, et al.

Case Study - Brazil

Comparative local level case studies

- São Francisco Mill, Balbo group, São Paulo State
 - Large scale production from organic sugar cane
- Cooperative Pindorama, Coruripe, Alagoas, N-E Brazil
 - Productive area: 19.400 ha (sugar cane and fruits for local markets)



Socio-economic impacts to be investigated

- Income level and employment
- Working conditions, mechanisation
- Education and health
- Inclusiveness of schemes

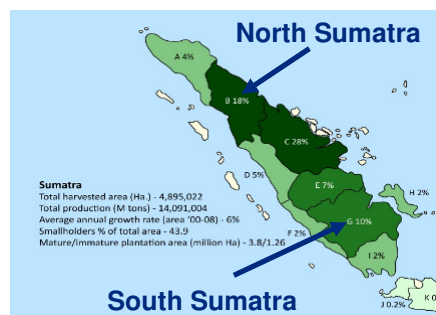
Case Study - Indonesia

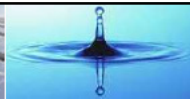
Comparative local level case studies

- World's leading exporter of palm oil, few up-stream processing to biofuels and bioproducts
- Case studies in North and South Sumatra (Comparison of ownership models)
 - Privately owned estates with associated smallholders
 - Government owned plantations
 - Independent smallholders

Socio-economic impacts to be investigated

- Income/poverty levels and employment, poverty alleviation
- Debt level, micro-lending
- Education level
- Migration patterns and mobility
- Land and water use, land rights
- Gender aspects

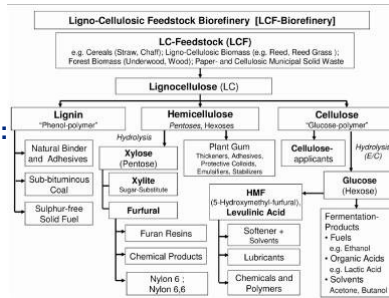




Case Study - 2nd Generation Biofuels

Biorefinery concepts selected

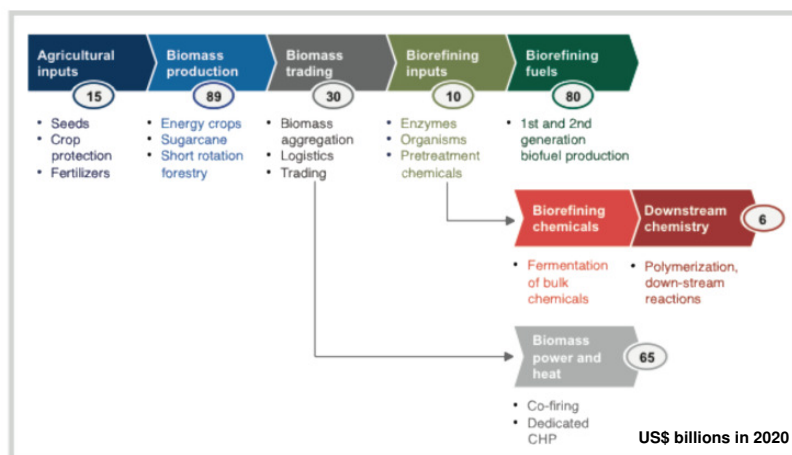
- Conventional biorefineries (e.g sugar and vegetable oil industry)
- Lignocellulosic feedstock biorefineries (LCF)
- Two-platform biorefineries (sugar and syngas platform)
- Thermochemical biorefineries (upgrading biomass by thermal processes: pyrolysis, gasification, HTU, torrefaction)



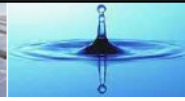
Invitation for Cooperation!!



Revenue Potential of Biorefineries



Lit.: The Future of Industrial Biorefineries, World Economic Forum, 2010



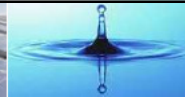
Economic Sustainability - Efficient biorefineries

Cost minimisation - cost competitive end products

- Local resources and existing infrastructure
- Streamlined supply chains
- Maximised biomass-to-product conversion rates
- Recycling, regeneration of catalysts
- Use of renewable energy (e.g. from by-products)
- Product flexibility

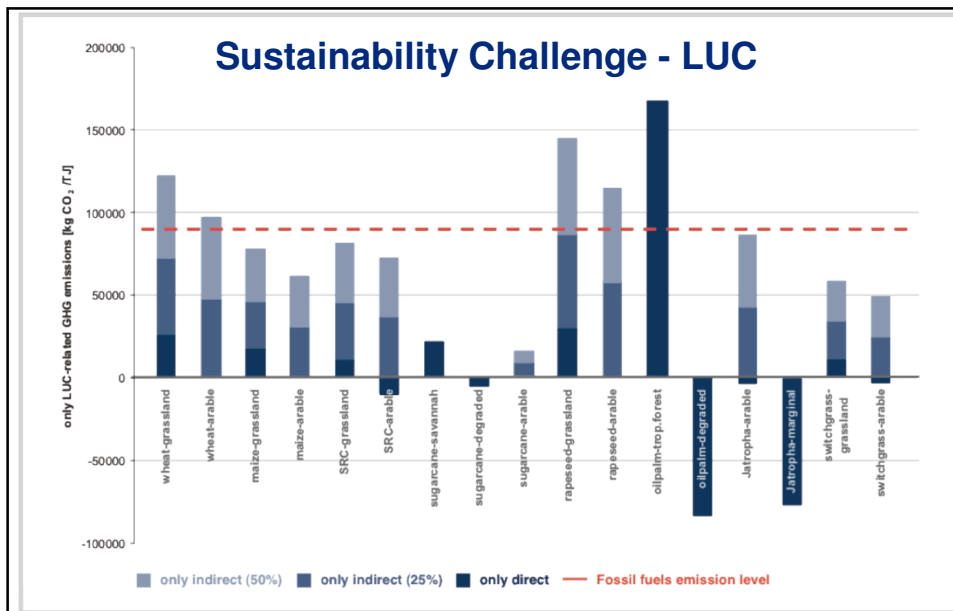
➤ Maximum advantage of intermediate and by-products

➤ Balance high value chemicals with high volume biofuels



Sustainability Challenges

- Impacts on biodiversity, rural communities, labour conditions, water resources and food supply
- Link between commodity prices and biorefineries
- Land use change and its effect on GHG emissions (e.g. soil carbon, carbon debt)
- Direct (DLUC) and Indirect Land Use Change (ILUC)
- Public perception



Land-Use Change induced GHG Emissions, Source: Oeko-Institute

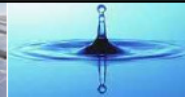


Policy and Regulations

Policy framework (incentive-based, command-and-control)

- Mandates for market creation for bio-based products (in combination with sustainability criteria)
- Subsidies and incentives (e.g. tax reductions and credits)
- Reduction of trade barriers
- Certification and assessment of sustainability criteria to avoid excessive LUC
- Total GHG emission criteria (entire life cycle)





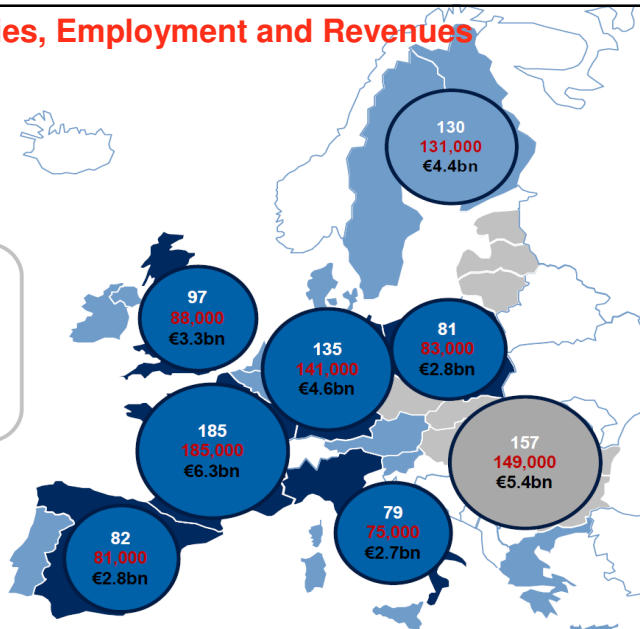
Report – Next Generation Ethanol and Biochemicals

- Study by Bloomberg New Energy Finance (BNEF), Sept. 2010
- Large-scale implementation of ligno-cellulosic ethanol in EU27
- Feedstock: forestry and agricultural residues (25% recovered), MSW
- No land use change involved (no ILUC)
- 5% of biomass for biochemical production (95% for ethanol)
- “bull case” scenario: increased crop yields (Eastern Europe), higher proportion of MSW
- **Policy Requirements**
 - EU-wide mandate for next-gen ethanol
 - Incentives for farmers to utilise residues

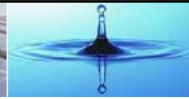
Refineries, Employment and Revenues

Key
Refineries
Jobs
Revenue

■ Top 6
■ Other States
■ New Member States

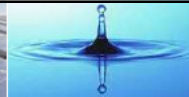


Source: Bloomberg New Energy Finance Note: The numbers of biorefineries is determined by the ability of each region or member state within the EU27 to supply bioproducts. Jobs in the chart represent the total man-years of employment between 2010 and 2020, not the number of jobs in 2020 alone.



Summary

- **Global-Bio-Pact engages in a global assessment of socio-economic impacts of biomass and bioproducts**
- **Case studies are launched in Argentina, Brazil, Costa Rica, Indonesia, Mali, Tanzania, and EU/US/Canada**
- **Cooperation is welcome on the socio-economic impact of 2nd generation biofuels and biorefineries**
- **Recent studies highlight significant revenue potential of biorefineries**
- **Suitable policy frameworks needed to ensure market up-take and socio-economic and environmental sustainability**



THANK YOU VERY MUCH FOR YOUR ATTENTION!

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