

# Global Bioenergy Partnership

*Working together to promote bioenergy  
for sustainable development*

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**Transportation biofuels for greenhouse gas mitigation, energy  
security or other reasons?**

**IEA Bioenergy - task 38**

**Salzburg, Austria; February 5- 6, 2008**

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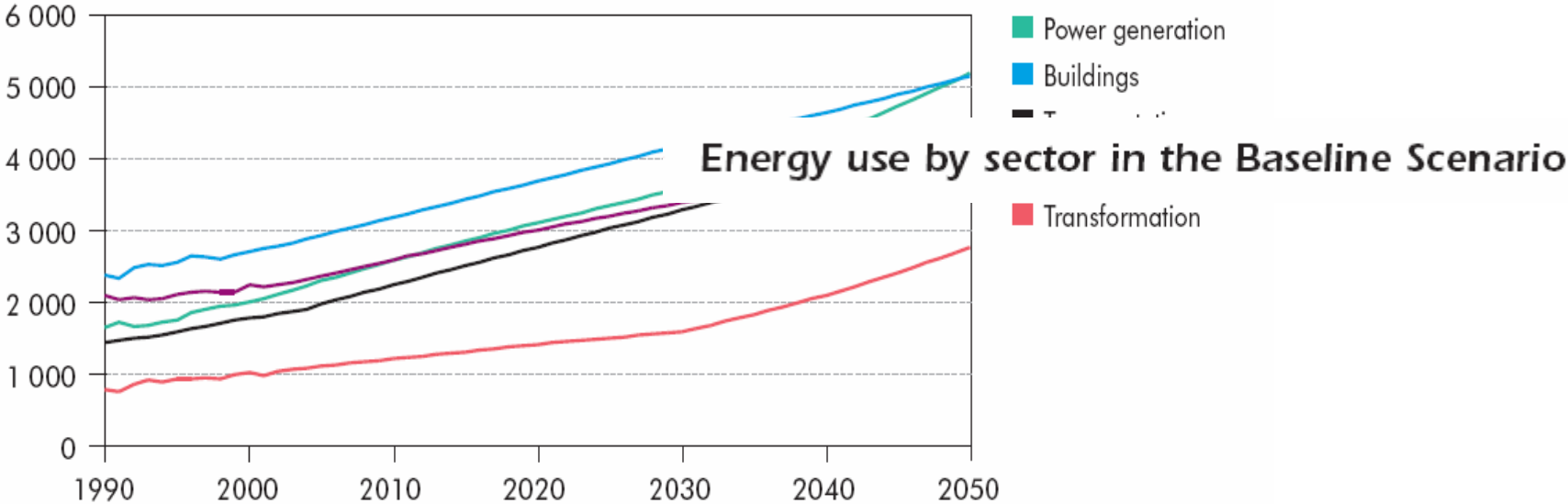
# KEY POINTS

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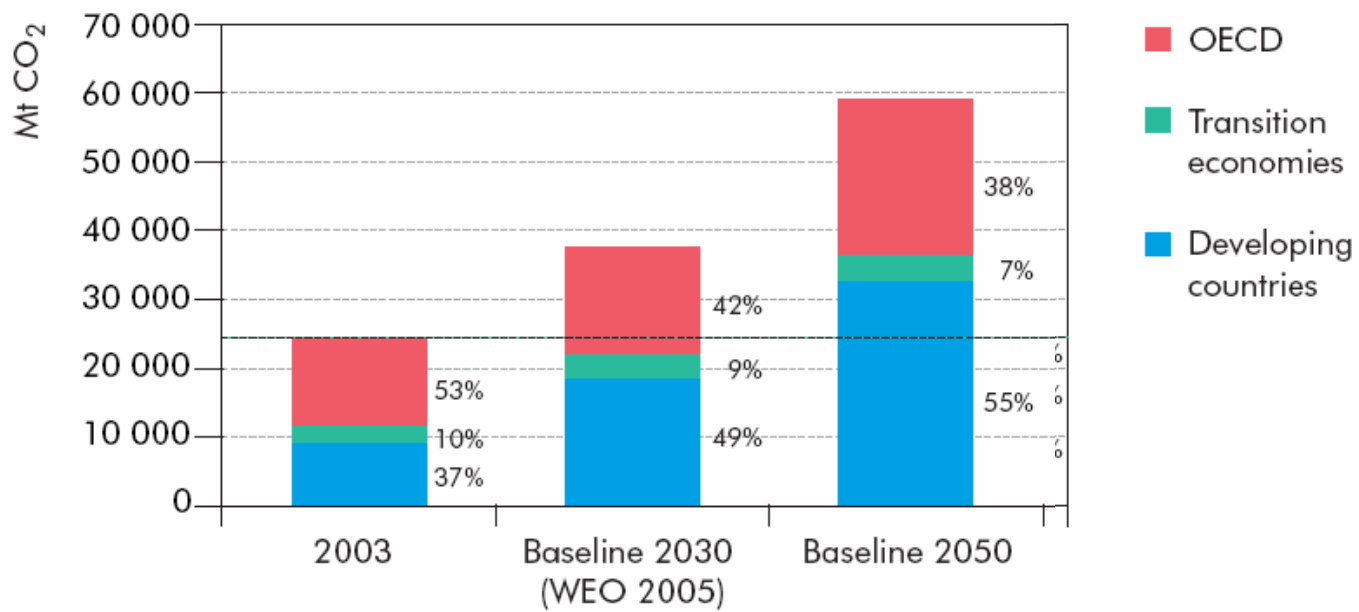
1. **Energy and Climate Change**
2. **International Partnerships for GHG mitigation**
3. **GBEP update**
  - **Biofuels in G8 +5 countries today**
  - **Biofuels development and perspectives**
  - **CO2 balance**
  - **Sustainability criteria**
  - **Economics**
  - **Projects**

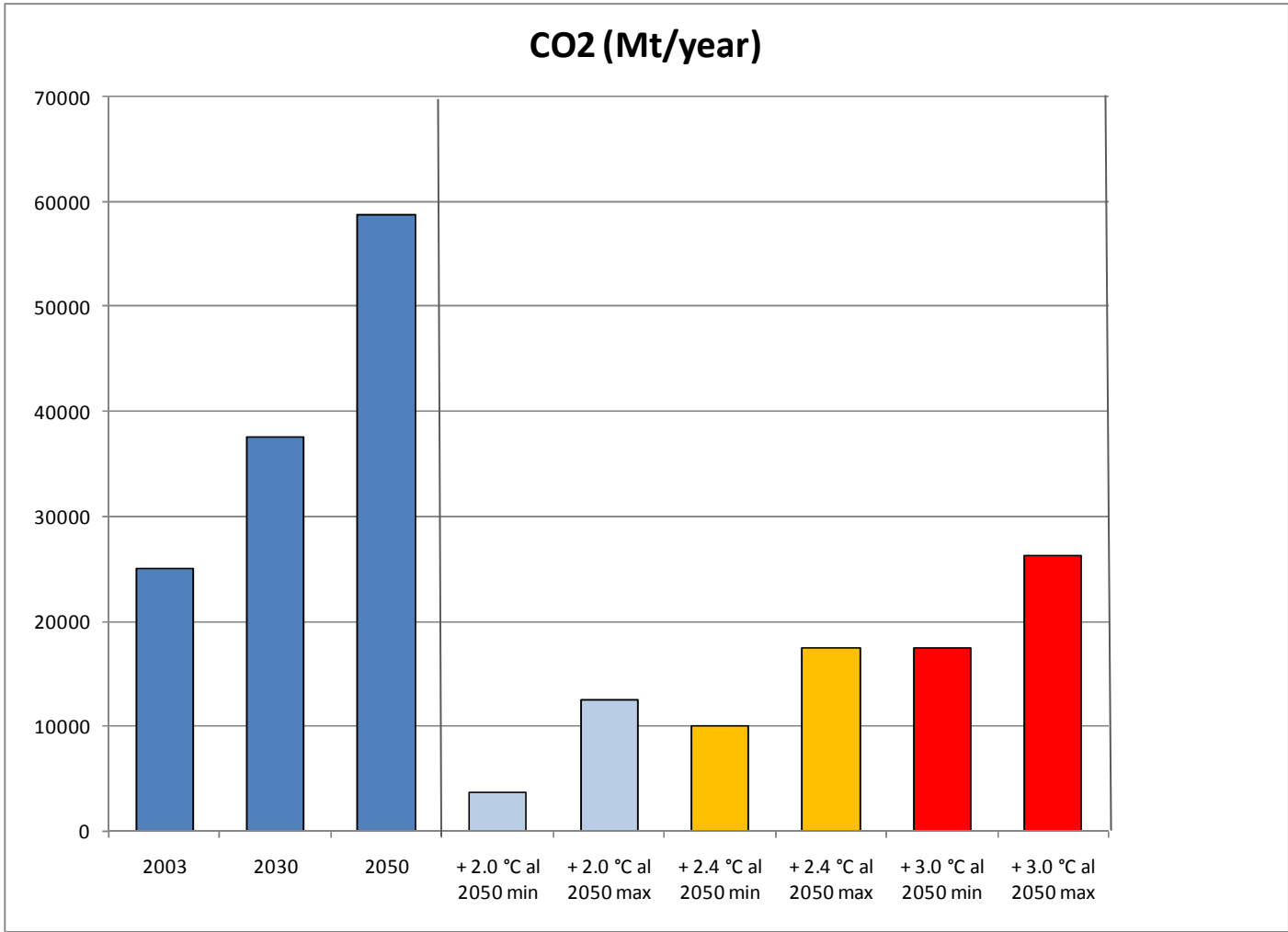
## Key messages

# ENERGY USE BY SECTOR IN THE BASELINE SCENARIO



|                             | Baseline Scenario |                |
|-----------------------------|-------------------|----------------|
|                             | 2003<br>(Mtoe)    | 2050<br>(Mtoe) |
| Electricity and heat plants | 2 180             | 5 177          |
| Other fuel transformation   | 1 003             | 2 761          |
| Industry                    | 2 326             | 4 138          |
| Transport                   | 1 895             | 4 472          |
| Buildings and appliances    | 2 733             | 5 142          |





# WHAT'S A GIGATON OF CO2 ?

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|                            |   |
|----------------------------|---|
| <b>Coal fired plant</b>    | <b>273 zero emission 500 MW</b>   |
| <b>CCS</b>                 | <b>1000 sequestration sites like Sleipner<br/>(only 3 in operation today)</b> |
| <b>Nuclear</b>             | <b>135 nuclear sites 1GW</b>  |
| <b>Efficiency</b>          | <b>Deploy 273 million new car at 40 mpg instead of<br/>20 mpg</b>             |
| <b>Wind</b>                | <b>4 times the current global gen capacity of 74 GW</b>                       |
| <b>Solar PV</b>            | <b>273 times the current global solar PV</b>                                  |
| <b>Biofuels</b>            | <b>Convert a barren area of about 4800.000 km2<br/>(2 times UK)</b>           |
| <b>CO2 stor new forest</b> | <b>Convert a barren area of about 900.000 km2<br/>(Germany + France)</b>      |

# ENERGY AND CLIMATE CHANGE

## A POSSIBLE SCENARIO FOR 2050

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### BALI

194 countries agreed:

2 year negotiation to define the road map with the target of 25-40 % reduction of CO<sub>2</sub> emission based on 1990 to be met within 2020

It is an enormous amount of CO<sub>2</sub> to be avoided in a short while

# GLOBAL WARMING- CLIMATE CHANGE

## It is an ethic issue that needs gov actions

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- **Commitment of all countries on the planet**
- **Definition of sustainability criteria for any options**
- **Definition of costs and values**
- **Definition of new market regulations**
- **Involvement of all stakeholders since the very beginning**

**Governmental Partnerships are political organizations crucial to define and present proposals for decision makers**

# INTERNATIONAL PARTNERSHIPS FOR THE GHG MITIGATION

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4 partnerships have already been set up:

- IPHE hydrogen set up in 2003
- CSLF carbon capture and storage set up in 2003
- M2M methane to markets set up in 2004
- GBEP bioenergy set up in 2006

All 4 very young, but very active: results achieved so far very promising

**A new partnership in preparation EEP (Energy Efficiency Partn)**



# IPHE: INTERNATIONAL PARTNERSHIP ON HYDROGEN ECONOMY

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- **16 Country Members + EU**
- **Chair CANADA**
- **Vice-chairs: Italy, USA, China, Japan**
- **Members: Australia, Brazil, Canada, China, France, Germany, Iceland, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Russian Federation, United Kingdom, United States**
  
- **Secretariat: Canada**

[www.iphe.net](http://www.iphe.net)

# CSLF: CARBON SEQUESTRATION LEADERSHIP FORUM

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- **21 Country Members + EU**
- **Chair: USA**
- **Vice Chairs: Italy, Australia**
- **Members: Australia, Brazil, Canada, China, Colombia, Denmark, France, Germany, Greece, India, Italy, Japan, Korea, Mexico, The Netherlands, Norway, Russian Federation, Saudi Arabia, South Africa, United Kingdom, United States**
- **Secretariat: DOE**

[www.csforum.org](http://www.csforum.org)

# M2M - 19 Partners

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[Argentina](#)

[Australia](#)

[Brazil](#)

[Canada](#)

[China](#)

[Colombia](#)

[Ecuador](#)

[Germany](#)

[India](#)

[Italy](#)

[Japan](#)

[Mexico](#)

[Nigeria](#)

[Poland](#)

[Republic of  
Korea](#)

[Russia](#)

[Ukraine](#)

[United Kingdom](#)

[United States](#)

## Project Network

Currently more than 480 organizations, including the Asian Development Bank, World Bank, UNECE, Consultants and Project Developers

# GBEP - 21 Partners

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**BRAZIL**

**CANADA**

**CHINA**

**FRANCE**

**GERMANY**

**ITALY**

**JAPAN**

**MEXICO**

**NETHERLANDS**

**RUSSIAN FED**

**UNITED KINGDOM**

**UNITED STATES**

**INTERNATIONAL ENERGY AGENCY**

**UN FOOD AND AGRICULTURE**

**UN CONF ON TRADE AND DEVLP**

**UN DEPT OF ECONOMIC & SOCIAL**

**UN DEVELOPMENT PROGRAM**

**UN INDUSTRIAL DEV ORGANIZATION**

**UN FOUNDATION**

**WORLD COUNCIL RENEW ENERGY**

**EUROPEAN BIOMASS IND ASSOC**

**IEA**

**FAO**

**UNCTAD**

**UN/DESA**

**UNEP**

**UNIDO**

**UNF**

**WCRE**

**EUBIA**

# GBEP – 9 OBSERVERS

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AUSTRIA

INDONESIA

ISRAEL

KENIA

MOZAMBIQUE

SOUTH AFRICA

SWEDEN

TANZANIA

EU

# FIRST GENERATION BIOFUELS

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- **Bioethanol** from crops as an alternative to food market (sugar cane, corn)
- **Biodiesel** from oil seeds (soybean, rapeseed, palm, sunflower) with trans-esterification with methanol (ethanol eventually) as an alternative to food market

# SECOND GENERATION BIOFUELS

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- Bioethanol from optimized sugar crops (sweet sorghum) in set aside area, in arid area or in poor soil
- Bioethanol from agriculture cellulose waste (corn stalks, straw) – Integrated agriculture-energy
- Biodiesel from optimized crops (Jatropha, Honge) - no food competition (**tropical and subtropical area**)
- Bio-oil (**SVO**) for adapted diesel engines for generators and tractors (when alcohol is not available or infrastructures inexistent) (**developing countries**)
- Biodiesel from hydro-refining of raw bio-oil (no more glycerin by-product)

# THIRD GENERATION BIOFUELS

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- Bioethanol from rotating wood plantations through cellulose hydrolysis
- Bio-oil or biodiesel from algae cultivation with CO<sub>2</sub> from power gen
- **Bio FT diesel** from waste bio-mass gasification
- Bio n-butanol from biomass fermentation (as co-solvent for ethanol/methanol-gasoline blends, or as chemical)
- Bio-hydrogen from selected biomass fermentation

# FOURTH GENERATION BIOFUELS

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- **Bio-H<sub>2</sub> from LT water photolysis through micro-organisms as catalyst**
- CO<sub>2</sub> reduction to CO through photosynthesis

# BIOFUELS IN G8+5 countries

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## Bioenergy in the global energy contest

- Bioenergy overview
- Bioenergy contribution to the world energy supply
- Bioenergy consumption in G8+5

## Policy overview

- Policies across countries
- Regional policies
- Sustainability and trade consideration

## Country profile and bioenergy data per G8 +5

## Regional profiles

- (EU, NAFTA, ASEAN, MERCOSUR, CBI, CAFTA)

# POLICY OVERVIEW G8 +5 Countries

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## **Principal policy mechanisms being deployed**

- Feed-in tariff
- Taxes
- Guaranteed market
- Compulsory greed connections
- Other direct supports on R&D&D

## **National targets and public incentives systems**

### **Government's current move towards performance focused policies**

- GHG reduction required rather than mandate on amount of fuels to be consumed

### **Recognition that no all biofuels are “green”**

### **Sustainability criteria need to be agreed upon internationally**

**WTO does not currently have a trade regime specific to biofuels. The current move towards technical standards regionally and internationally is addressed**

# GBEP: Harmonization of GHG methodologies

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**US is the GBEP leading Partner on biofuels for transportation**  
**Germany is the GBEP leading Partner on solid biomass**

## **Main Objectives:**

**- Develop a harmonized methodology to be used by policy makers in all countries**

**Develop a template or best practice guidance in the harmonized methodology for conducting GHG lifecycle assessments**

# GBEP: GHG for transportation

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**US hosted first GBEP Task Force meeting Oct 2007**

**Participants from Canada, France, Germany, Italy,  
Japan, UK, US, ENEP, UNF, ICCT, UCB, ISU**

**Group decided it possible to develop a checklist of  
common elements to be included in a GBEP  
methodology**

# BACKGROUND

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- GHG methodologies taskforce established by GBEP steering committee in May 2007
- Goal of taskforce is to focus global efforts on the harmonisation of methodologies for measuring the GHG benefits of transport biofuels.
- End result is to have flexible methodology to be used by policy makers in all countries (both developed and developing) and be applicable to any type of transport biofuel.
- First taskforce meeting October 2007
- Second meeting March 2008

# TASKFORCE WORK PLAN

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- Review existing methodologies for measuring exclusively the GHG impacts of transport biofuels.
- Develop a harmonised approach by which the results of GHG lifecycle assessments can be compared on an equivalent and consistent basis.
- Encompass the full well-to-wheel lifecycle of transport biofuels and address all significant sources of GHG emissions
- Not indicate a preference for any particular existing methodology or feedstock, or to place limits on the parameters that may be included in biofuel GHG life cycle assessment tools.
- Define a minimum set of recommended parameters and inputs to be considered when conducting a GHG analysis for potentially any type of transport biofuel and to set these out in a good practice guidance document for policy makers.

# MEMBERSHIP OF TASKFORCE

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At first meeting the following organizations attended:

- Canada
- France
- Germany
- Italy
- Japan
- the United Kingdom
- the United States
- UNEP
- the UN Foundation
- the International Council on Clean Transportation
- University of California Berkeley
- Iowa State University
- and the GBEP Secretariat

# RESULTS OF OCTOBER 07 MEETING

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- Review of existing efforts in defining methodologies
- Broad agreement that it is possible to develop common methodology
- Development of preliminary list of parameters and inputs needed for a common methodology
- Recognition of issues needing further discussion

# LIST OF PARAMETERS

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- The GHGs to be covered;
- The effects of direct land use change, both in terms of above and below ground carbon inventories;
- The effects of the production cycle, including fertilizer production, agricultural inputs and processing energy;
- Combustion of the finished biofuel and tailpipe emissions; and
- Corresponding factors to facilitate comparison with the petroleum fuel replaced.

# ISSUES NEEDING FURTHER DISCUSSION

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- The possible need for common definitions of terms;
- Accounting for co-product emissions;
- Ensuring transparency in default values and parameters used, and assumptions made, in conducting a GHG lifecycle assessment;
- Whether to include consideration of pollutants, such as particulate matter;
- Whether and how to take account of the effects of indirect land use change;
- How to take account of future technologies (e.g. cellulosic) in the design of the methodology.

# SECOND TASKFORCE MEETING

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- Scheduled for March 7 in Washington DC
- Agenda still not defined but will likely focus on issues still needing further discussion and next steps

# NEXT STEPS

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- Continue meeting and define timeline for finishing final methodology by 2009.
  - First draft completed (hopefully) by late 2008
  - Draft will be made available for comment
  - Comments incorporated and submitted to GBEP Steering Committee for approval

# MAIN COMPONENTS OF A CHECKLIST

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1. **GHGs to be included in checklist**
  
2. **Direct land- use change**
  - Above- ground biomass
  - Soil carbon
  
3. **Production cycle**
  - Farm/forest to gate
  - Farm/forest gate to tank
  
4. **Wells to wheels**
  
5. **Comparison to petroleum fuel replaces**

# KEY ISSUES STILL NEEDING RESOLUTION

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## Methodology Issues

- Energy balance (co-products included)
- How to allocate emissions from co-products
- Transparency about default value/models

## Externalities

- Inclusion of criteria pollutants ?
- Indirect land-use change included?
- N<sub>2</sub>O fixing

## Future considerations

- How is cellulose accounted for?

# FARM/FOREST GATE TO TANK

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**This aspect is crucial:**

**Production of bio-diesel in a tropical country needs to bring methanol there from Venezuela and back bio-diesel from such tropical country to the international market (CO<sub>2</sub> emission for logistic of both methanol in and bio-diesel out)**

**Production of bio-oil in the tropical country and use it as SVO for domestic demand and avoiding oil import (CO<sub>2</sub> emission saved in comparison with the above)**

**Import of bio-oil from tropical countries to Europe and refine it in refinery**

**Production of bio-oil in Europe and use it as fuel for large low speed diesel engines in substitution of diesel)**

# SUSTAINABILITY CRITERIA

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- **Competition with food**
- **Protection of biodiversity**
- **Management of land**
- **Management of water**
- **Control of air, soil, waters pollution**
- **Social impact on urbanization**
- **Keeping people on rural area**

# ECONOMICS

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- Global warming- climate change means a new global commitment for the GHG mitigation
- Biofuels should compete in the fuel market, but the fuel market regulations should be drastically modified in order to meet the target
- Biofuel business should not be based on the oil price only
- A shared CO<sub>2</sub> value should be defined to cover the extra cost of biofuels compared with fossil fuels

(40 Euro/ton of CO<sub>2</sub> ? )

# MARKET DEVELOPMENT

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- First gen biofuels: increase sustainable production worldwide competing in a new fuel market
- Second gen biofuels: demo units –cost sharing industry and govts
- Third gen biofuels: pilot units with prevalent public funds
- Forth gen: basic research- mainly public funds

GBEP could help in the harmonization of all these activities through an integrated **WORLD BIOFUELS PROJECT**

# KEY MESSAGES

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- **Growth in bioenergy needs to be carefully managed if we are to make the most of its benefits on resolve its challenges**
- **Sustainability is a key objective and it is wise to ensure sustainability management of the entire chain**
- **Methodologies to measure GHG emission reduction from the use of biofuels are essential for the climate change mitigation**
- **Next generation biofuels are likely to provide large amount of biofuels in a short while**
- **Bio-fuels development is already in progress**
- **Capturing the full potential of biofuels means overcoming environmental and social constrains and removing trade barriers.**
- **Economics and competition need a change in the market regulations**

# FOR FURTHER INFORMATION

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## **GBEP Secretariat**

Food and Agriculture Organization

Rome - ITALY

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