# Biofuels Markets Congress and Exhibition

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# Potential Role of Biofuels in Future Markets

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## **Today's Energy Challenges**

- If no action is taken, by 2050 (Source: IEA, ETP 2008):
  - ➤ Coal demand would almost triple (+192%)
  - Gas demand increase by 138%
  - ➤ Oil demand grow by 65% and
  - Import dependency of most countries would further increase
  - ➤ CO<sub>2</sub> emissions increase by 130% IPCC: Cutting by half necessary to prevent dangerous global warming
- Biomass for energy uses versus food production





### Oil: How much is left to produce

(IEA World Energy Outlook 2008)

- The world is far from running short of oil. Remaining <u>proven reserves</u> of oil and natural gas liquids amount to about 1.2 to 1.3 trn barrels (more than total production since 1850).
- Long term potentially recoverable <u>total oil resource</u> base amounts to around 6.5 trn barrels.
- BUT
  - Future reserves growth will depend, to a large extent, on increases in recovery (35% recovery rate on average today, 1% increase would add 6% to proven reserves)
  - > Decline rates of oil fields accelerate
  - Immediate risk of oil supply comes from lack of investment where it is needed
- Investment (including R&D) will be decisive for future fuel supply → more petrol / more biofuels?

































- Created in 1974
- Integral part of members' energy security
- Conducts policy analysis, compiles data
- Convenes expertise
- Assists in implementation
- Develops scenarios that address energy and climate change simultaneously























## **IEA Energy Technology Network**

### IEA GOVERNING BOARD

CERT - Committee on Energy Research and Technology

Fusion Power Co-ordinating Committee

### IMPLEMENTING AGREEMENTS

- Env., Safety, Economy
- **Fusion Materials**
- Large Tokamaks
- NuclearTechnology
- Plasma Wall

Interaction TEXTOR

- Reversed Field Pinches
- Spherical Tori
- Stellarator Concept
- **Tokamaks Poloidal**

Field Divertors

Working Party on Fossil Fuels

#### IMPLEMENTING AGREEMENTS

- Clear Coal Centre
- Clear Coal Science
- Enhanced Oil Recovery
- Fluidised Bed Conversion
- Greenhouse Gas R&D
- Mutiphase Flow Science

Advisory Group on Oil & Gas Technology Working Party on Renewable Energy Technologies

### IMPLEMENTING AGREEMENTS

- Bioenergy
- Deployment
- **■** Geothermal
- Hydrogen
- Hydropower
- Ocean Energy
- Photovoltaic Power
- Solar Heating/Cooling
- SolarPACES
- Wind Turbines

Working Party on Energy End-Use Technologies

### IMPLEMENTING AGREEMENTS

- Advanced Fuel Cells
- Advanced Materials Transp.
- Advanced Motor Fuels
- Buildings/Communities
- **Emissons Reduction**

Combustions

- Demand Side Management
- District Heating/Cooling
- **Electricity Networks**
- **Energy Storage**
- **Heat Pumps**
- Hybrid/Electric Vehicles
- Industrial Technologies/

Systems

■ Superconductivity

Hydrogen Co-ordination Group

Experts Group on R&D Priority-Setting and Evaluation

Ad Hoc Group on Science and Energy Technologies



- Climate Technology Initiative
- Energy Technology Systems Analysis Programme
- Energy Technology Data Exchange

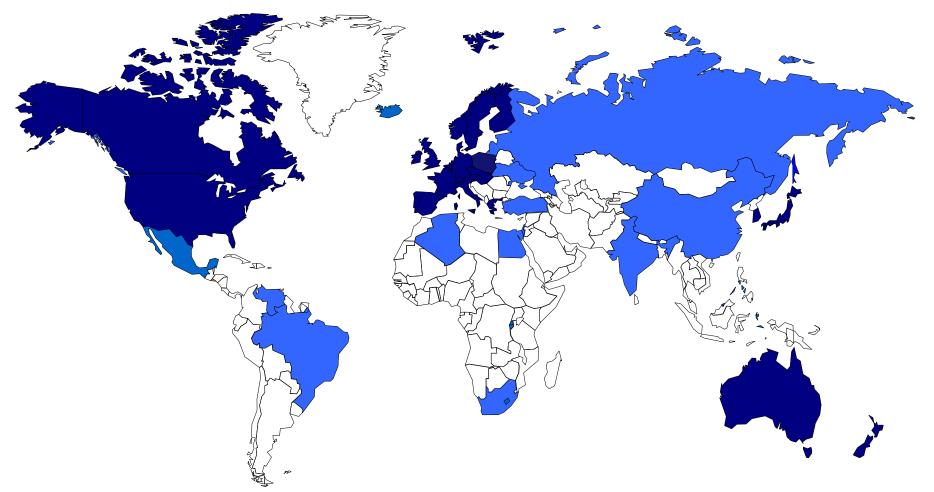


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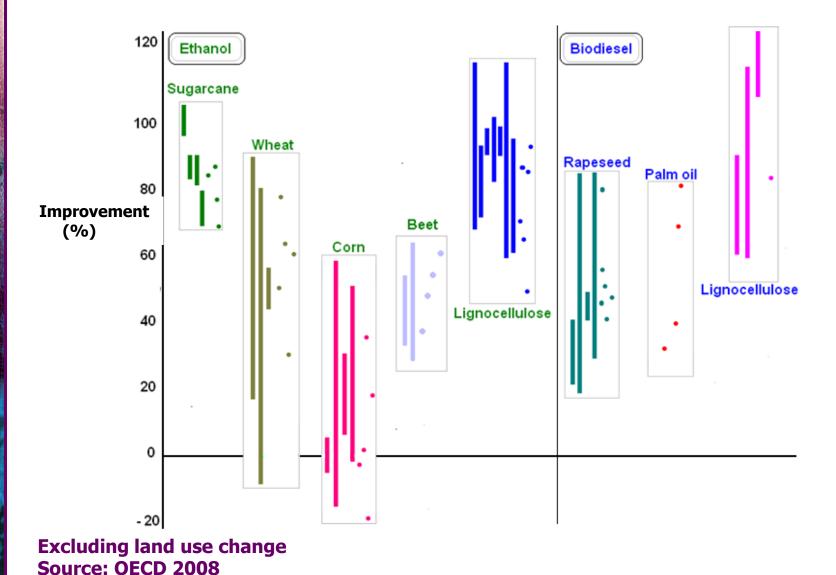
## **IEA's Global Energy Technology Co-operation**



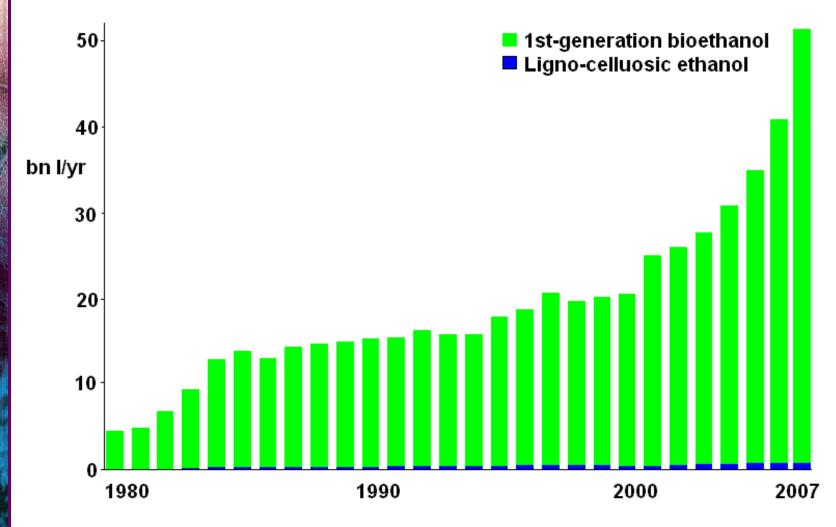
More than 5 000 participants from governments, industry and R&D community

# © OECD/IEA - 2008

## Well-to-wheel emission changes compared with gasoline or mineral diesel



# World ethanol production from 1<sup>st</sup> generation and ligno-cellulose







# From 1<sup>st</sup> to 2<sup>nd</sup> Generation Biofuel Technologies

- Joint study of IEA and Bioenergy Implementing Agreement Task 39 (November 2008)
- Main messages:
  - Currently technical barriers for 2<sup>nd</sup> Generation biofuels-production remain
  - ▶ Production costs are uncertain ~0.80-1.00 USD/lge
  - ➤ For many years 2<sup>nd</sup> generation biofuels will probably not be fully commercial without significant governmental support
  - Considerably more RD&D is needed to ensure sustainable production of various feedstocks
  - Once proven, a steady transition from 1<sup>st</sup> to 2<sup>nd</sup> generation is assumed



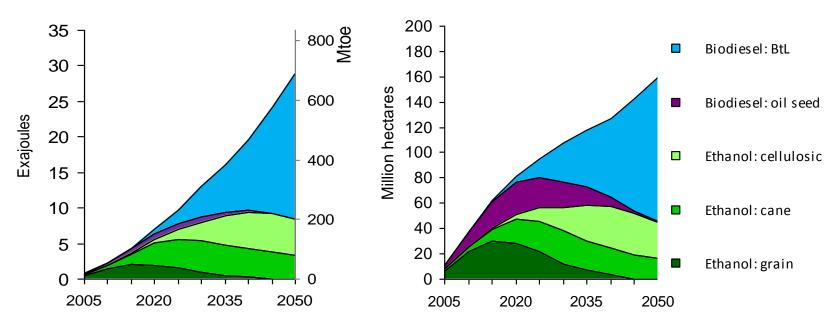




**Source:** IEA – Energy Technology Perspectives 2008.

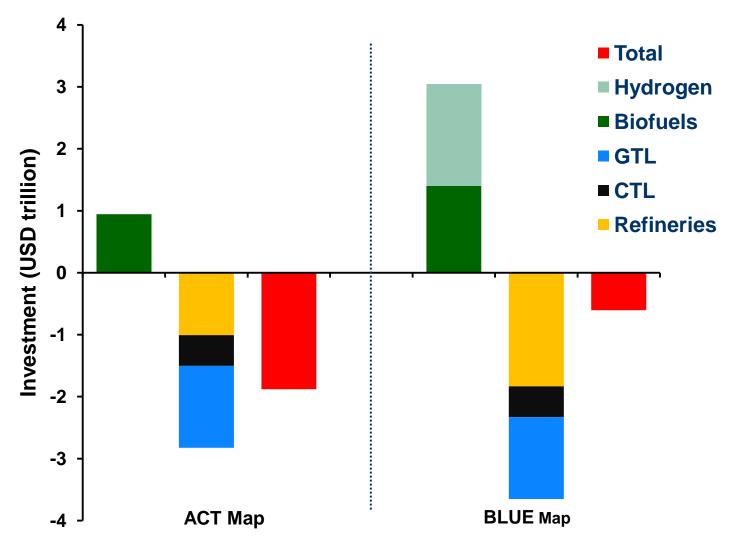
## **Biofuel shares and land use ETP 2008 BLUE Map Scenario**

- 690 Mtoe/yr (29 EJ/yr) in 2050 → 160 Mha land (13 200 Mha world total land area, 1 500 Mha used to produce arable crops)
- Share of total transport fuel
  - Currently 1 %
  - > 26% by 2050



**Source: IEA – Energy Technology Perspectives 2008.** 



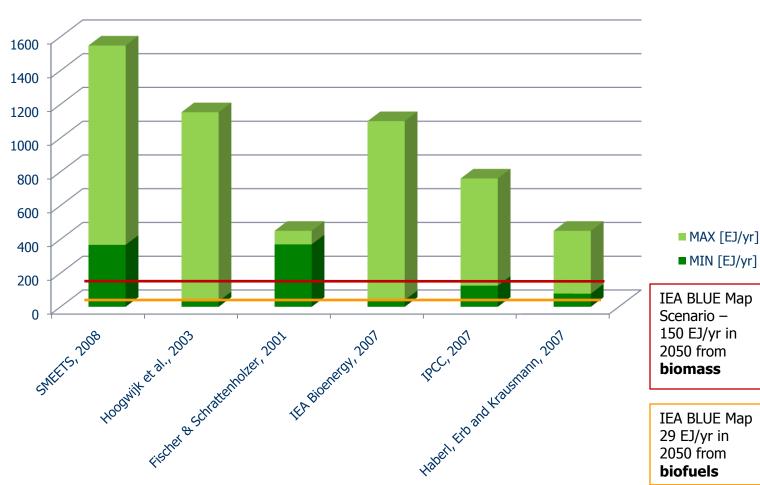




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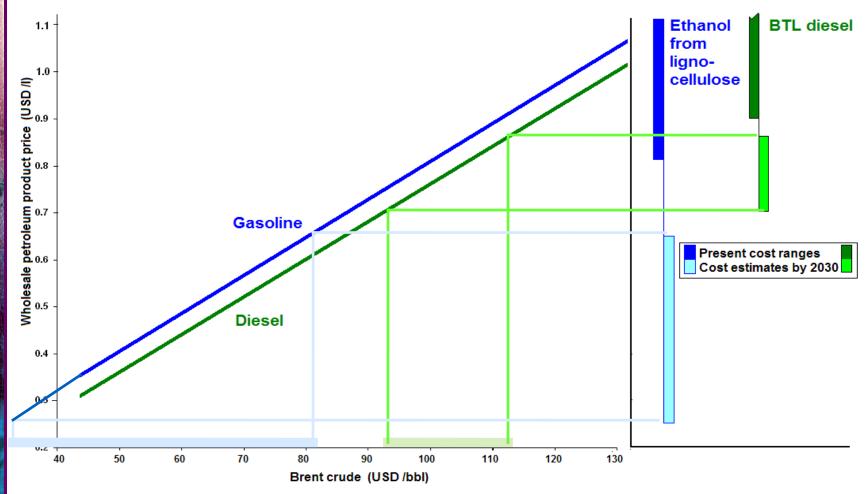
### **Overview – Previous Studies**

### **Global Bioenergy Potentials**





## **Production Cost Ranges for 2nd Generation Biofuels versus Crude Oil Price**



Present and 2030 projection production cost ranges for 2<sup>nd</sup>-generation biofuels (USD / litre gasoline equivalent) compared with wholesale petroleum fuel prices correlated with the crude oil price over a 16 month period

Source: Based on IEA World Energy Outlook, 2006, section on biofuels



## **IEA Currently Takes a Closer Look at 2<sup>nd</sup> Generation Biofuels Potentials**

- Promises of 2<sup>nd</sup> generation lignocellulosic biofuels
  - can use crop waste -> avoid competition between food production and biofuels production
  - Can help further diversification of supply
  - Low CO<sub>2</sub> emissions

### Questions:

Substantive work already undertaken, but not yet fully understood and/or communicated

- Are the efforts to develop this new technology worth while?
- What could be the potential of 2<sup>nd</sup> generation lignocellulosic biofuels?