



# BIOFUELS in a global context

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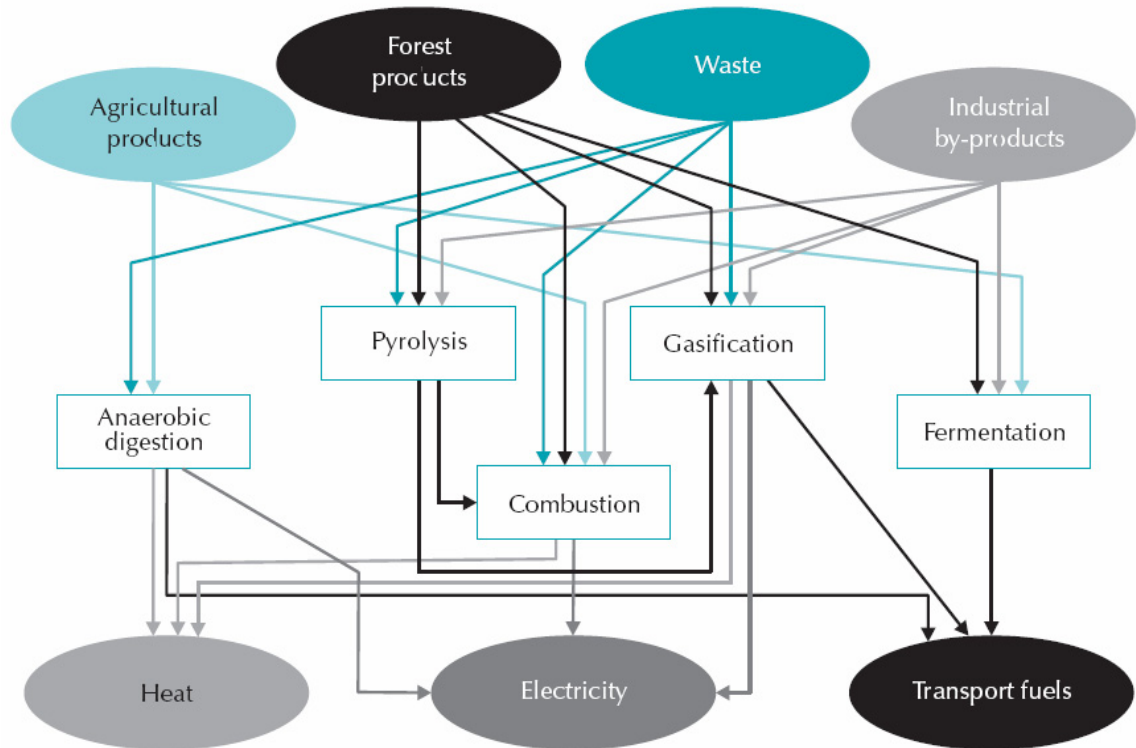


# Issues

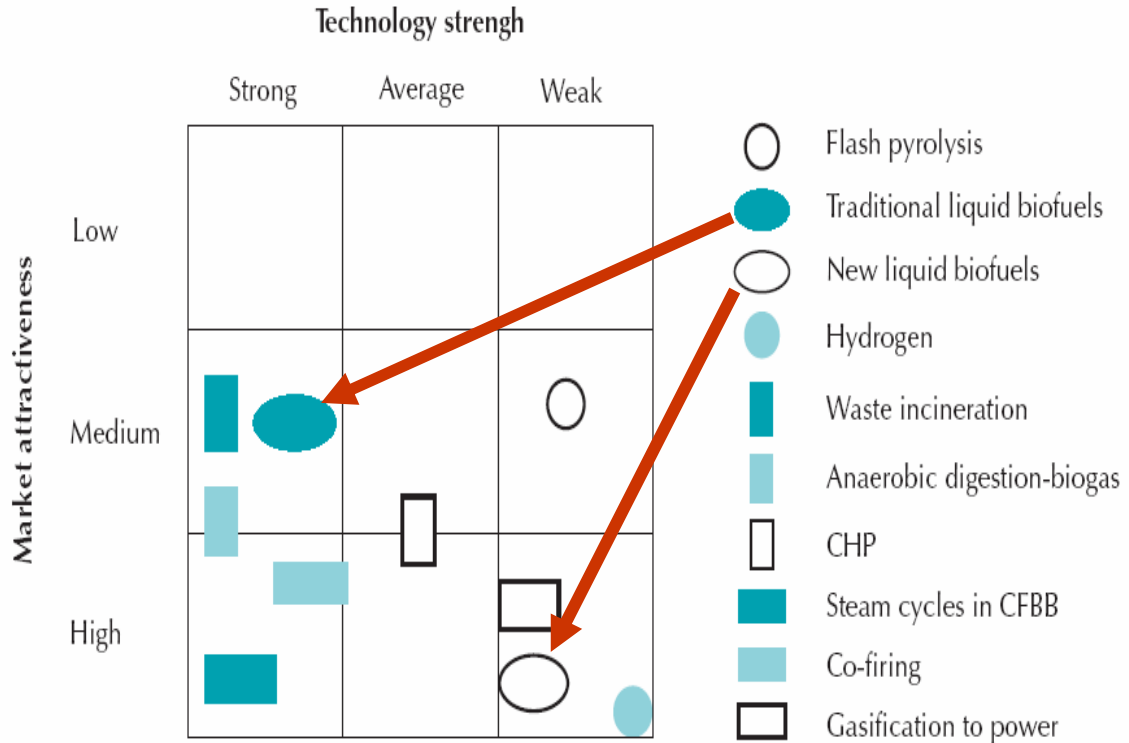
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- OECD countries value biofuels as a means of reducing greenhouse gases, meeting clean air policies and achieving greater energy supply security by reducing foreign oil dependence.
- Non-OECD countries consider biofuels to be a means of stimulating rural development, creating jobs, and saving foreign exchange.

# Bioenergy matrix



# Technologies and markets





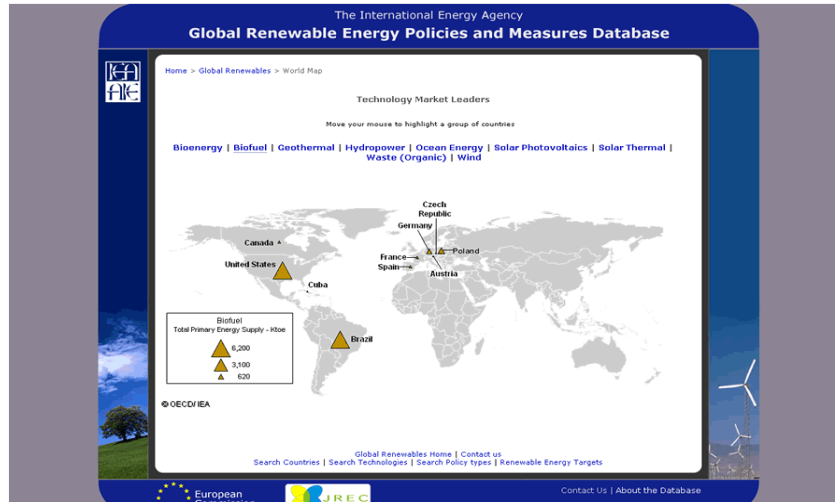
# Biofuels...

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1. Can make an important contribution to energy policy aims.
2. Can contribute to energy security by diversifying energy supply sources for transport.
3. Can reduce greenhouse gas emissions, reduce local air pollution, and develop new industry.
4. In developing economies can stimulate and sustain rural development, create jobs, and save foreign exchange.

# 2005 production

- 2% of the world's gasoline market
- 0.2% of the world's diesel market



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## Leading producers

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- Brazil - 17.5 billion litres bioethanol - half of the world's trade
- USA - 14 billion litres bioethanol (2004)
- China - 5 billion litres bioethanol
- Germany – 1.9 billion litres biodiesel – half of the world's production



# Fuel standards and engines

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- Most petrol engines suitable for running on blends of petrol and, up to 10%, bioethanol.
- Millions of new flexi-fuel vehicles can run on up to 85% bioethanol blend.
- Conversion costs are low.



# Biofuels energy ratios

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Fossil fuel input to biofuels output:

~ 1:3 - biodiesel

~ 1:8 - sugar cane bioethanol

~ 1: less than 2 - corn bioethanol



# Advanced technologies

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- Ligno-celulosics
  - Fuel from plant waste such as straw
- Bio-refineries
  - Co-production of fuel, chemicals, energy



# Carbon dioxide emissions

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- Large differences in potential carbon dioxide savings.
- Critical factors:
  - Crop yields and agricultural efficiency
  - Transport, processing
  - Production efficiency
- 90% reduction for bioethanol from sugarcane and crop residues, and for biodiesel from animal fats.
- 10-15% reduction - annual root and cereal crops.

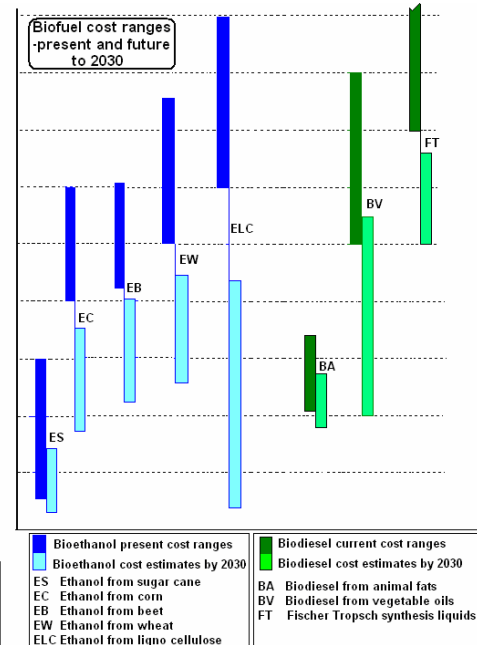
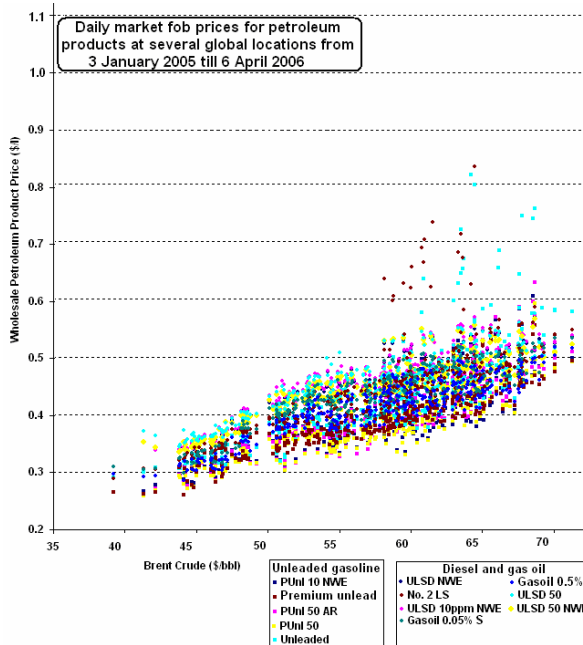


## Existing targets

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- US: 10% annual growth of bioethanol by 2012.
- EU: 5.75% by 2010.
- Mandatory biofuels targets placed on oil companies exist in 11 countries.

# Economic feasibility





# Pros and cons

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- Sugar cane
  - Competitive
  - Clean
  - Trade potential
- Grain, beets
  - Not competitive
  - Limited emission reduction gain
- Ligno-cellulosic
  - Costly today, potentially competitive
  - Not competing with food resources



# Observations

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- Today - biofuels compete with food and fibre products.
- Genetically modified species can provide higher yield.
- Dry and marginal lands may become acceptable for new crops e.g. jatropha, euphorbia.
- “Second generation” biofuel technologies to come mainly from waste biomass.
- Ligno-cellulosic materials so far with limited commercial success.
- RD&D initiatives will play a crucial role in commercialising these technologies.



# Conclusions

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- Trade policy should open access to the most competitive international sources of biofuels.
- The potential for expanding biofuels in the future by developing advanced technologies such as ligno-cellulosic and bio-refineries.
- Governments should direct Research, Development and Demonstration policies to bring these technologies forward as soon as possible.
- Governments need to consider carefully the objectives of quota policies – are they stimulating the right sort of biofuels?



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