BIOFUELS: an International Perspective

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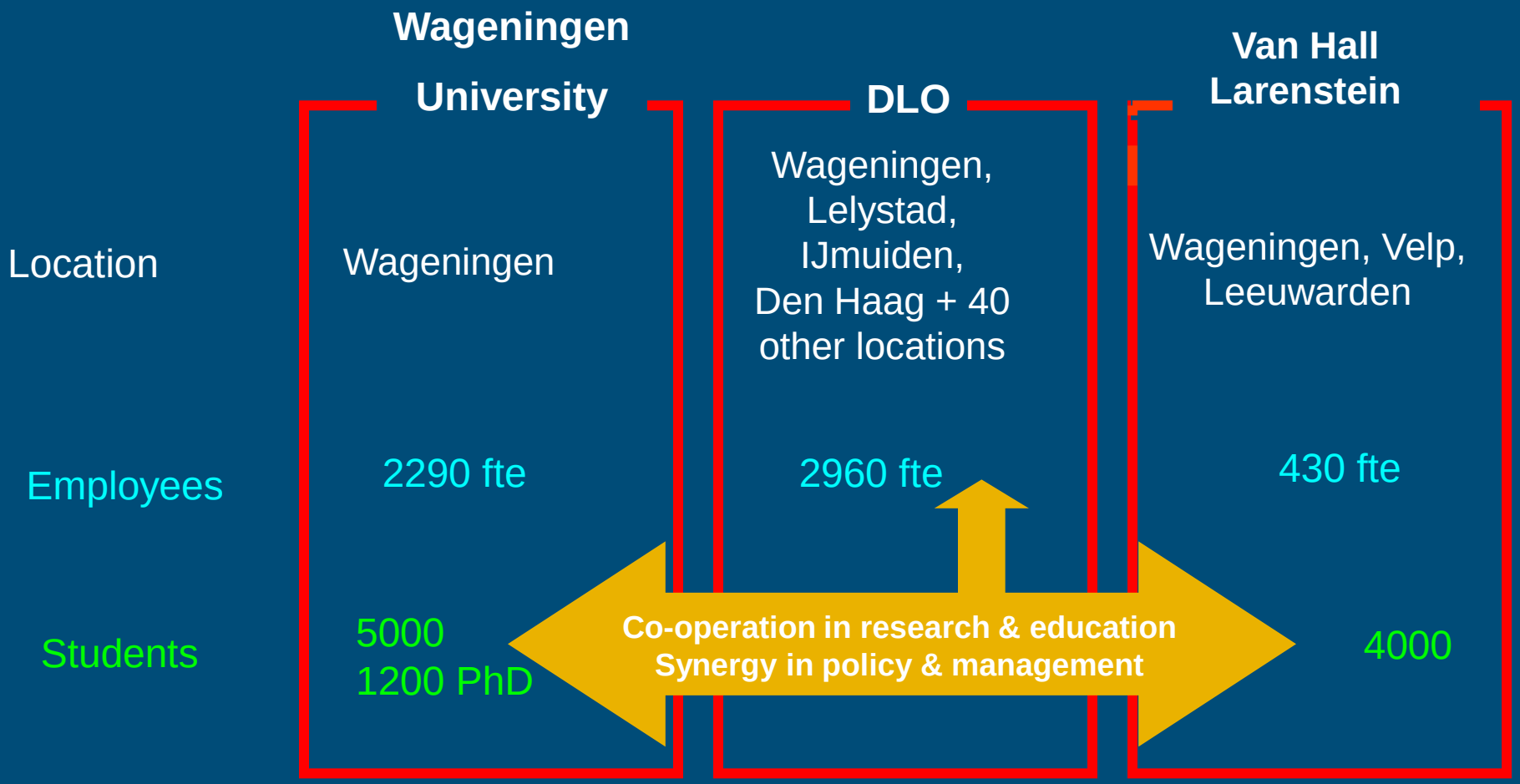

Source: report 2005

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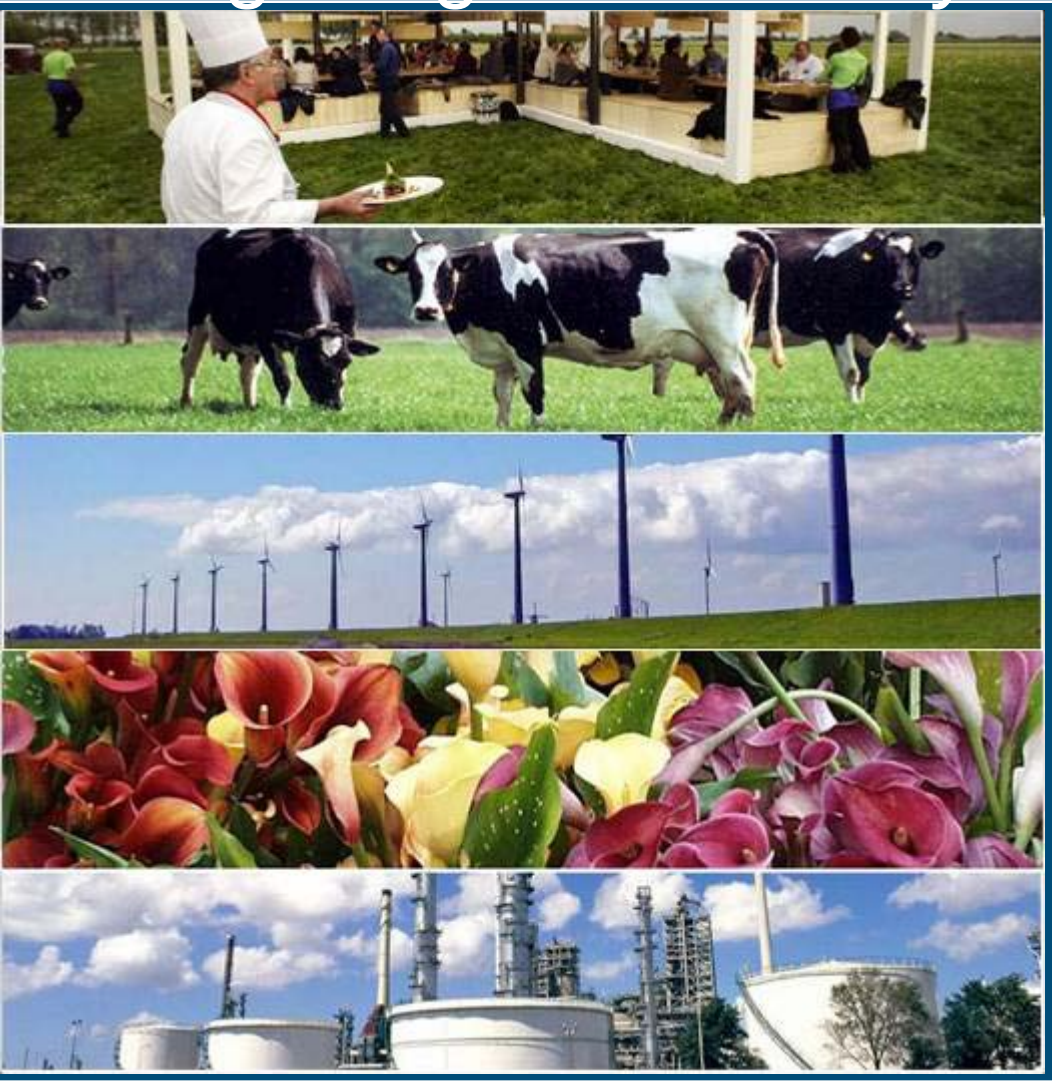

Social sciences group

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Three Hard Truths"…

- "demand for energy is going to continue to surge,
- energy supplies from all sources will struggle to keep up, and there is an
- urgent need to reduce green house gas emissions".

Crisis?

Soaring energy prices to mid-2008, followed by a collapse – what will it mean for demand?

How will the financial crisis & economic slowdown affect energy demand & investment?

Are we setting ourselves up for a supply-crunch once the economy is back on its feet?

Surge of demand: Transport energy consumption

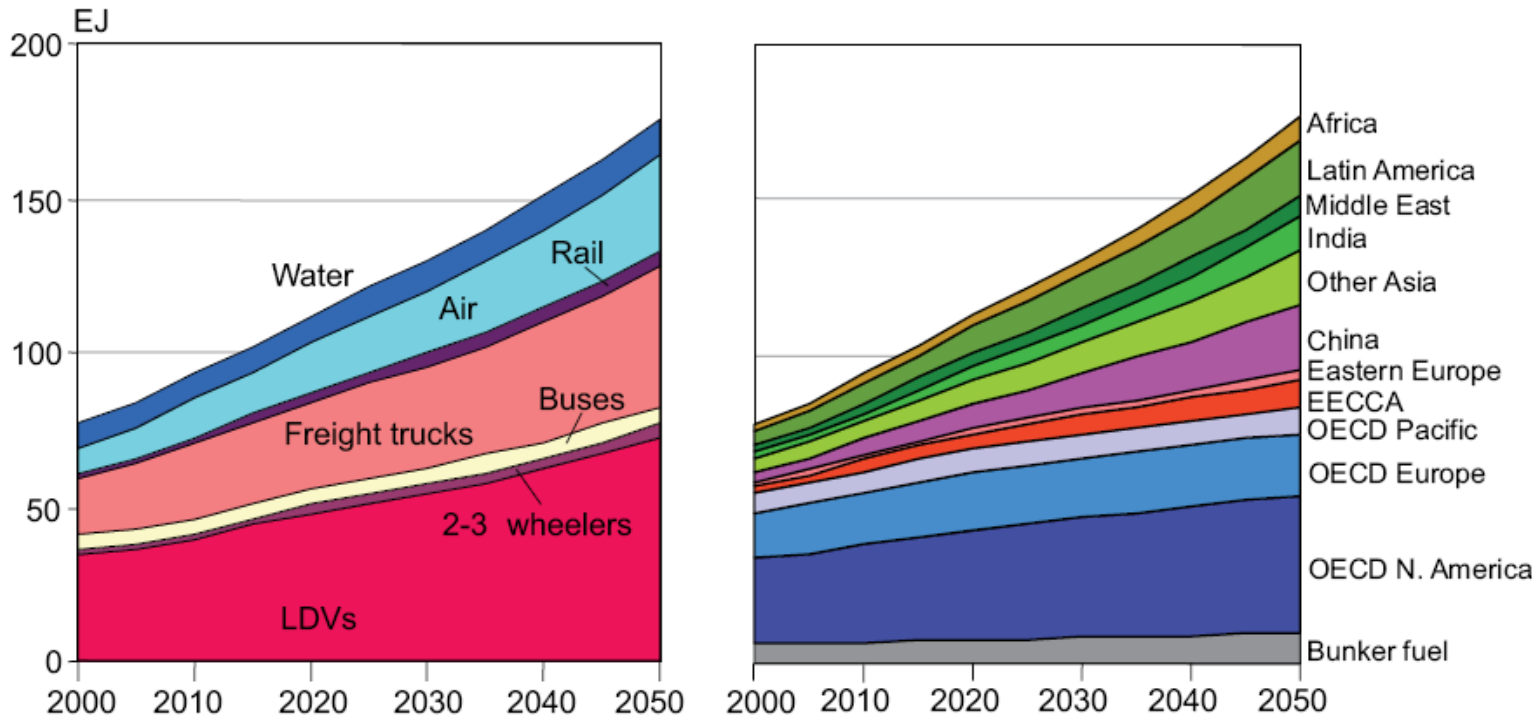


Figure 5.3: *Projection of transport energy consumption by region and mode*

Source: WBCSD, 2004a.

IAE Outlook 2008

- ***World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise***
- ***Demand for coal has been growing faster than any other energy source & is projected to account for more than a third of incremental global energy demand to 2030***

Impact of crisis?

IAE, 2008 Outlook

- ***All of the growth in oil demand comes from non-OECD, with China contributing 43%, the Middle East & India each about 20% & other emerging Asian economies most of the rest***

Renewables

- ***Soon after 2010, renewables become the 2nd-largest source of electricity behind coal, thanks to government support, prospects for higher fossil-fuel prices & declining investment costs***

Impact crisis?

The supply crunch

- ***Investment of $26 trillion, or over $1 trillion/year, is needed, but the credit squeeze could delay spending, potentially setting up a supply-crunch once the economy recovers***

Energy and climate change

- ***97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone***

So again: Three Hard Truths"…

- "demand for energy is going to continue to surge,
- energy supplies from all sources will struggle to keep up, and there is an
- urgent need to reduce green house gas emissions".

IAE conclusions Outlook 2008

Current energy trends are patently unsustainable — socially, environmentally, economically

Oil will remain the leading energy source but...

> ***The era of cheap oil is over, although price volatility will remain***

> ***Oilfield decline is the key determinant of investment needs***

> ***The oil market is undergoing major and lasting structural change, with national companies in the ascendancy***

Impact crisis?

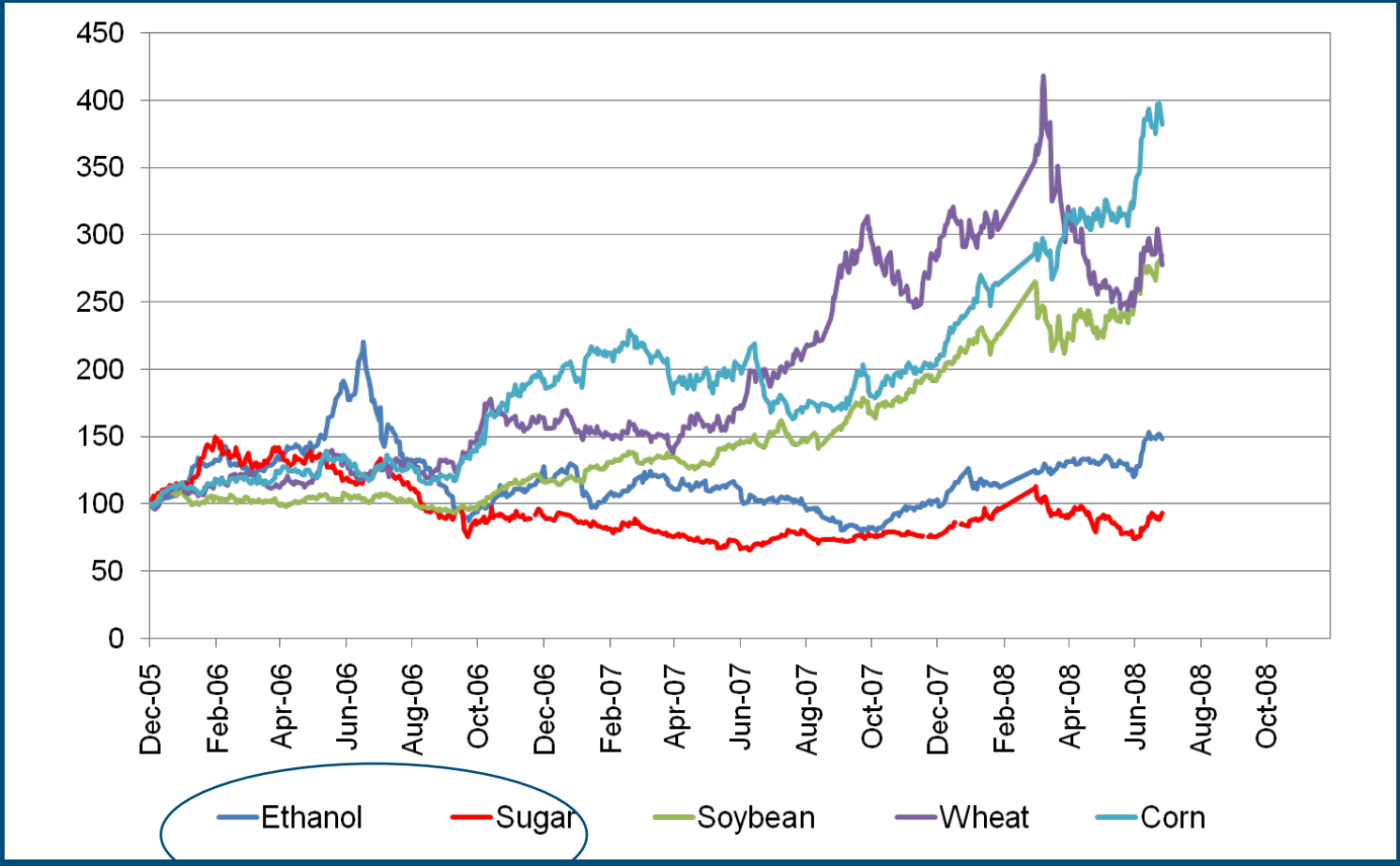
Uncertainties : oil prices

- Higher oil prices
- Higher energy prices lead to higher food prices as costs (e.g. fertilizer, processing, and transport) increase. Higher transport costs induce higher price effects as distances increase.

Uncertainties: Currencies

- Appreciation of dollar: World prices are denominated in dollars and the dollar depreciated against most currencies.

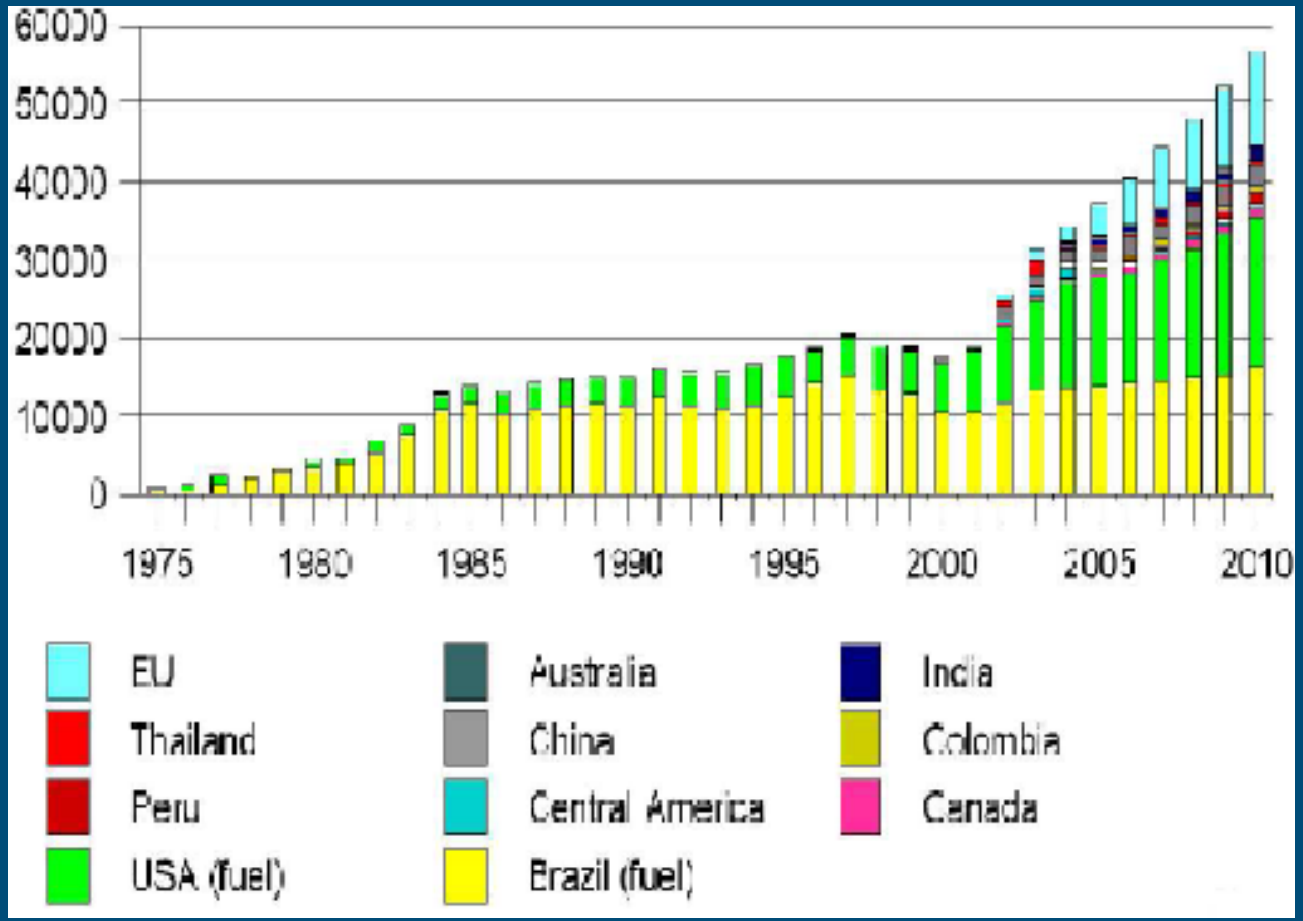
Uncertainties: feed stock prices



BIOMASS PRODUCTION

- Land use for energy production
  - Worldwide the upper limit of bio-energy potential could be over 1000EJ per year, being more than the current global energy use of 450 EJ (Grain, 2004)
  - HOWEVER, constraints from biodiversity, alternative uses, societal responses, costs/benefits, sustainability: 3P's

ETHANOL PRODUCTION



Ethanol Production per land (x 1000 ton ethanol)

Source: F.O.Licht, 2004

EU DEMAND predictions for biofuels

- EU 10% for transport by 2020
- Supply from:
  - Energy crops
  - By products from food/feed, agro industry, aquaculture
  - Chemical industry
  - By products from forestry, wood and composites
  - Import (about 50% according to industry)

CONSTRAINTS FOR PRODUCING BIOFUEL IN EU

- Volume: production volume will not match 2010 policy
- Price: import price vs. EU cost price favors import
- Policy restrictions: December 2008 EU directive for biofuels makes production of first generation fuels complex

EU The facts: biodiesel

- EBB official statistics show a much lower rate of growth in the year 2007 compared to previous years. Production increased from 4.9 million tonnes in 2006 to 5.7 million in 2007. This represents a **yearly growth of only 16.8% compared to 54% last year and 65% in 2005**.
- Biodiesel production has decreased in 6 of 26 Member States since 2006, and has stagnated in many other countries, completely in contradiction with EU objectives. This highlights the negative change in market conditions in 2007 and 2008.

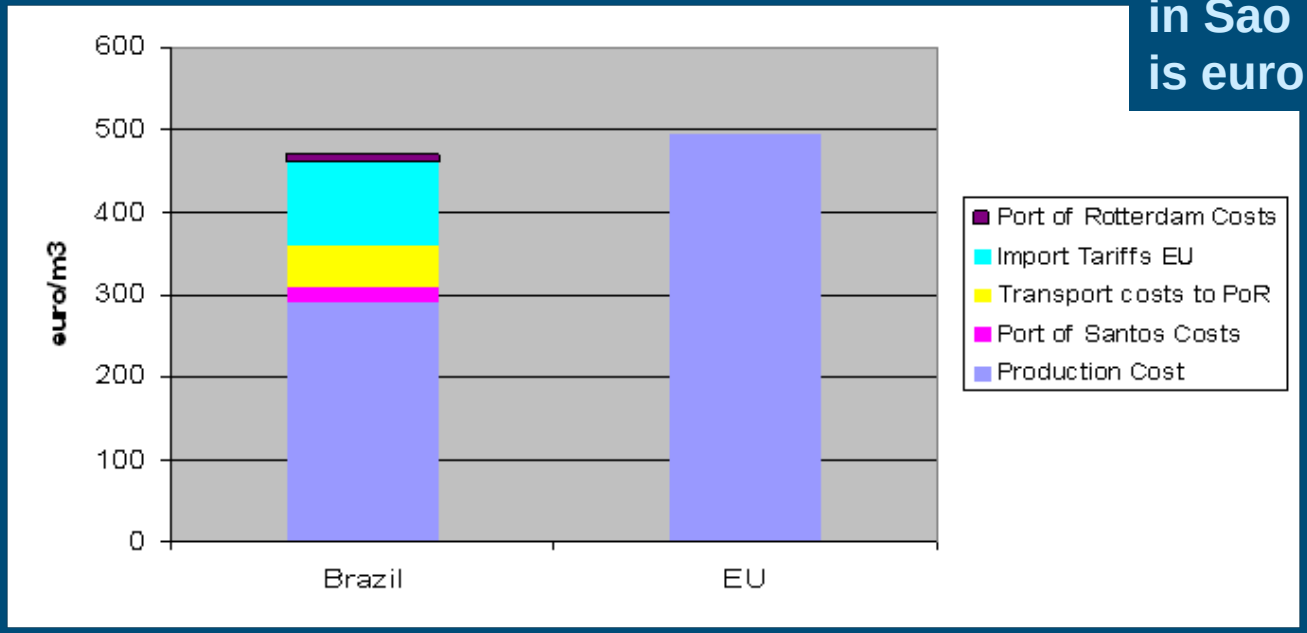
The facts: biodiesel

- **Installed biodiesel plant capacity* increased by 55% in 2007, to 16 million tonnes capacity in 2008**. The number of plants as of July 2008 is 214.
- EBB statistics for 2008 however show that **3 million tonnes of installed capacity remains idle** due to the lack of a viable market for biodiesel in Member States.

EU The facts: bioethanol

Price of 1 l bio ethanol today at the pump station in Sao Paulo is euro 0.33

Ethanol Costs – Brazil vs. Europe



- Large-scale import of ethanol from Brazil can compete with ethanol produced in Europe.
- Low production costs of the Brazilian ethanol compensate import tariff and transport costs

Future drivers

Drivers will remain to be

- the resource base,
- technology options
- environmental impacts and
- costs.

Outlooks: Brazil

- Record growth for Brazilian ethanol exports in 2008, with a 45% jump in Brazil's ethanol shipments abroad, from 3.5 billion liters in 2007 to 5.1 billion liters in 2009, which keeps Brazil at the top in global ethanol exports. Brazil is also number one in sugar exports, with 19.4 million tons in 2007 and a slightly better 19.5 million tons in 2008

Outlooks US

- The U.S ethanol industry remains strong in spite of changes brought on by the ongoing economic crisis.
- Largest ethanol producer globally.
- New administration has sharp targets for expanding market share for renewables.

Outlooks Europe

- Adoption by the European Union in December 2008 of the European Directive on motor vehicle transport fuels, which established the addition of 10% renewable to fossil fuels in all member countries by 2020.
- General expectation: larger import volumes, under the New December Biofuel directives!

Outlooks Argentina

- Argentina finished 2008 among the five largest biodiesel producers in the world and was the second largest exporter. Total industry production reached 1.07 million tons in 2008, with sales in excess of US$1.3 billion.
- Since end of 2008 a rapid decline in demand and pricing took effect.
- However, all competitive factors favor the surge of export of biodiesel on the mid-term.

Finally

- The three truths:
- “demand for energy is going to continue to surge,
- energy supplies from all sources will struggle to keep up, and there is an
- urgent need to reduce green house gas emissions”
- will move the biofuel industry, despite the crisis.