



Tension Between the 4 F's Food – Fibre – Fuel – Feed

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Outline

- Food security**
- Water crisis**
- Fibre market**
- Energy security**
- Environmental security**
- Conclusions**

The food security problem: challenges

❑ Population growth – ‘food’ demand

- 1.2% (70-80 million people) a year

❑ Income growth – ‘feed’ demand

- Asian economic growth 5-6% a year
- Means more meat and dairy consumption

❑ Biofuels expansion – ‘industrial’ demand

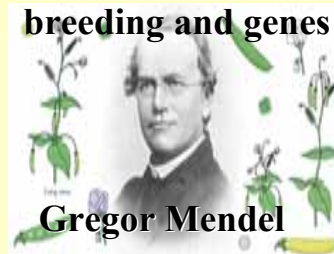
❑ Land availability is limited

- Potential in Ukraine, Russia, Latin America

❑ Technology uptake

- Need another ‘green revolution’
- Will GM be it?
- Incentives for change?

breeding and genes



Gregor Mendel

❑ Climate change

❑ Speculation

- Important to market liquidity
- But can add to price volatility



Economic growth

*Europe's ban on GMO: it is unnatural...
but food is not produced for the environment!*



Positive proof of global warming.



18th
Century

1900 1950 1970 1980 1990

Water crisis

Water 'bubble' is unsustainable and fragile: 6.7 billion people have to share the same quantity as the 300 million global inhabitants of Roman times

Water use	Litres of water
Drinking water	2-5 litres/person/day
Household use	20-500 litres/person/day
Wheat	500-4,000 litres/kilo
Meat	5,000-15,000 litres/kilo
Biofuel	1,000-3,500 litres/litre
Cotton t-shirt	2,000-3,000 litres
Agriculture	3,000 litres/person/day 1 litre per calorie



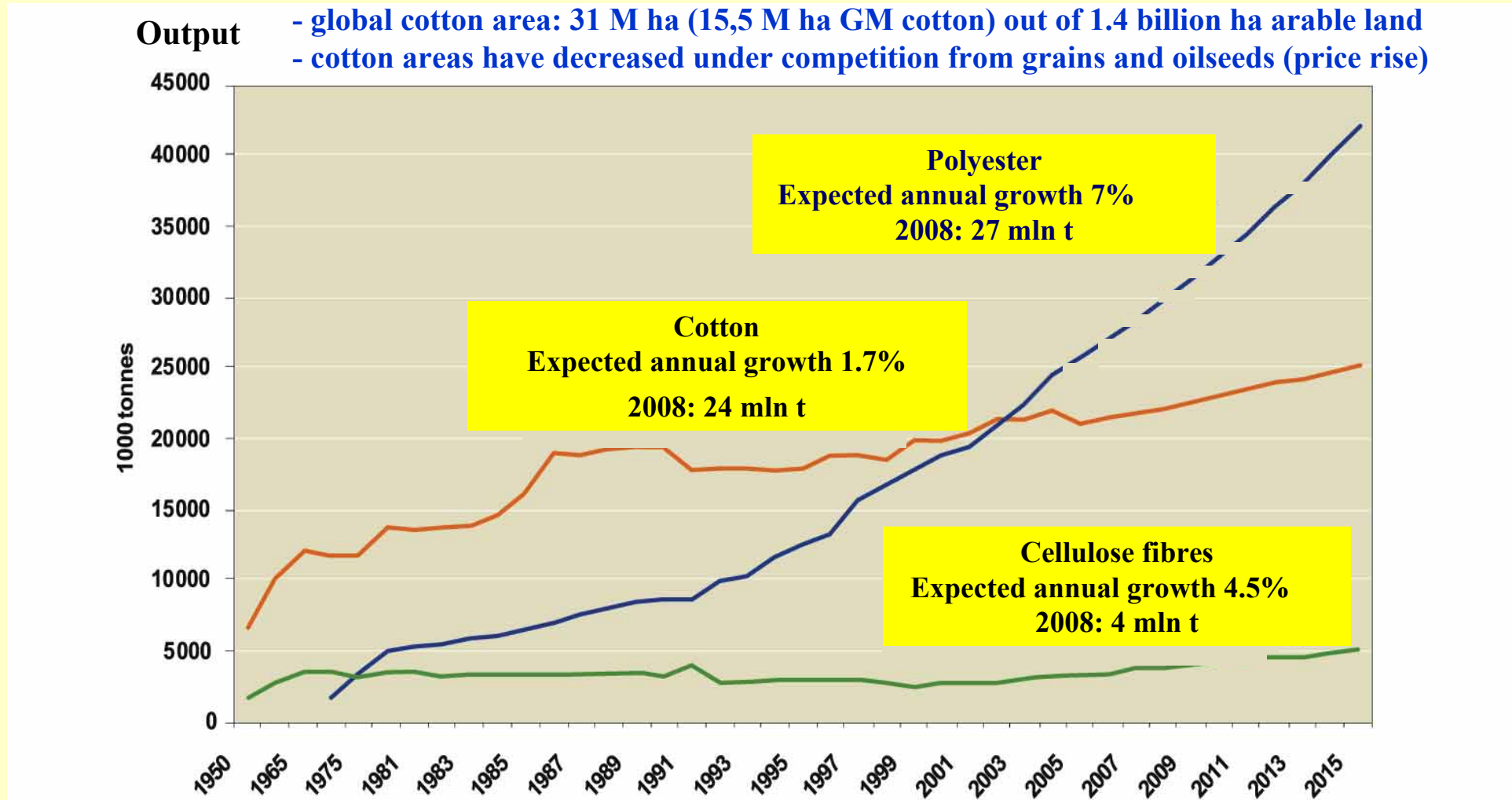
Globally, food crops evaporate 7,100 km³ of water per year, that is: 7,100,000,000,000,000 litres

- **About 78% of water for food comes directly from rain**
- **Increasing part is met by irrigation**

Source: IWMI (2007) In: *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*, London: Earthscan, and Colombo: International Water Management Institute

Fibre: competition between cotton, cellulose and polyester production?

- ❑ Fibre market will remain competitive but future water availability is critical (cotton production is water intensive)
- ❑ Lower oil prices are bad for cotton: polyester prices fall due to lower petroleum prices



Energy security: the global outlook

Global population growth

from 6,7 to 8 bln people by 2025



Increased demand for agricultural products

By 2025 global food output must increase by about 50%

- Food
- Feed
- Biomaterials (inc. fuel)



A Low Carbon Future

Increasing Dependency



Energy security???

Will be on the priority list with increasing oil prices

Global outlook (2009)

- 6% of cereals is used for fuel ethanol production
- 10% of sugarcane is used for fuel ethanol production
- 9% of vegoil is used for biodiesel production

Food and energy

Is there any market relation between the agriculture of foodstuffs and that of energy?

Is there available land?

- ❑ **Biofuels are not the primary, or a major driving force affecting global food prices:**
 - biofuels' role in food prices is limited

- ❑ **Impact on use of agricultural land:**

Brazil:

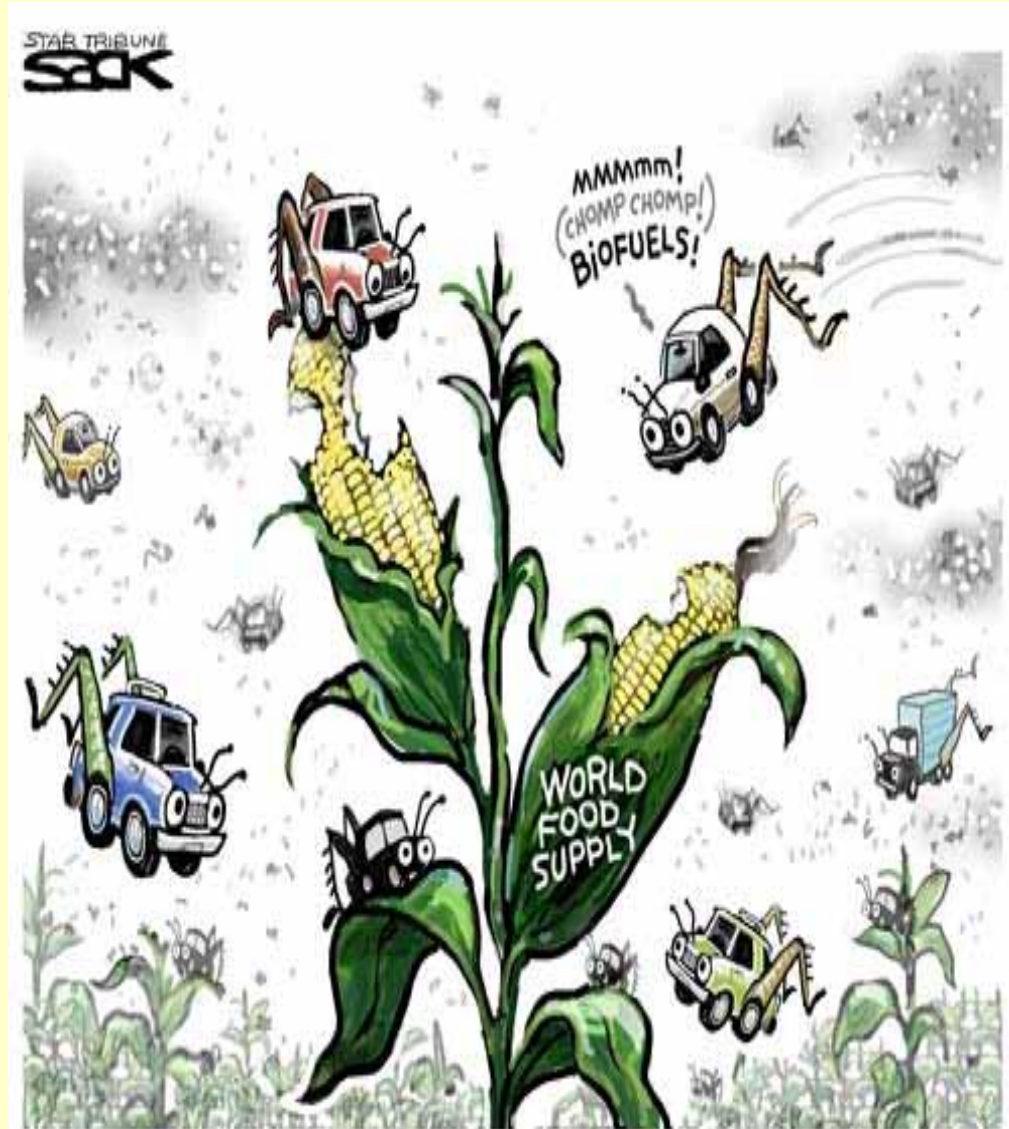
Sugarcane is grown on 2.5% of the arable land
(1.2% of arable land is dedicated to ethanol production)

USA:

RFS (136 bln l of biofuels by 2022) impact on land use:
15% of total arable land (currently 7%)

EU:

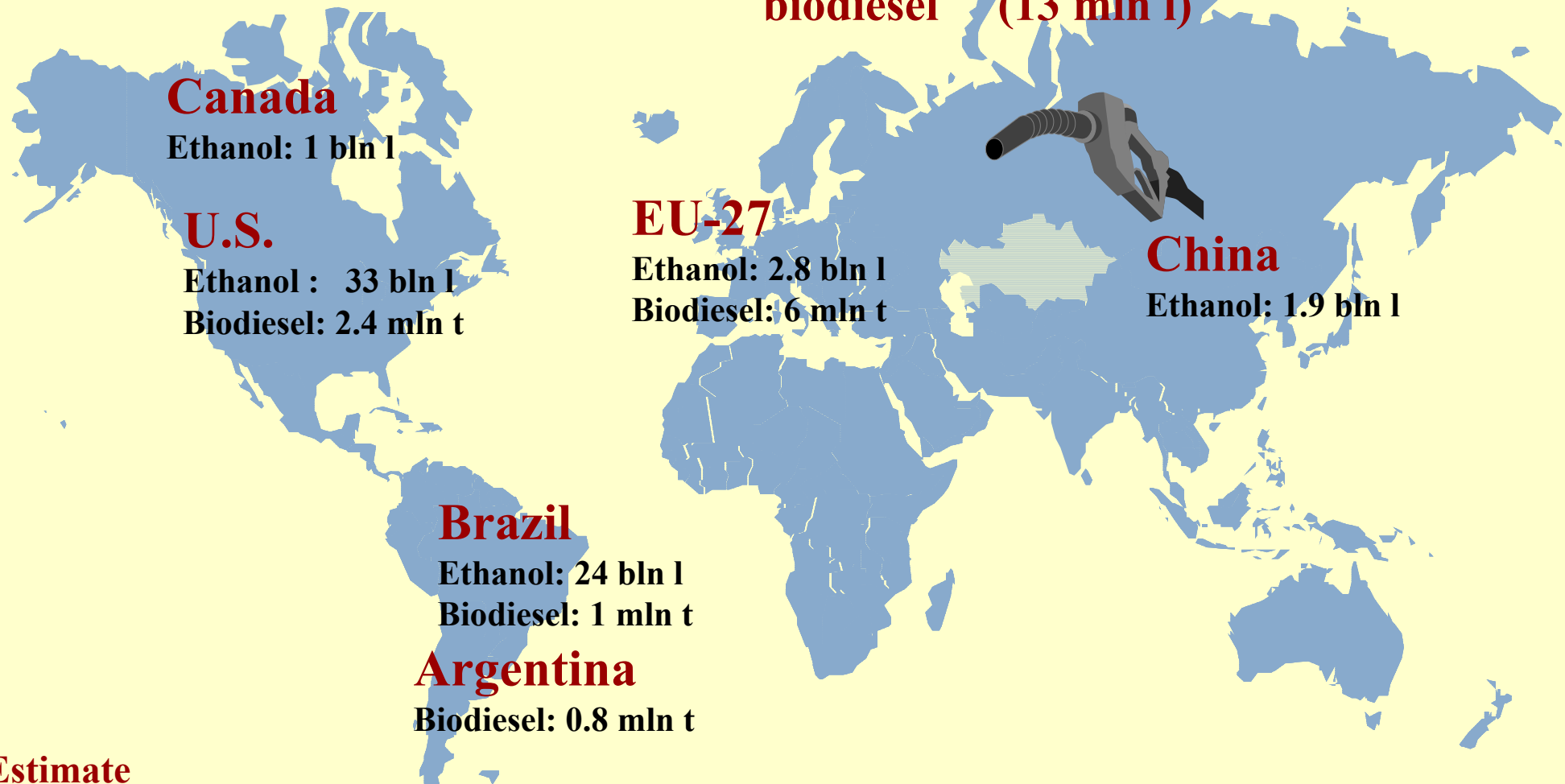
10% of biofuel impact on land use by 2020:
15% of EU-27 total arable land (currently 3-4%)



World fuel ethanol and biodiesel production (2008)

6% of the global feed grains and 10% of the global sugar production went to ethanol processing
9% of the global vegetable oil production went to biodiesel processing

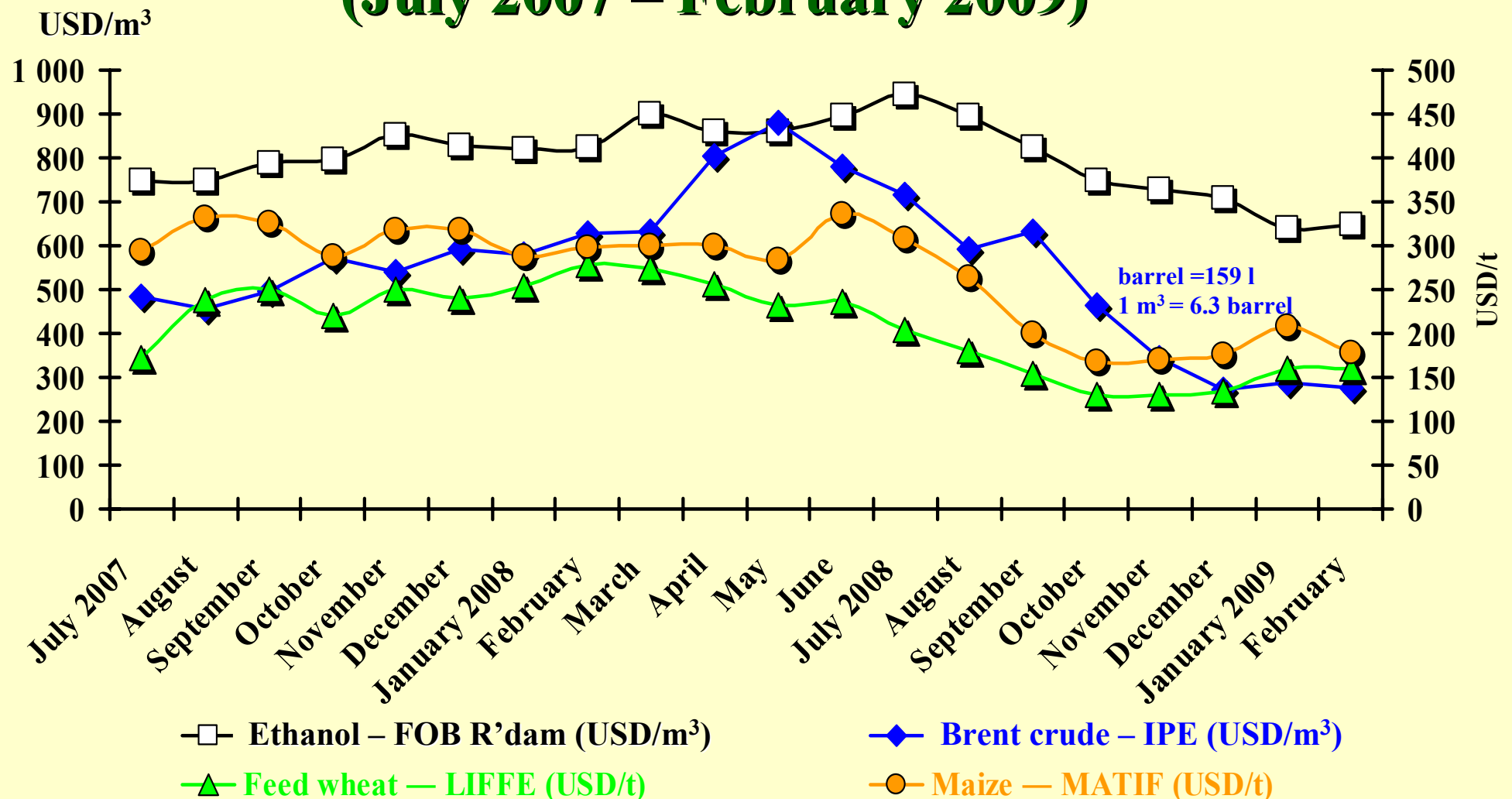
**Total production*: fuel ethanol (65 bln l)
biodiesel (13 mln t)**



***Estimate**

Source: F.O. Licht's World Ethanol & Biofuels Report [2009]

Prices of ethanol, crude oil, feed wheat and maize in the EU (July 2007 – February 2009)



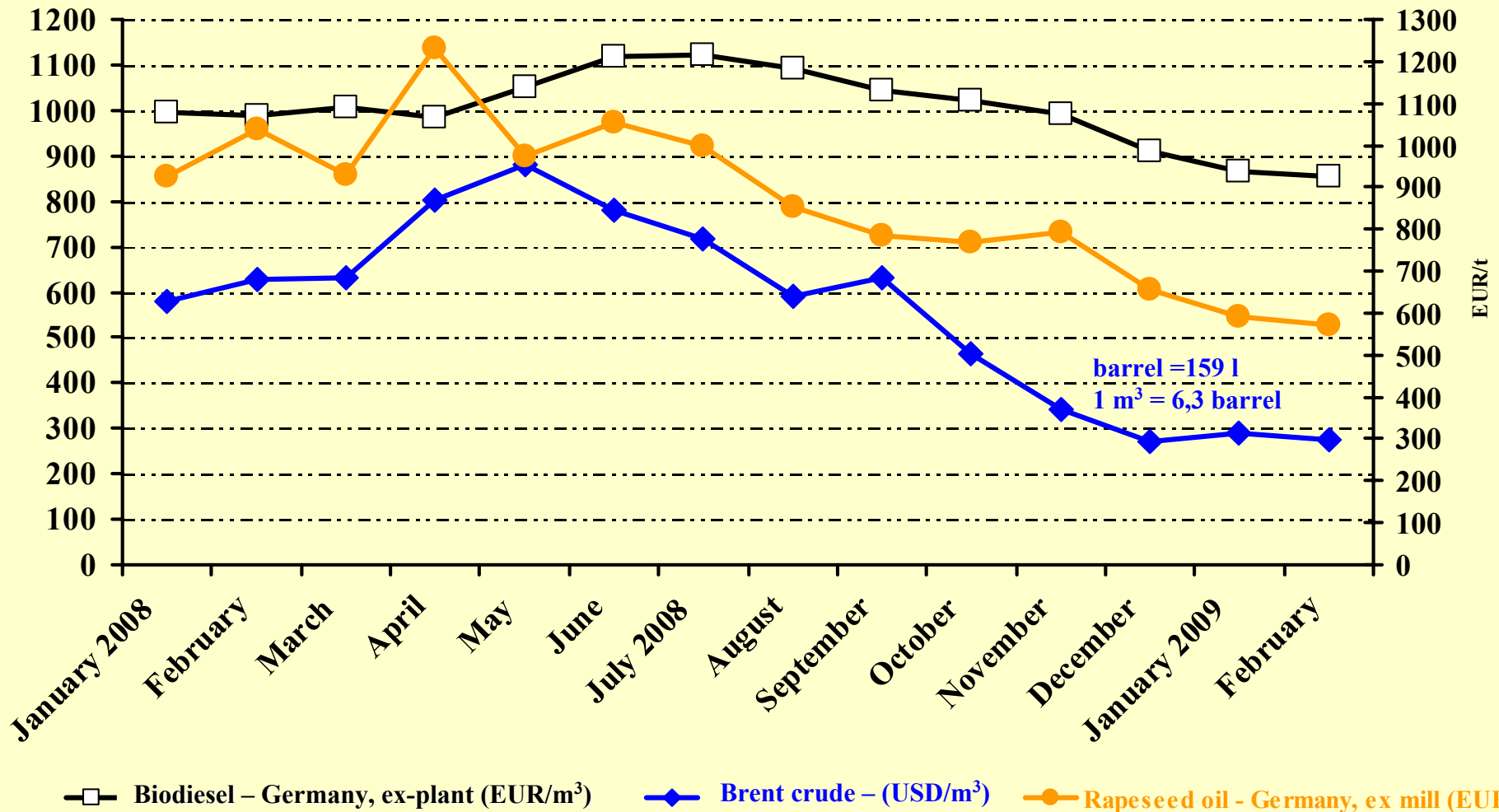
Note:

Competitiveness of ethanol production depends on the relative prices of feedstock and fossil fuel

Ethanol and crude oil parity prices (February 2009): at €0.50/l ethanol and \$103/b crude oil price (but crude oil price was \$44/b)

Prices of biodiesel, crude oil and rapeseed oil in the EU (January 2008 – February 2009)

USD/m³; EUR/m³



Note:

Competitiveness of biodiesel production depends on the relative prices of feedstock and fossil fuel

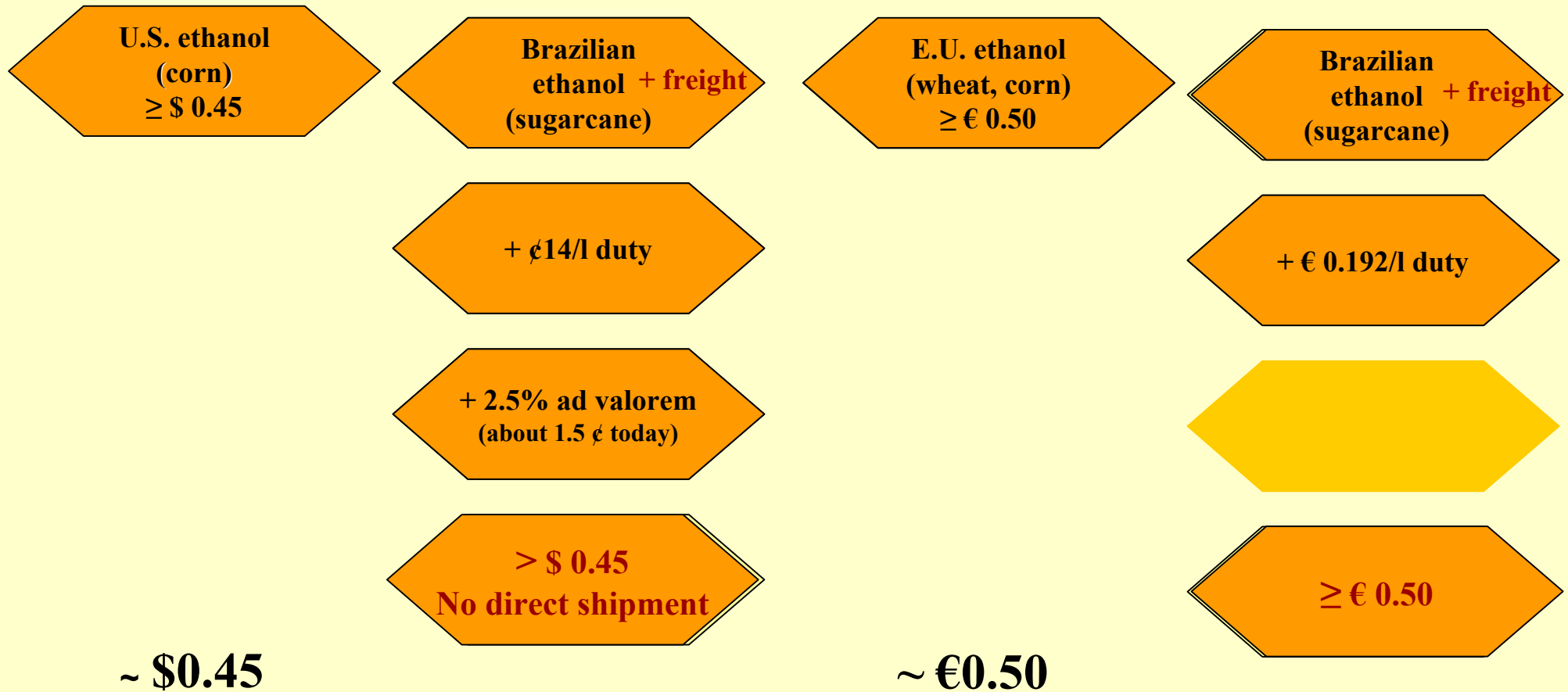
Biodiesel and crude oil parity prices (February 2009): at €0.85/l biodiesel and \$174/b crude oil price (but crude oil price was \$44/b)

Source: HGCA, Kingsman

Trade distortion in the EU and US (ethanol)

Spot price (April, 2009)

Spot price (April, 2009)



Rotterdam cif (T1): $\$0.43/l$ ($\text{€}0,33/l$) + $\text{€}0.192/l$ duty = $\text{€}0.51/l$ (ethanol price in the EU is largely determined by the exports from Brazil)
Rotterdam fob inc. duty: $\text{€}0.51/l$

Source: Argus Biofuels, Argus Media Ltd

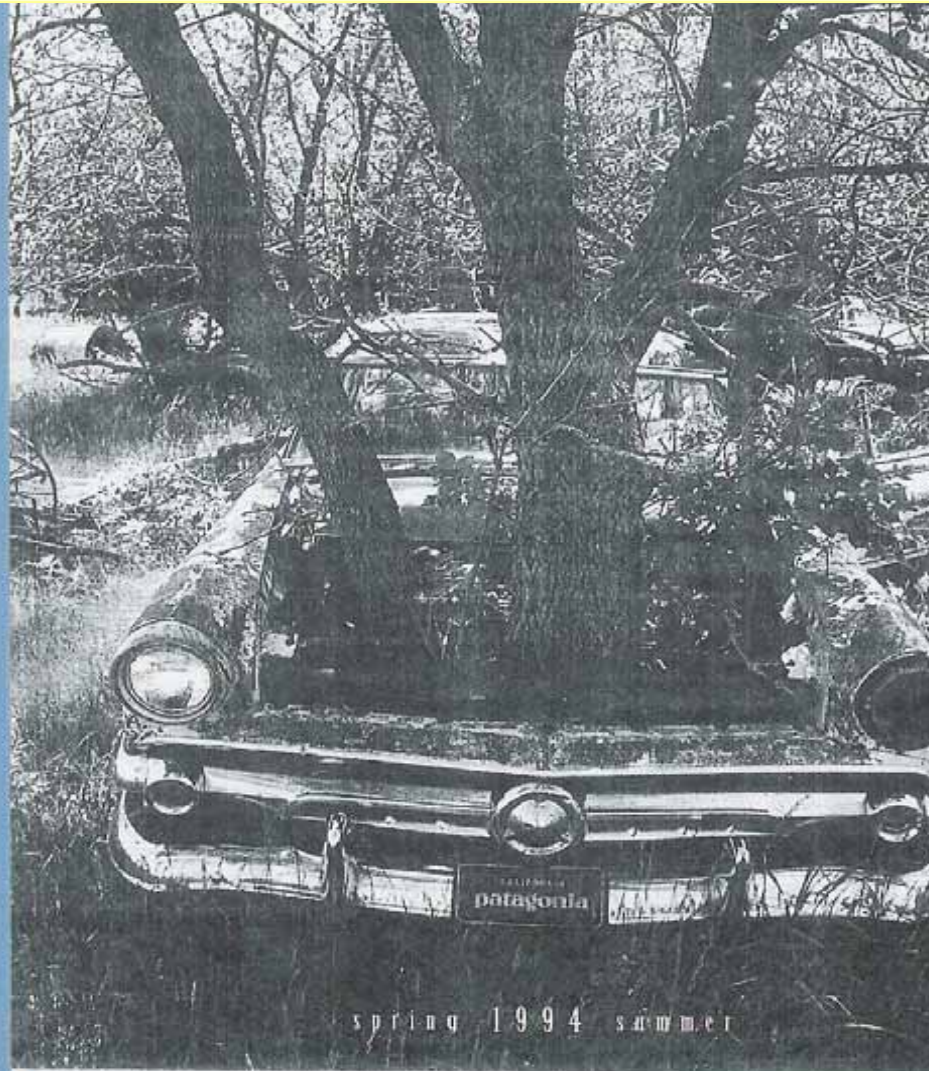
EU: the Renewable Energy Directive (RE-D)

- ❑ **10% target** for biofuels in total fuel consumption by 2020 (no sub-targets for electricity and hydrogen as proposed by Parliament)
- ❑ **GHG cut-off value: 35%** growing to **50%** in 2017 (60% for new plants)
- ❑ Methodology to calculate **default and typical GHG savings**
- ❑ **“No-go areas”**: high biodiversity and high carbon stocks land
- ❑ Higher contribution of **waste, residues, non-food & ligno-cellulosic biofuels** towards the 10% target for 2020
- ❑ **Sustainable cultivation** of biofuels feedstock (RE-D and EU CAP cross compliance rules)
- ❑ **Indirect Land Use Change (ILUC)** assessment
- ❑ **Social sustainability** – to be finalized through Comitology
- ❑ **Verification and Auditing**

Next generation biofuels: challenge and promise for the future

Feedstock supply is not the problem:

- collecting and delivering energy in a usable and sustainable format is the issue



Delivery of public goods: problems

❑ Targeting of actions

- Lack of evidence about links between actions and outcomes (cause and effect)
- Huge spatial heterogeneity (values, threats, feasibility, adoptability)

❑ ...But we are not alone

ABC 7:30 Report - September 2008:

- ABC reporter : *Are we winning the war on terror..?*”
- Adam Dolnik (Centre for Transnational Crime Prevention):
‘Well, we have not defined our objectives and we have no metrics for measuring success ... In short, I don’t know’

❑ Positive changes are needed

- Highly valued environmental outcomes, with high confidence and high cost-effectiveness
- Emphasises a “business approach” and “value for money” with targeted support

❑ Create markets where possible to minimise the public costs

- Governments play a central role in creating markets
- Caps on emissions (water and carbon) create the demand for environmental services

❑ Private or charitable organisations – clubs

- Acquire land to provide services (nature parks)

❑ Public payments to private land managers



Conclusions

- ❑ Food security will remain top priority
- ❑ Land availability is limited so global cooperation and innovation is key
- ❑ Water supplies are under stress:
 - we will run out of water long before we run out of oil
- ❑ Fibre production is influenced by support (wool, cotton) and crude oil prices
- ❑ Biofuel production is critically dependent on policies in the consuming countries
 - low blending rates
- ❑ Potential for biofuel trade can only be given by increased demand, but rules for sustainable biofuel production need also to be clarified
- ❑ More pressure on global markets and local ecosystems to supply food needs
- ❑ Focus on delivery of public goods



QUESTIONS?
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**We know where biodiversity will go from here...
into distant memory and history books**

