Biofuels: is the cure worse than the disease?

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Biofuels: is the cure worse than the disease?

R. Doornbosch, and R. Steenblik* (2007), background paper prepared for the Round Table on Sustainable Development, OECD, Paris

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& Commentary
Herald Tribune
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www.iht.com
The misguided politics of corn ethanol
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Les biocarburants, danger l'environnement ?
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www.nytimes.com
Corn Ethanol: Biofuel or Biofraud?
By JERRY GARRETT
FINANCIAL TIMES
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OECD slams biofuels subsidies for sparking food price inflation

Outline

- Potential conventional and advanced biofuels
  - Technical
  - Economic
- Policy
  - Subsidies
  - Trade policies
- Consequences
  - Certification
  - Cost-effectiveness
- An alternative policy agenda

Technical Potential
Energy crops – 'first-generation'

- Available land with potential for rain-fed cultivation
  - deduct forest land
  - deduct land already in use (arable land)
  - deduct land needed to accommodate growing population
  - deduct needed pasture land
- Estimate at lower end of range in alternative studies, however, still optimistic
  - Overestimate land that could be used
  - Underestimate land already in use
  - Underestimate water shortage (f.e. Africa)
  - Competing demands
- Yield – 190 Giga Joule per hectare a year
- Total: 14 Exa joule in 2050 (8% of demand transport)

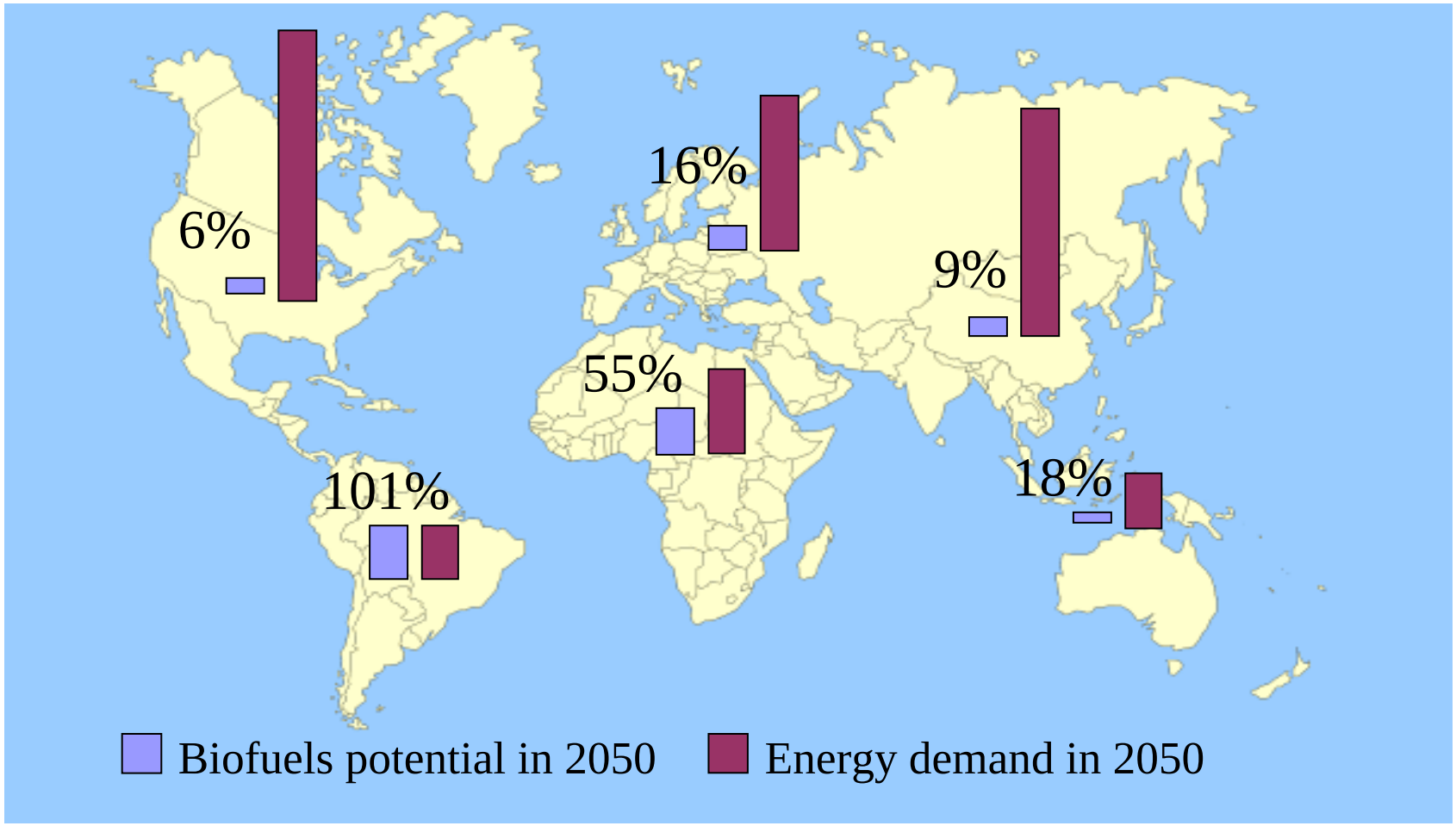
Technical Potential
Residues/waste – 'second-generation'

- Crop residues
  - Higher productivity, less residuals
  - Prevent soil erosion
- Forest residues
  - Increased demand for material use
  - Prevent soil erosion
  - Inaccessibility very distant locations

  (< 200 km between harvesting and processing)
- Animal and organic waste
  - Cost of collection / complexity of logistics
- Marginal and degraded land
  - not taken into account (in the order of 5 – 7 Exa Joule)
- Total: 24 EJ in 2050 (12% of demand in transport)

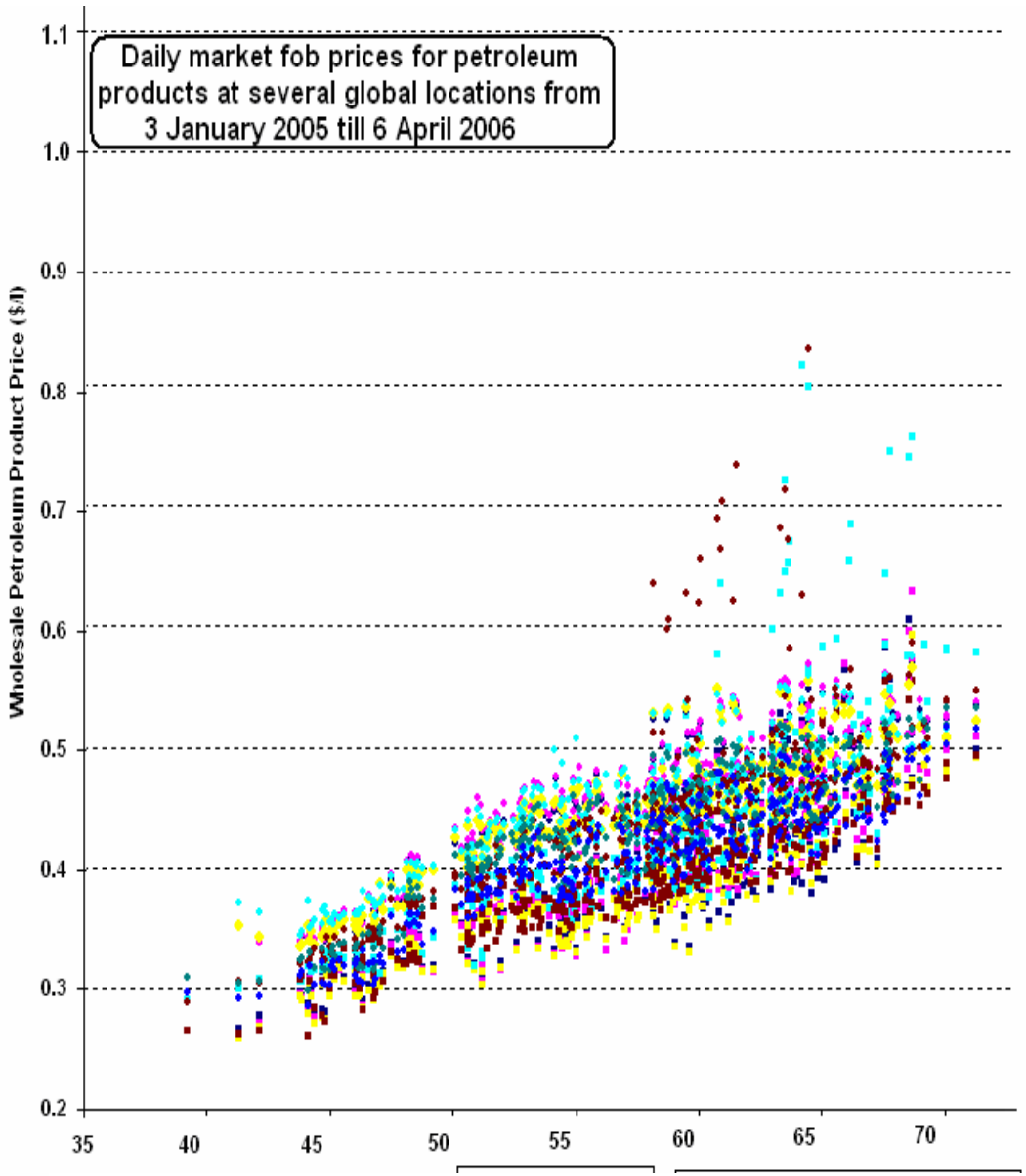
Technical Global Biofuels Potential

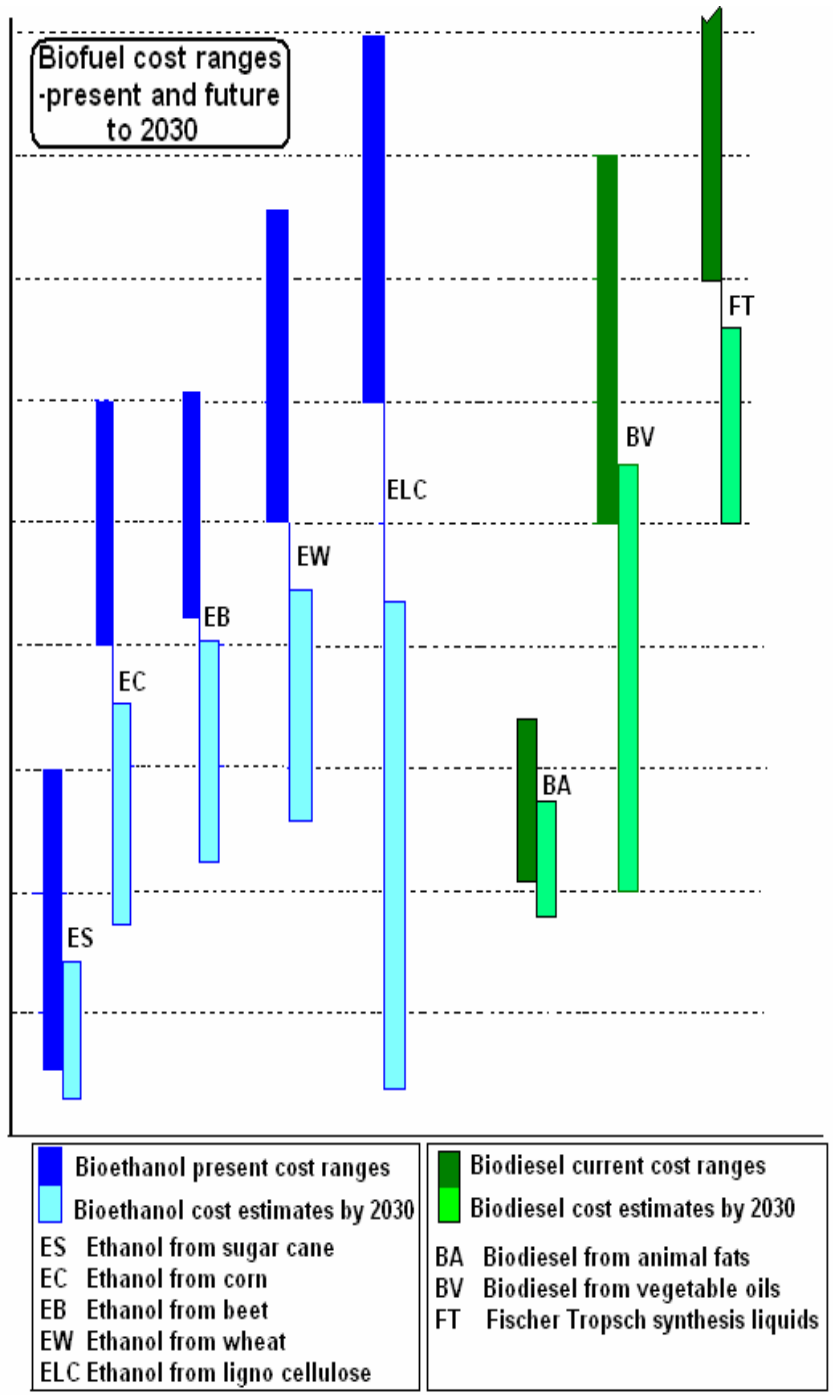
max. 20% of energy demand in transport sector



Economic Potential

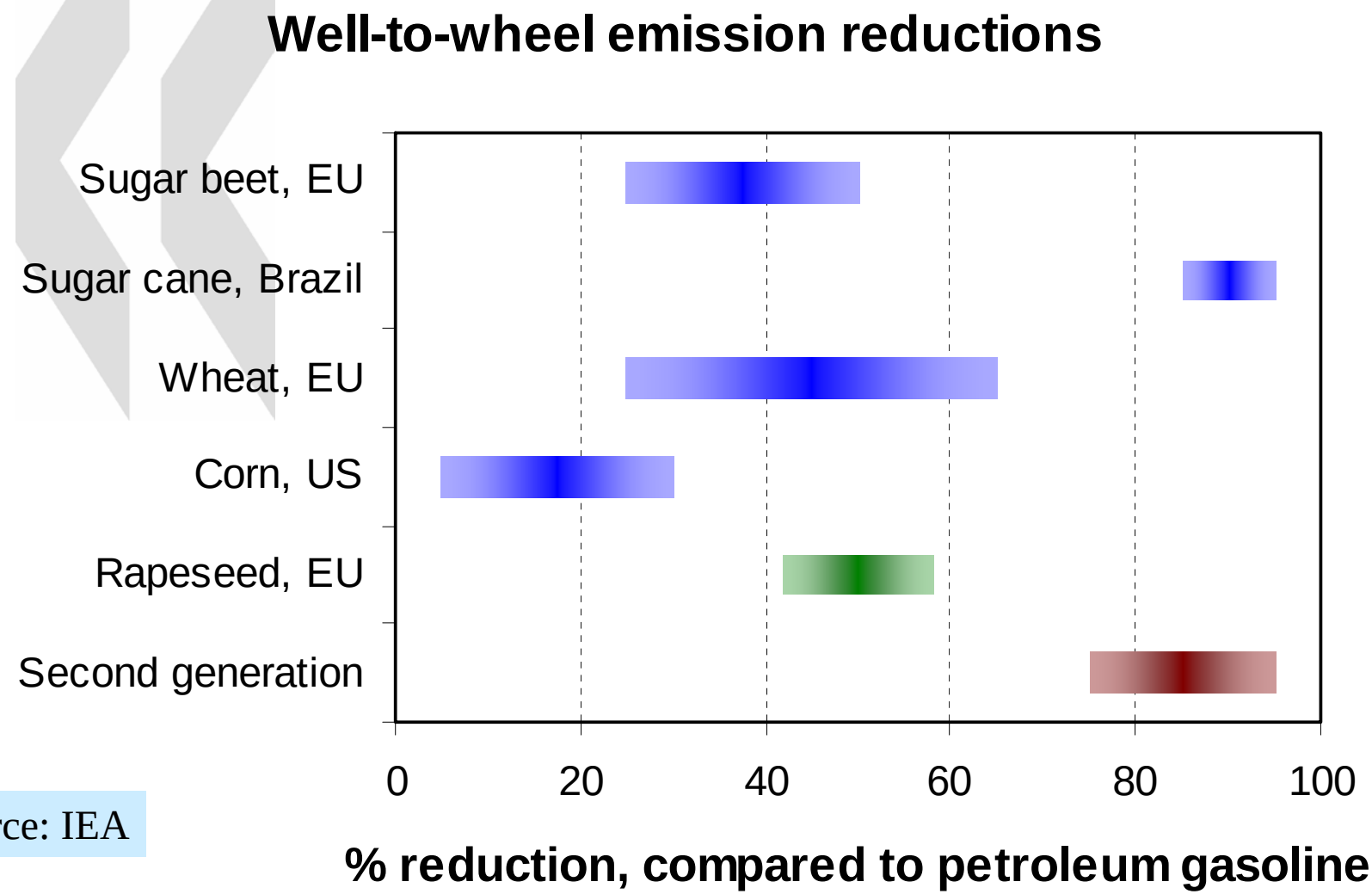
- IEA: between 7% (2030) and 14% (2050) of energy demand in transport
- Assumptions:
  - Declining feedstock prices
  - Technological breakthroughs
  - Acceptable cost of logistics
- However:
  - Trend feedstock prices is up and correlated with oil price
  - Breakthroughs are inherently uncertain
  - Cost of logistics high





Source: IEA (2006), Ralph Sims

Climate Change mitigation potential



Source: IEA

Climate Change Mitigation Potential

- Reduce emissions with 2 Giga tonnes of CO_2–equivalent or 3.5% of total energy-related CO_2 emissions in 2050
- Assuming:
  - Only sugar cane and second-generation technologies are used
  - Life-cycle GHG reductions from well-to-wheels is 90%
- Ambitious IEA (2006) scenario reduces emissions with 1.8 Giga tonnes

Provisional total support estimates (TSE) 2006

OECD economy	Ethanol		Biodiesel		Total liquid biofuels	
	TSE (billions of US$)	Variable Share (percent)	TSE (billions of US$)	Variable Share (percent)	TSE (billions of US$)	Variable Share (percent)
United States	5.4 – 6.6	60% – 65%	0.5 – 0.6	~ 85%	5.9 – 7.2	~ 65%
EU	1.6	98%	3.1	90%	4.2	93%
Canada	0.15	70%	0.013	55%	0.11	65%
Australia	0.035	~ 70%	0.021	~ 70%	0.05	~ 70%
Switzerland	>0.001	94%	0.009	99%	0.01	98%
Total	**7.2 – 8.4**		**3.6 – 3.7**		**10.8 - 12.1**	

Source: Steenblik, R., Biofuels at what cost? Government support for Ethanol and biodiesel in selected OECD Countries, IISSD, Global Subsidies Initiative

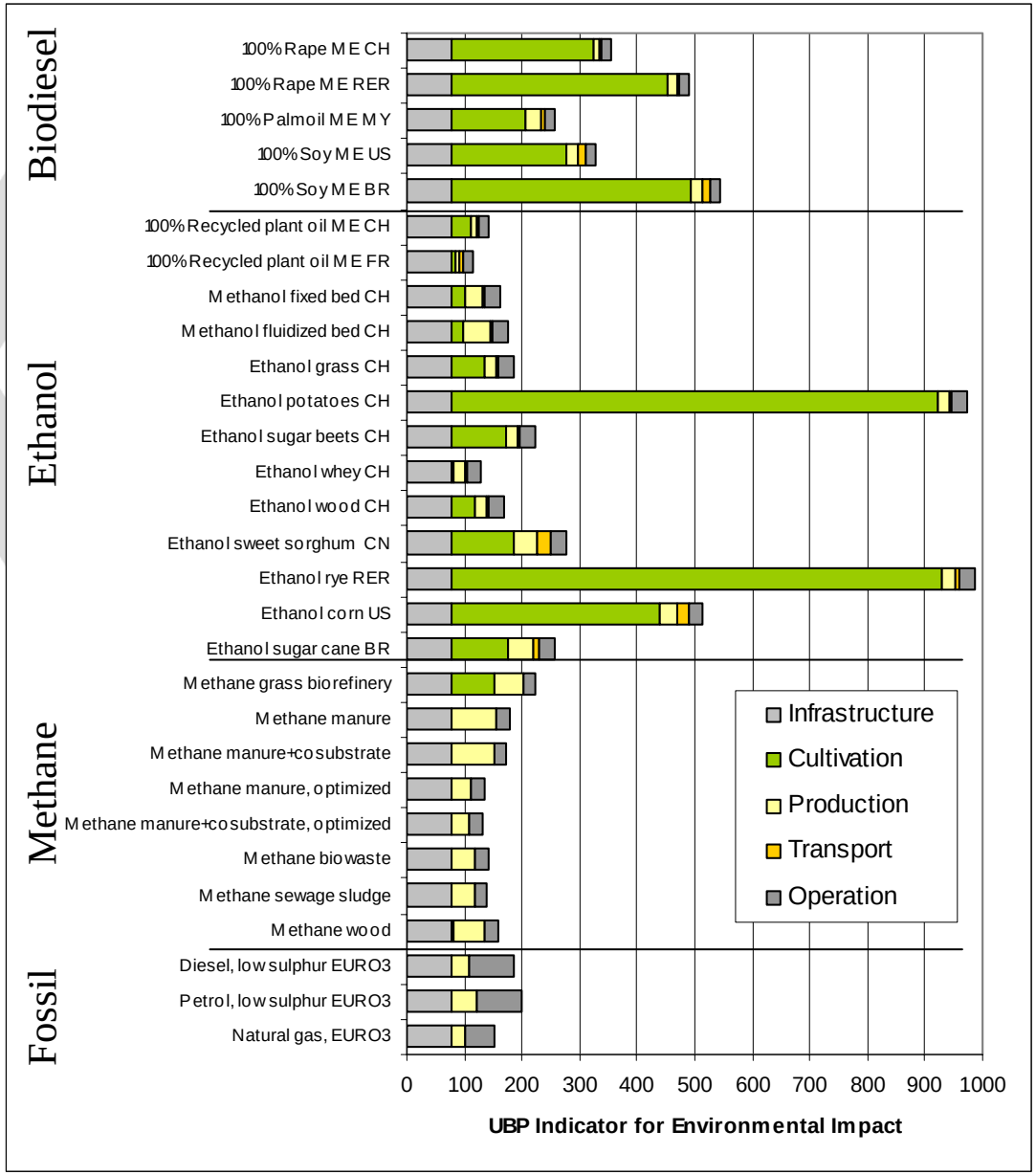
Volumetric targets and mandates Trade Barriers

- Mandatory targets and aspirational goals
- Sometimes specifically for ethanol and biodiesel
- Trade barriers favour domestic consumption

Consequences (1)

- Increased GHG as a result of deforestation and land use changes
- Land degradation / water pollution

Source: Zah (2007)



Consequences (2)

- Higher food prices
  - Winners and losers in the agricultural sector
- No benefits for least-developed countries
- No noticeable effects oil dependence

Policy Response: certification

- No truly international effort yet
- Voluntary because of WTO concerns
- Displacement effects not accounted for
- No strong differentiation on GHG balance
  - Exception: Low Carbon Fuel Standard
- Timeframe
  - implementation on global scale will take several years

Cost-effectiveness

- Energy security:
  - support per litre of fossil fuels displaced
  - US: between $ 0.66 and 1.40 per litre fossil fuels displaced
  - EU: between $ 0.77 and 4.98 per litre fossil fuels displaced
- Climate Change
  - support per tonne of CO_2 avoided
  - US: > $ 500 per tonne of CO_2
  - EU: > $ 340 per tonne of CO_2

In summary

Current policy mix risks to:

- emit more GHG
- damage the environment (biodiversity, soil and water quality)
- increase food insecurity

- without benefiting energy security
- And while 'losing' a lot of taxpayer money in the process

➢ Current policies need revision

Alternative policy agenda (1)

- Cease creating new mandates, support schemes
  - phase out existing ones
- Introduce more technology neutral policies
  - carbon tax, low carbon fuel standard
- Support R&D 2nd generation technologies
- Environmental cost and benefits

- Increase energy efficiency

Alternative agenda (2)

- Step up certification efforts
- Work on trade barriers
- Optimal use biomass in developing countries
  - Energy access or producing for export markets?

Literature

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