

7. BMBF-Forum für Nachhaltigkeit
Forschung für nachhaltige Entwicklungen - International
2.-4. November 2010, axica, Berlin

Sustainability of bio-energy ? Opportunities and Threats

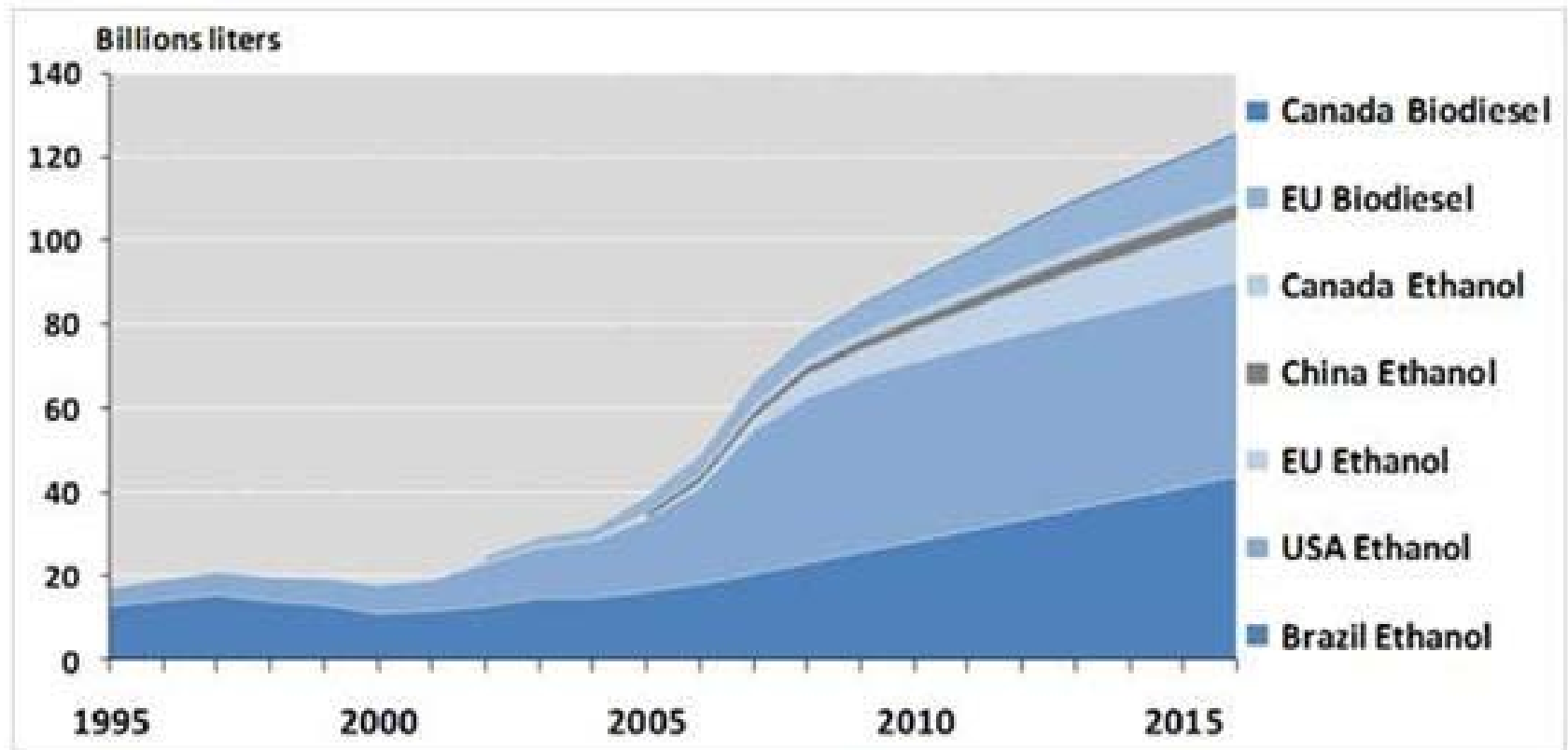
Sonja Peterson, Institut für Weltwirtschaft



NaRoLa – Nachwachsende Rohstoffe und Landnutzung (Renewable Resources and Land Use)

- Project Partners:
 - Kiel Institute for the World Economy (IfW)
 - Von Thünen Institute (vTI)
 - University of Bonn
- Aim: Development of an integrated modeling framework to assess bioenergy and land-use connecting
 - the multisectoral, multiregional general equilibrium model DART, which was developed for the economy-wide analysis of questions related to climate policy,
 - the regionalized agricultural and environmental information system RAUMIS, which maps in detail the German agricultural sector and its land use.
 - a newly developed location choice model for biogas is used in order to assess location choices for large scale biogas plants in Germany.

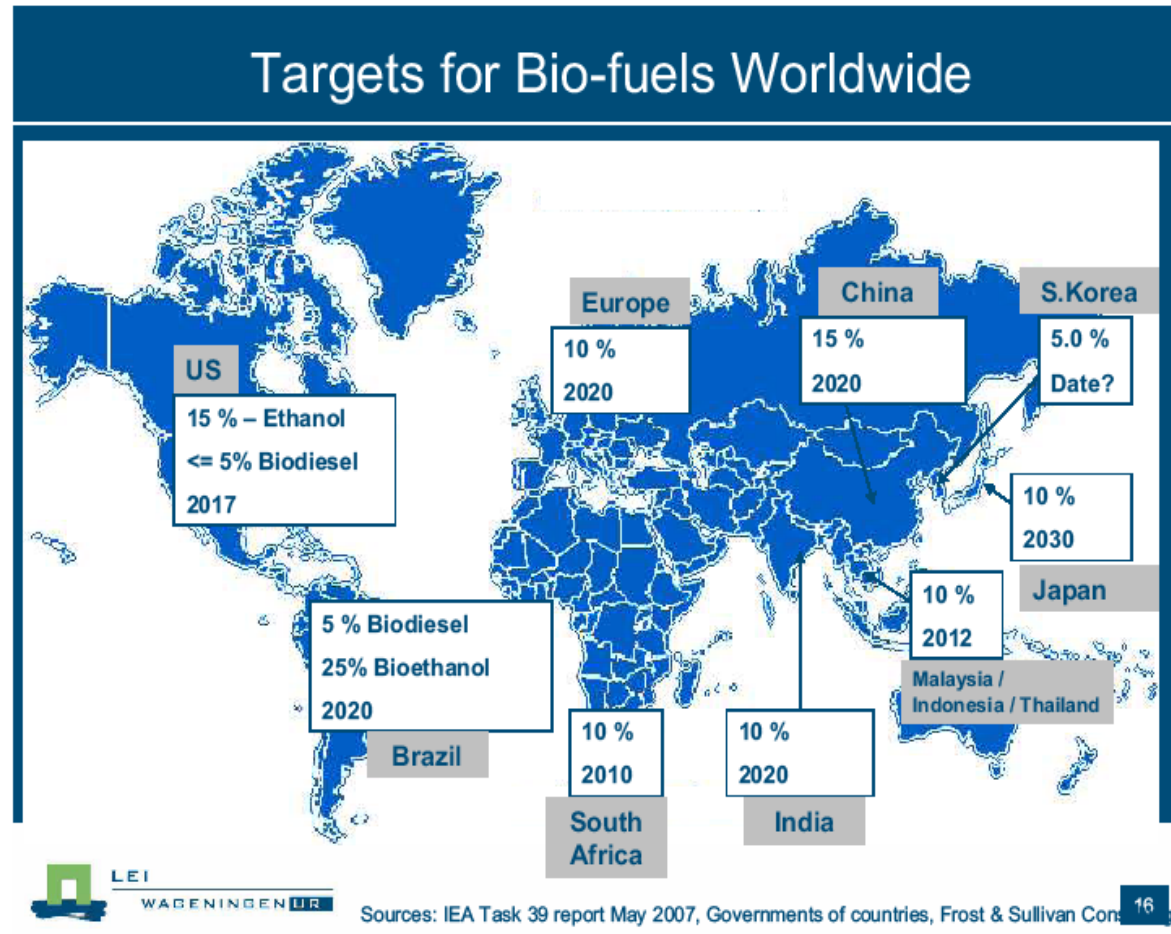
Dramatic increase of biofuel production



Quelle: OECD-FAO Agricultural Outlook 2007 - 2016

The development is purely policy driven

- Biofuel is competitive only in Brazil
- In EU & USA:
 - Tax exemptions (in EU ca. 2.9 Bill Euro loss of revenue in 2006)
 - Biofuel quotas
 - Direct payment
 - Feed-in tariffs– EEG
 - ...



Hope 1: **Energy Security**

Bioenergy reduces dependence on imports of fossil fuels

Example Germany (true for basically the entire EU)

- Uses entire agricultural land (without forest) for existing bioenergy uses assuming a high yield: 7% of primary energy use, 11% of final energy use
- Bioenergy on 30% of land: 2.3% of primary energy and with optimal use (Pellets) 9%.
- On 30% of land biofuels: 17% of fuel use
- Import quota has only little significance. In other areas with strategic resources high import quotas are not of concern.

=> No priority

Hope 2: **Development of rural areas**

Bioenergy opens new opportunities to earn money with agriculture

- Net effect on jobs is unclear
- Weak effects in tillage-regions, but not in all cases.
- If bioenergy displaces livestock farming effects are negative.
- Positive effects mainly for technology development and plant construction
- High policy dependence

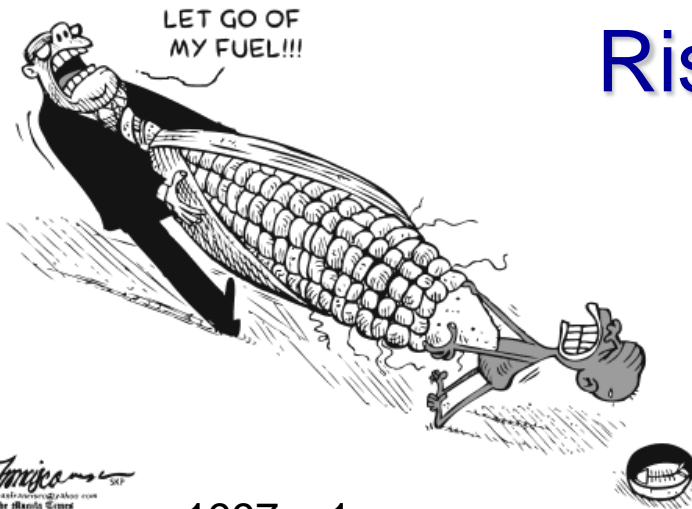
=> No priority

Hope 3: **CO₂ Savings**

Bioenergy reduces the use of fossil fuels and thus contributes to GHG emission savings

- This is possible though to different degrees.

=> Bioenergy should clearly be targeted at climate mitigation.



Tanja
www.tanja.com
© The Harold Ginn
APRIL 2008

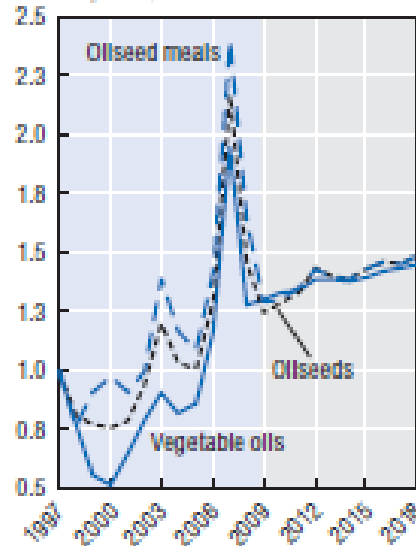
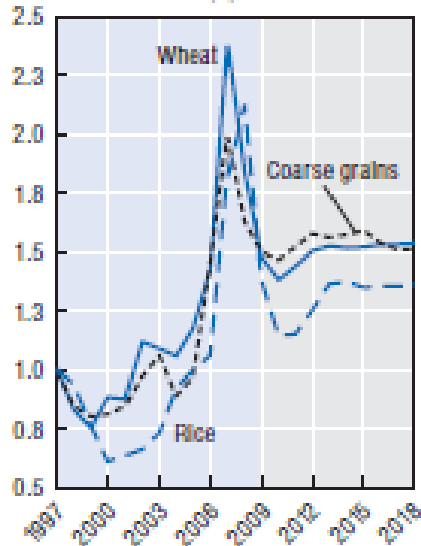
1997 = 1

Risik 1: Food security

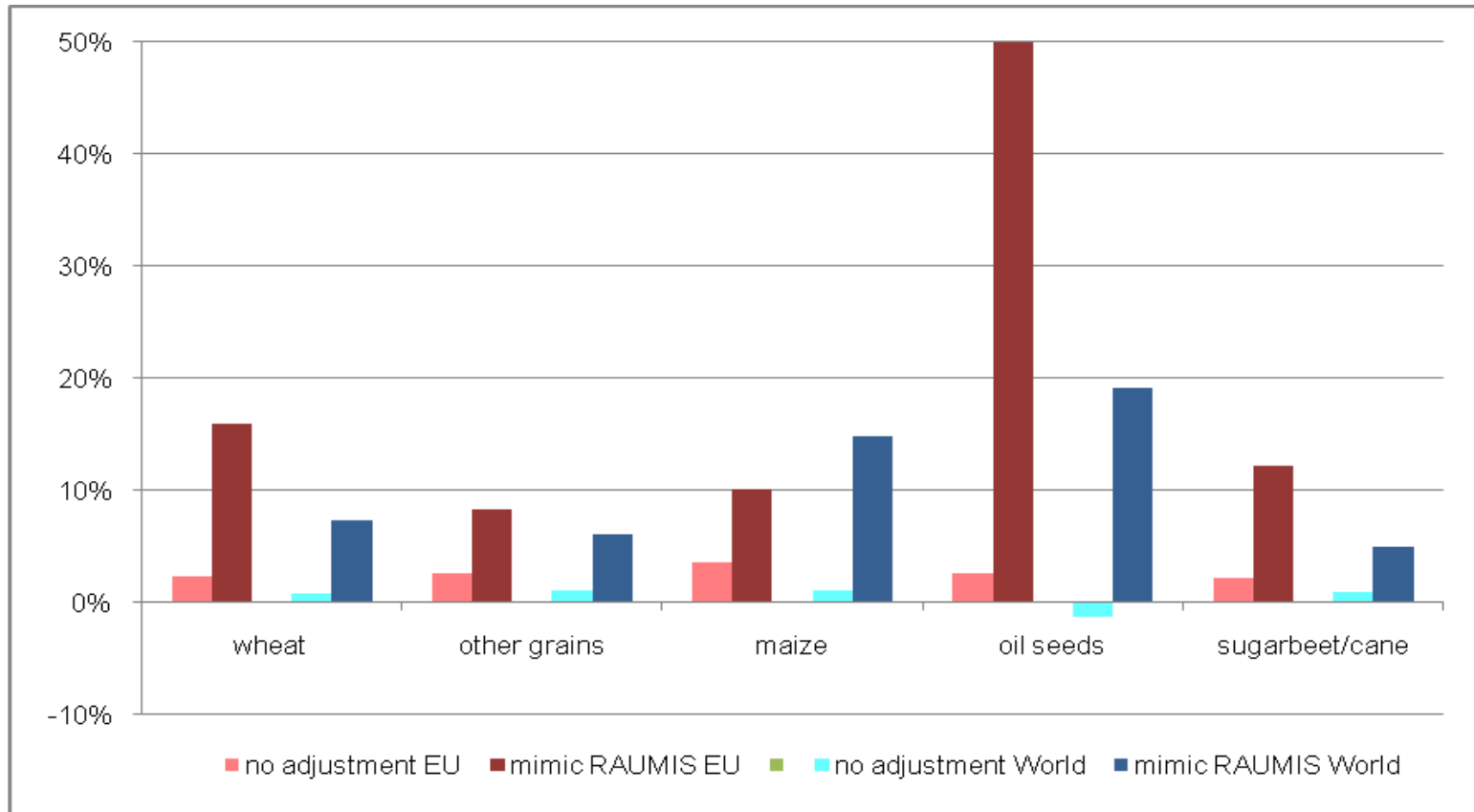
Food or Fuel debate

- In the short term
 - extreme weather conditions (grains, milk)
 - Production decreases in main export countries
 - Low stocks
- In the long term
 - Growing food demand in emerging countries
 - Higher production costs: oil price
 - Demand for bioenergy
 - Land use competition

Outlook for world crop prices to 2018 Index of nominal prices, 1997 = 1

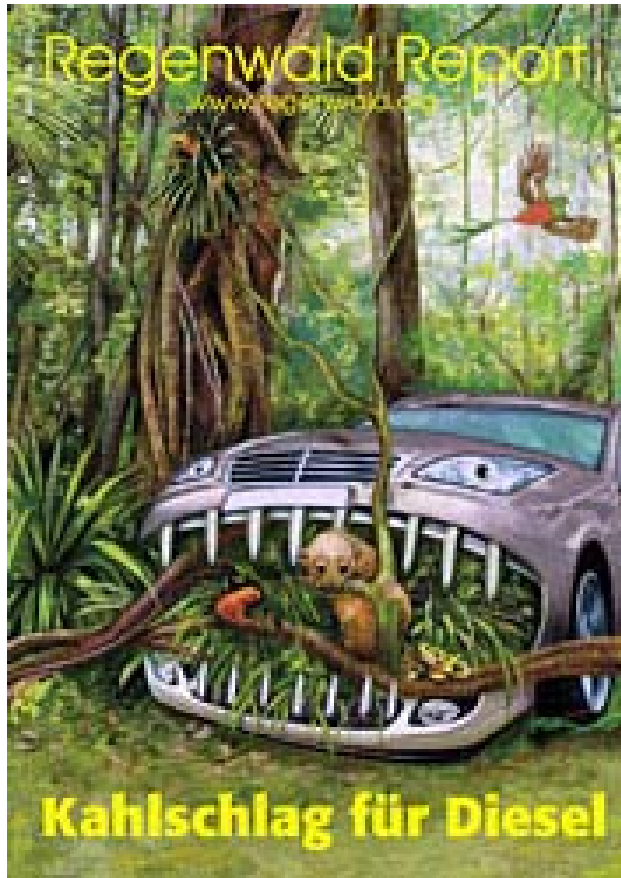


NaRoLa showed that impact of biofuel targets on agricultural market is not negligible



Changes in agricultural prices under a 10% EU biofuel quota compared to the baseline in 2020 in the EU and the world.

Risk 2: Sustainability



- **Biodiversity:** direct and indirect land use change and intensification reduce loss of biodiversity
- **Soil and Water:** bioenergy can have negative effects for soil protection and water use.

Potential of bioenergy

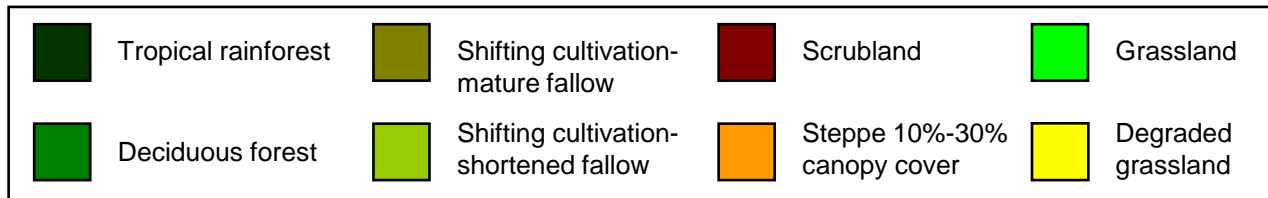
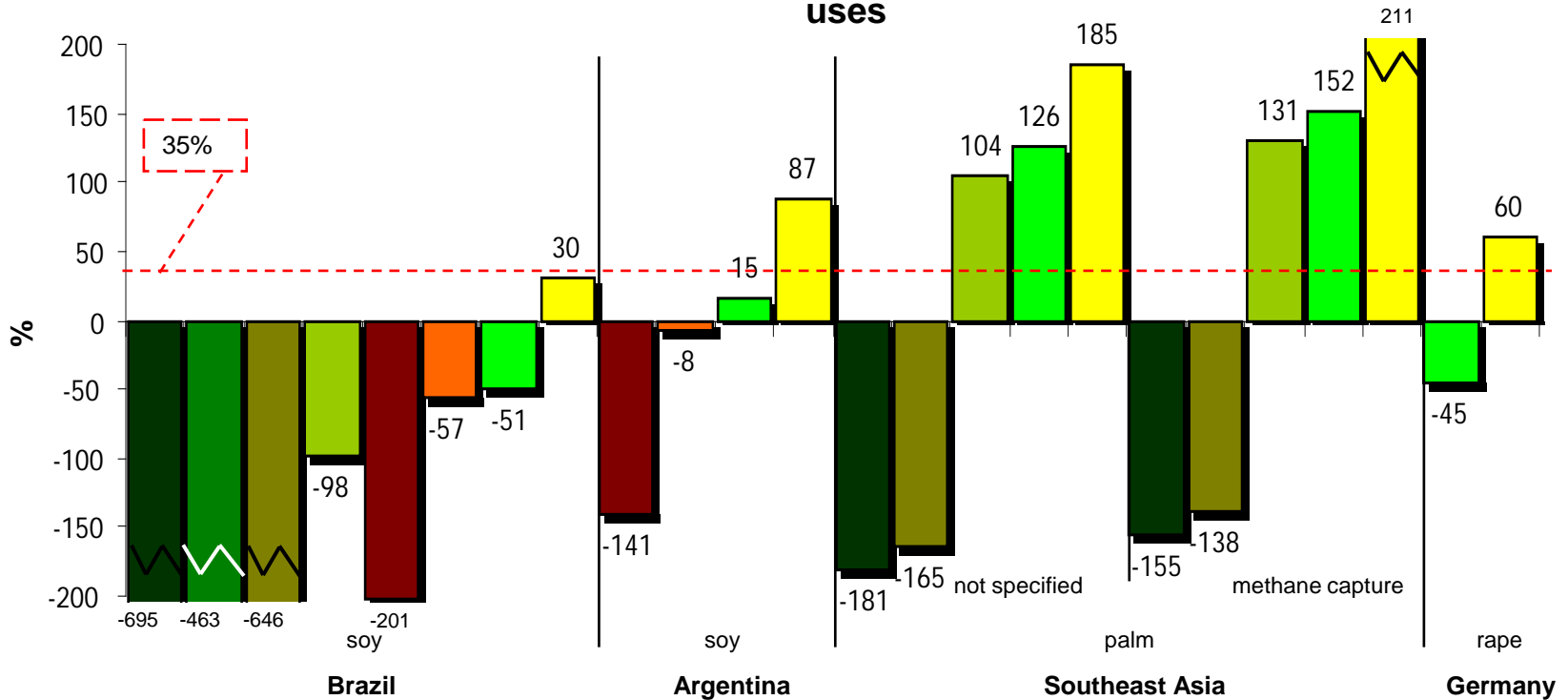
Account for:

- **Food First:** Food security has to be guaranteed. Bioenergy is thus a very local question.
- **Sustainability criteria** need to be guaranteed:
 - In EU „best practice “
 - Certification of bioenergy (IfW is involved)

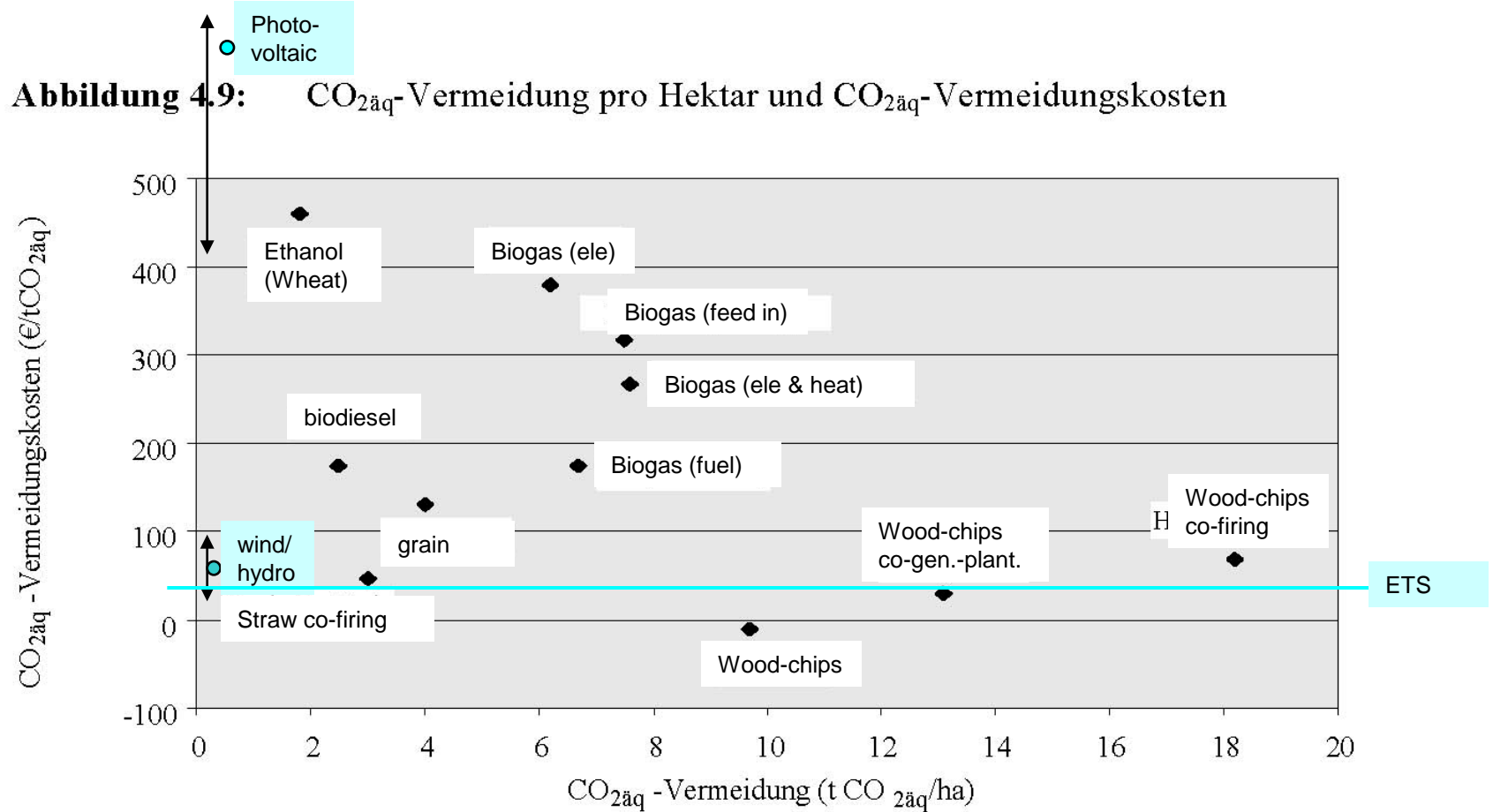
Diverging estimates

- World energy demand in 2030 (WEO 2008): ca. 700 EJ
- Sustainable bioenergy potential likely < 100 EJ in 2050
- In addition: still strong assumptions in scenarios.
- Maximum: ca. 10 % of world energy demand
- **BUT: Bioenergy needs to be analyzed at a local resp. national level.** Global conclusions are difficult.

Total emission savings (%) per year of various biodiesel options and former land uses



Mitigation cost & -potential of bioenergy



Quelle: Wissenschaftlicher Beirat Agrarpolitik beim BMELV; Nutzung von Biomasse zur Energiegewinnung – Empfehlungen an die Politik; Nov 2007

Conclusions

- There is unused potential for bioenergy (use of residuals), but total potential is restricted by productive land (at least in EU)
- Bioenergy competes with food and nature conservation
- Energy security: only small contribution, no priority !
- Theoretically: 10% of world energy demand. But: Needs to be decided locally
- So far bioenergy is not competitive (except in Brazil)
- Labor markets effects are unclear
- Main aspect: GHG savings: focus on carbon balance and mitigation costs
- Current policy should be revised: move toward uniform carbon price plus extension of certification to entire agricultural production