Biofuels:
Potential and Policies in Germany

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Overview

- Technical and Economic Potential of Biomass in Germany: the SRU-Assessment
- German Biofuel Policy
- Political Economy of Biofuel Policy

Assessment of Biofuel Potential

- Short – Term versus Long-Term
- Biomass from cultivation versus waste biomass
- Biomass Use as raw material, in stationary sources or as biofuels

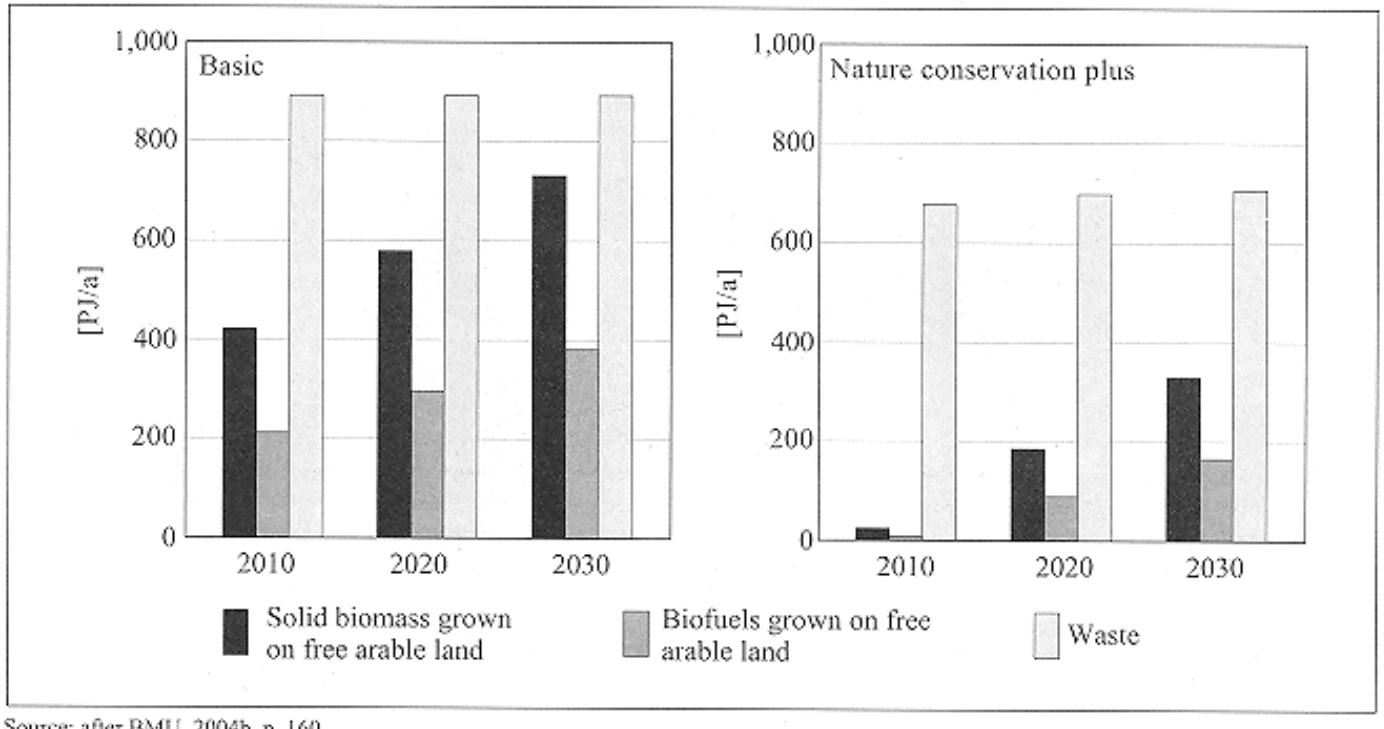
Criteria for Biofuel Potential Assessment

- Land Use Conflicts
- Maximum CO2-Reduction Potential
- Other environmental effects
- Specific CO2-Reduction Cost

Biomass Potential in Germany

Figure 8

Biomass Potential for Energy Savings under Various Nature Conservation Requirements

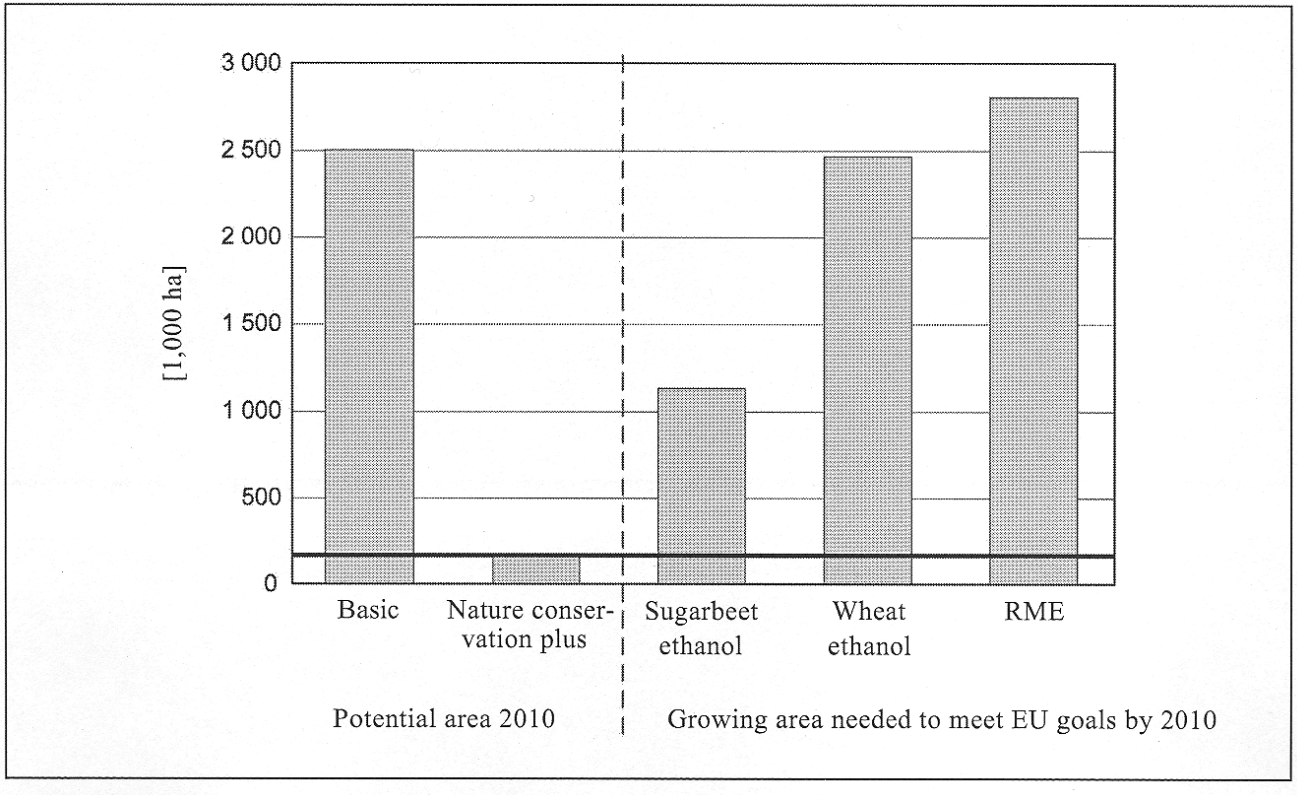


Source: after BMU, 2004b, p. 160

Biofuel – Nature Conservation Trade-off

Figure 9

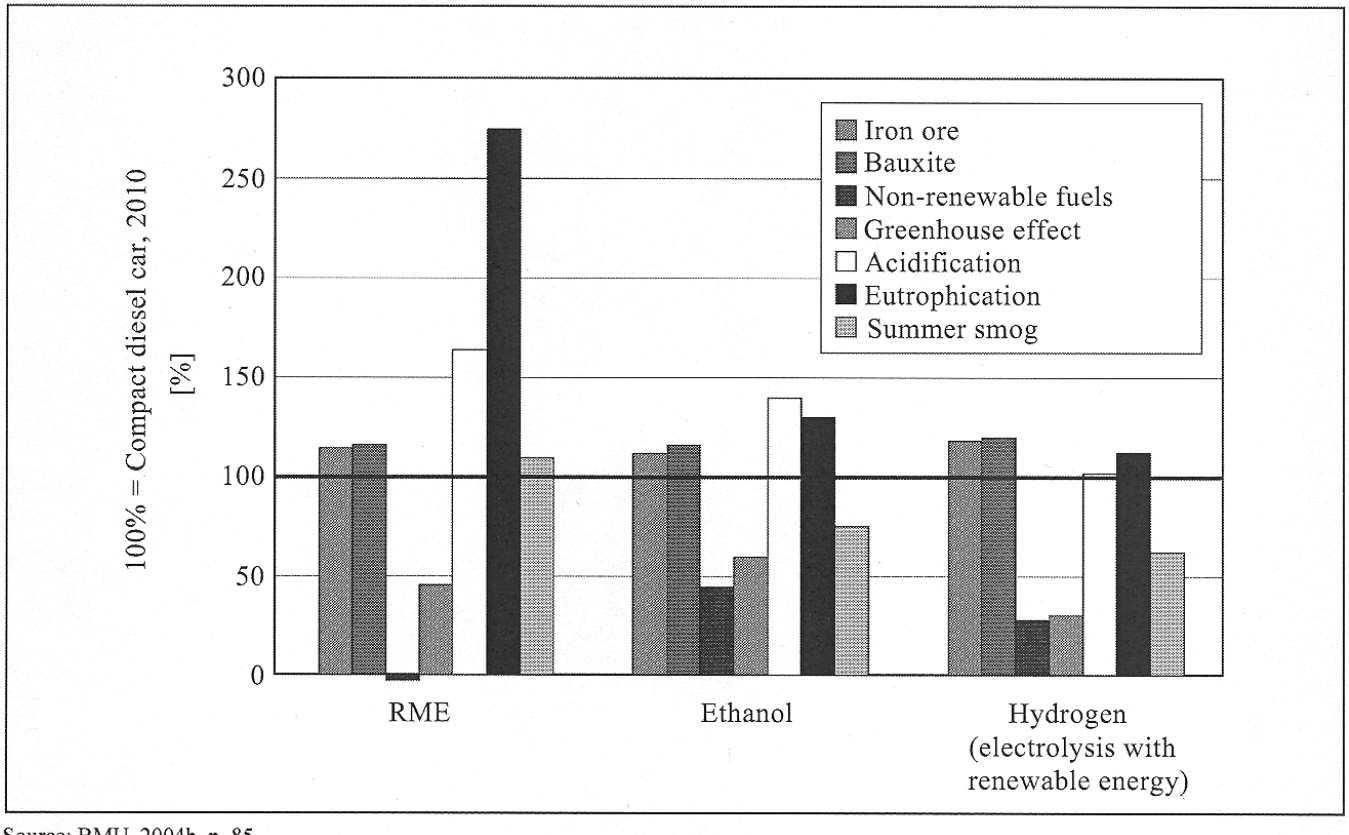
Crop Coverage Needed to Meet the EU 2010 Target of 5.75 per cent Biofuel and Available Arable Land



Source: BMU, 2004b, p. 162, modified

Figure 10

Environmental Impact of Different Biofuel Paths

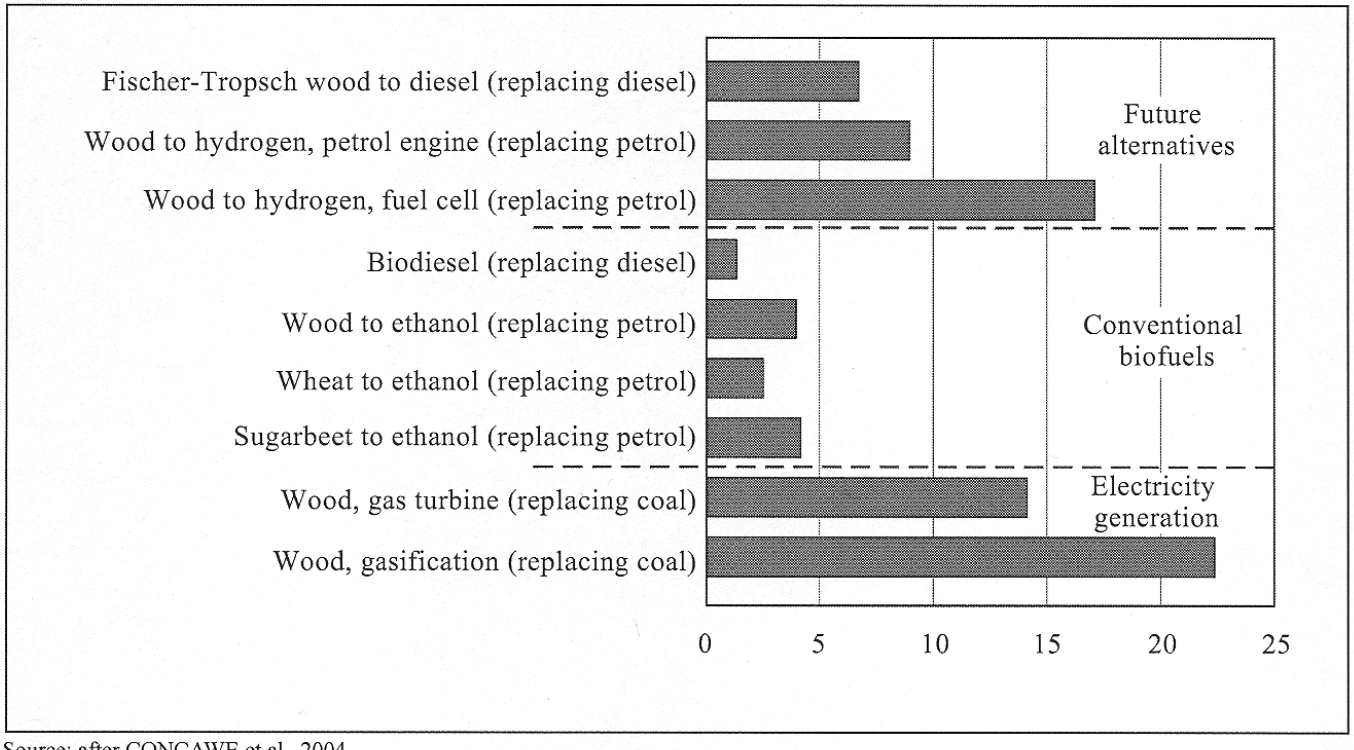


Source: BMU, 2004b, p. 85

Potential of the second generation technology

Figure 11

Greenhouse Gas Savings Potential from Different Biomass Paths



Source: after CONCAWE et al., 2004

Coal Substitution a Priority for Germany

Table 1

Greenhouse Gas Reductions from Various Uses of One Tonne of Biomass from Short Rotation Plantations

Type of Use	GHG Savings kg CO^2eq/t Biomass
Coal substitution, power station without CHP	650
Gas substitution, CCGT without CHP	270
Diesel substitute (Fischer-Tropsch synthesis)	290
SRU/EA SG 2005/Table 7.6. Data Source: BMU, 2004b and FRITSCHE, 2003	

High CO_2-Abatement Costs

Table 2

Costs of GHG Abatement Using Biofuel Variants

Fuel	Abatement costs €/t CO_2eq	Source
Biodiesel (rapeseed)	35–1,600 280–350(1) 110	QUIRIN et al., 2004 CONCAWE et al., 2004 own calculations
Biodiesel (sunflower)	0–750 220–260(1)	QUIRIN et al., 2004 CONCAWE et al., 2004
Rapeseed oil	– 50–1,000	QUIRIN et al., 2004
Sunflower oil	– 50–400	QUIRIN et al., 2004
Bioethanol (sugar cane)	20–150	QUIRIN et al., 2004
Bioethanol from sugarbeet	90–1,100 250–560(1) 500–1,000 320	QUIRIN et al., 2004 CONCAWE et al., 2004 SCHMITZ et al., 2003 own calculations
BTL (wood)	100–600 300 120	QUIRIN et al., 2004 CONCAWE et al., 2004 own calculations
Hydrogen (wood)	620–650	CONCAWE et al., 2004
See: EU Emissions Trading (February 2005)	approx. 8	European Energy Exchange, Leipzig

(1) Depending on use of co-products

SRU/SG 2005/Table 7.7

Conclusions: Transition Management is the key issue

- Strong Trade-Offs between Nature Conservation and biofuel market promotion with first generation biofuels
- Limited environment and economy compatible potential in the short-run
- Stationary sources should get priority in coal based economies

  → 2010-targets overambitious and expensive or infant industry support?
- But: considerable growth potential beyond 2010
- High oil and high CO2-Certificate prices may considerably reduce need for subsidization

German and EU Policy I: Targets and Supply Side Support

- EU Target for Growth of Biofuel Share:
  - -2% until 2005
  - 5,75% u ntil 2010
  - 8% until 2020

Supply Side:

- Common Agricultural Policy: Single Payment Scheme and Market Intervention in Favour of Sugar

- Research and Pilote Projects: 43 Million € in 2005

German and EU Policy II
Demand Side Support

- Renewable Energy Law: Fixed price to feed in electricity from biomass into grid (up to 17,5 ct/kWh)
- Moneral Oil Tax Relief 2004 – 2010
- New Government: Reduced Tax Relief, but blending Rule - Obligatory Biofuel Blend in conventional fuel

German and EU Policy III
Problems of new blending g rule

- Beyond 5% share in conventional fuel?
- A separate biofuel chain or or common with conventioanl fuels?
- Consumer pays the higher fuel price (3ct)?
- Compatibility with Euro 4 and Euro 5?

German and EU Policy IV
Effects – Germany as front runner?

- Production Capacity: 1,2 Mio. t in 2004, 3 Mio. t. foreseen for 2006 (= 6%)
- Take off as regards bioethanol – 2,2 m3 expected for 2010
- Substitution of 2,6 Mio.t. CO2 by biofuels – 17,5 by biomass
- Agricultural market: 400 Mio. € for biofuels, 1 Billion € for biomass

  At high cost: tax relief costs up to 2 bill. €/year

The Political Economy of Biofuels in Germany I
The Drivers

- Agricultural Community: New subsidies – new markets
- Green Community: Transition towards Renewables - „out of oil“
- Car Industry: „Integrated Approach“ to CO2-Reduction from Cars

The Political Economy of Biofuels in Germany II
The Concerns

- Nature Conservation: Take Trade-offs serious
- Fiscal Policy: Erase-Subsidies-Agenda
- Global Environmentalism:
  Subsidising monocultures in Brazil and elswhere?

Conclusion: Irreversible Transition?

After an inefficient start with haevy investments into a biomass economy and potential considerable trade-off to other land use policy goals, vested interests in the biofuel economy in Germany have become strong.

Second generation technology may lay the ground for a more efficient and environmentally compatible take-off in the next decade.