2nd International BtL-Congress

International Trade in Biomass – Perspectives and Conditions

12./13. October 2006

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Content

- Preconditions for international trade
- Trade with energy wood
- Trade with agricultural raw materials
- Trade with liquid biofuels
- WTO conditions
- Perspectives for agriculture
- Conclusions

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Preconditions for international trade

Transport-worthiness

- **High specific heating value**
- **High transport density**
- **Good storage ability**

Disequilibrium between supply and demand on domestic markets

Conditions of market access

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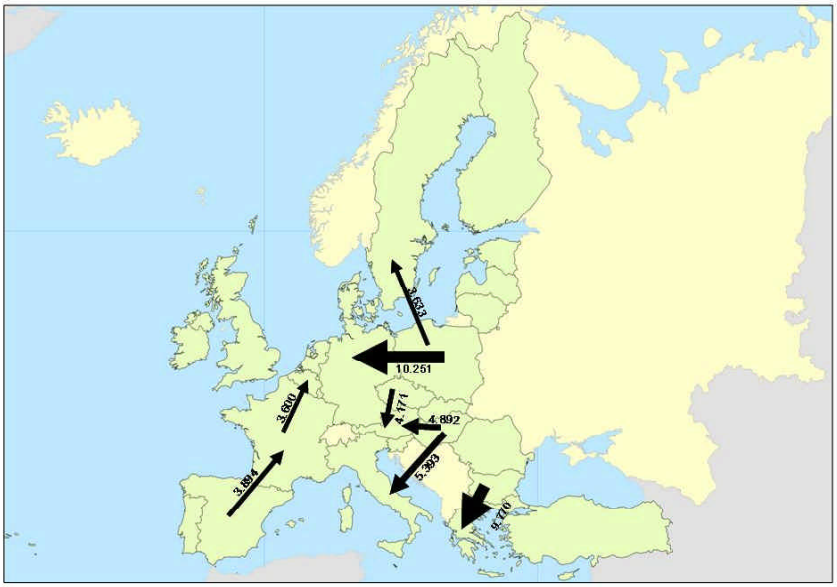
Most significant energy wood trade in Europe in 2001 stated in thousand USD



Souruce:
Thoroe, C. u. J. Schweinle, 2006

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Trade with wood pellets

- Strong growing market
- Good transport- and storage ability
- Expansion of wood pallets plants
- Disequilibrium of national supply and demand
- Increasing imports from North America
- Trade has in general still a minor role

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Installed number of pellet boilers and individual stoves smaller than 100 kW

	Anlagen-leistung	Anzahl der Pelletkessel und Einzelöfen < 100kW			
		2001	2002	2003	2004
Schweden	< 25 kW	36 000	44 700	54 700	67 200
Dänemark	< 100 kW	31 000	32 000	32 500	33 000
Finnland	< 100 kW	730	1 370	2 120	3 000
Österreich	< 100 kW	12 300	16 800	22 000	28 000
Deutschland	< 35 kW	7 200	11 800	18 150	27 250
Italien	< 35 kW	.	70 000	100 000	25 500
Summe					**ca. 284 000**

Quelle: Thoroe, C. u. J. Schweinle, 2006

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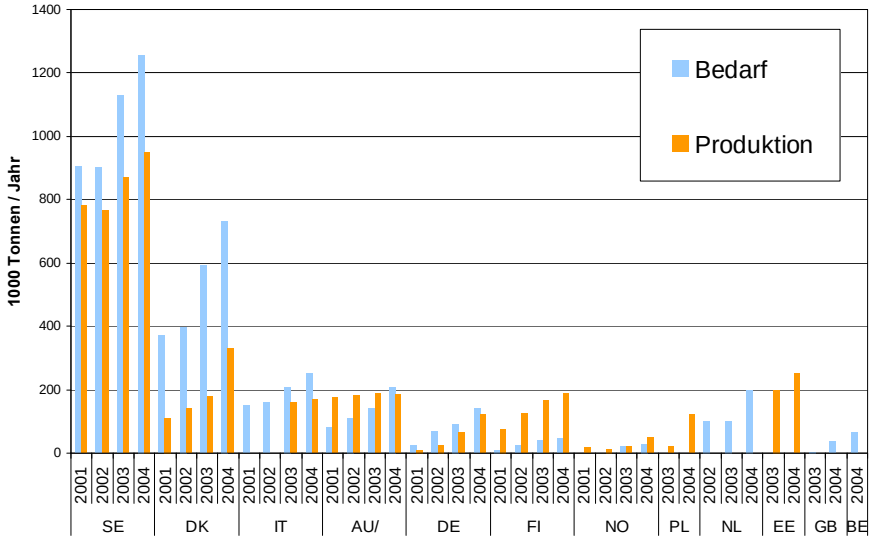
Production of wood pellets and consumption



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Quelle: Thoroe, C. u. J. Schweinle, 2006

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Pellet import countries

	2001	2002	2003	2004
	1000 tons / year			
Schweden	174	172	266	350
Dänemark	200	215	323	470
Italien	k.A.	k.A.	52	60
Deutschland	20	24	25	20

Quelle: Thoroe, C. u. J. Schweinle, 2006

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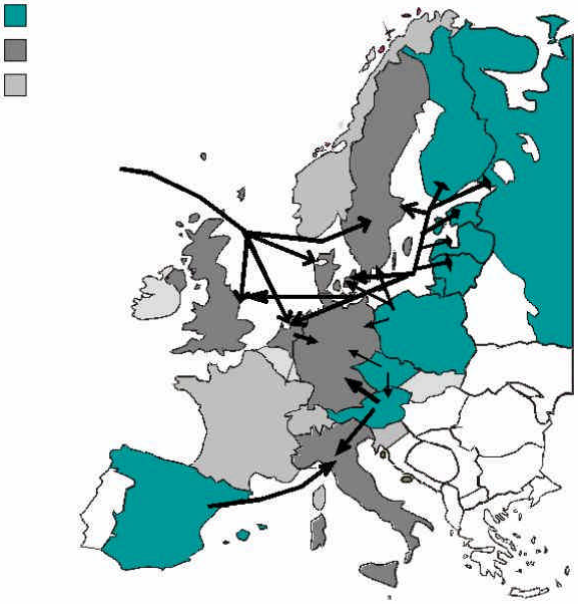
Pellet trade flows within the European Union



Quelle: Thoroe, C. u. J. Schweinle, 2006

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Trade with agricultural raw materials

- Net trade between 8 und 30% of production
- Disproportionately high increase of net trade
- Increase of real prices expected

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Outlook on prices of agricultural raw materials from OECD (International Agency for Energy)

Quelle: AGR/CA/APM (2005) 24/FINAL

- Period of outlook: 2005 – 2014
  Scenario: crude oil price 60 US$/barrel
- Expected increase of world market prices:
  - Wheat 15 %
  - Maize 15 %
  - White sugar 20 %
  - Oil seeds 28 %
  - Vegetable oils 30 %
  - Oil shred 25 %

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Trade of liquid biofuels

- So far only little international trade
- Highest potential for liquid biofuels in Brazil and USA
- Different national support of market introduction
- National imbalances between supply and demand

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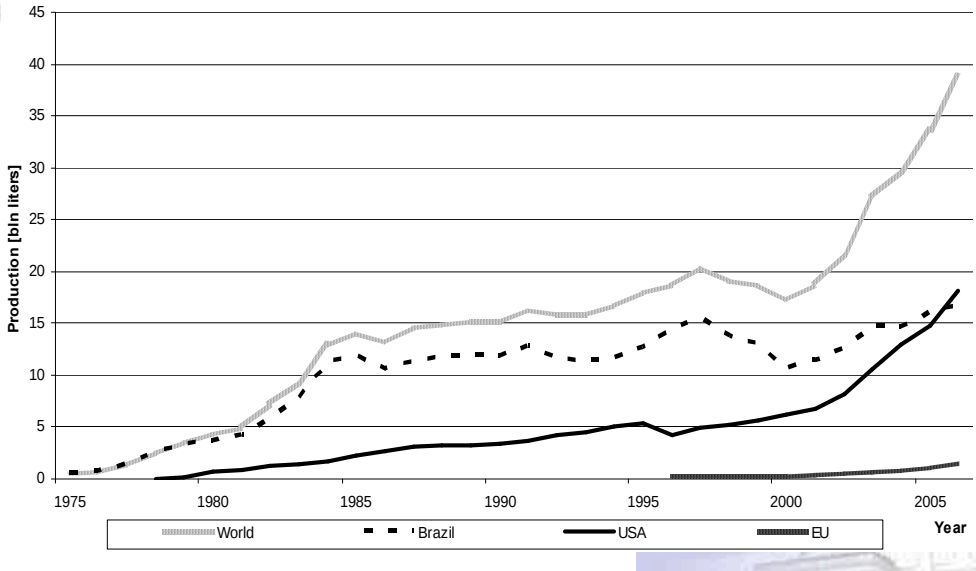
Production of bioethanol in Brazil, USA and EU (billion l)



Quelle: FO Licht (2006)

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Reduction of mineral oil tax for bioethanol in selected countries

Land	Mineralölsteuerermäßigung		Jährl. Bioethanol-erzeugung
	[%]	[€/hl]	[Mio. hl]
Deutschland (bis 2009)	100	65,45	5,85[1)]
Spanien (bis 2012)	100	39,6	5,2[1)]
Frankreich (bis 2010)	62,7 (direkt) / 64,5 (ETBE)	37,0 / 38,0	1,2
Schweden (bis 2008)	100[2)]	52,5	0,65
Vereinigt. Königreich[4)]	42	33,0	-
Polen (ungegrenzt)	5	1,72	
Litauen (bis 2010)	100	28,8	0,1
Ungarn (bis 2010)	100	42,6	-
Brasilien	43	11	144
USA	280[3)]	[3)]	127

[1)] Ende 2005
[2)] auf 2,2 Mio. hl
[3)] nur bei 10 %-Beimischungen (E-10) sind 28 % des gesamten Gemisches steuerbefreit (Steuerlast 0,132 US-Cent/gal anstatt 0,184 US-Cent/gal)
[4)] je Produzent o. Importeur 5 Jahre

Quelle: Henze, A. u. J. Zeddies, 2006

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New plant for bioethanol Südzucker in Zeitz

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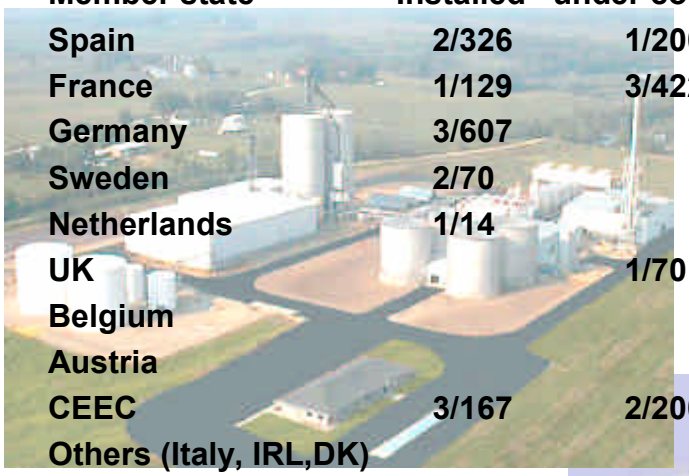
Plants for bioethanol in the EU- 25

Bioethanol for biofuel: number/ mio l capacity



Member state	Installed	under constr.	planned
Spain	2/326	1/200	1/125
France	1/129	3/422	7/1,700
Germany	3/607		3/390
Sweden	2/70		1/130
Netherlands	1/14		3/485
UK		1/70	1/130
Belgium			3/750
Austria			1/200
CEEC	3/167	2/200	4/560
Others (Italy, IRL,DK)			3/290
TOTAL	12/1313	7/892	27/4760

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Bioethanol

Brazil

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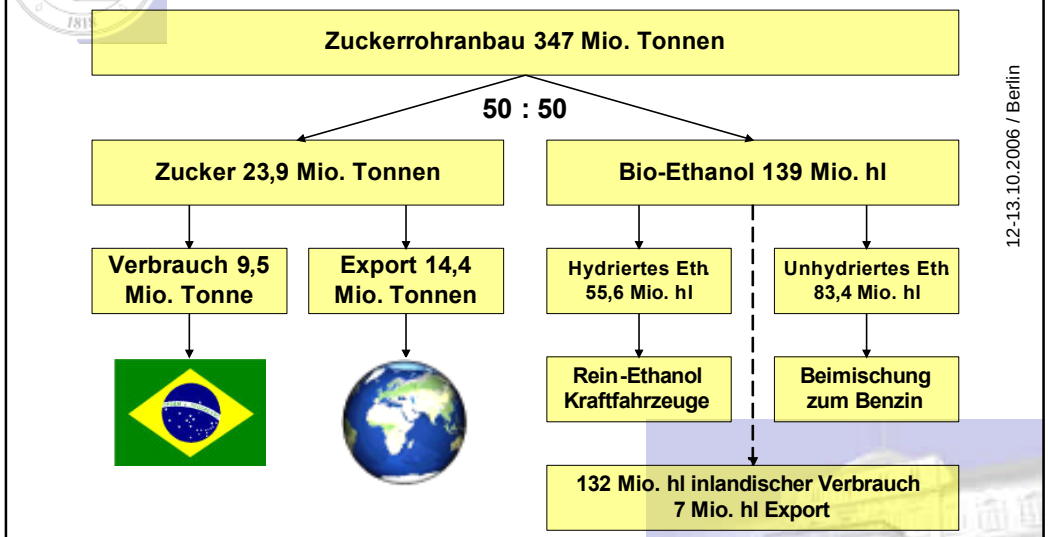
Production of sugar cane in Brazil



Quelle: Henniges, O., 2006

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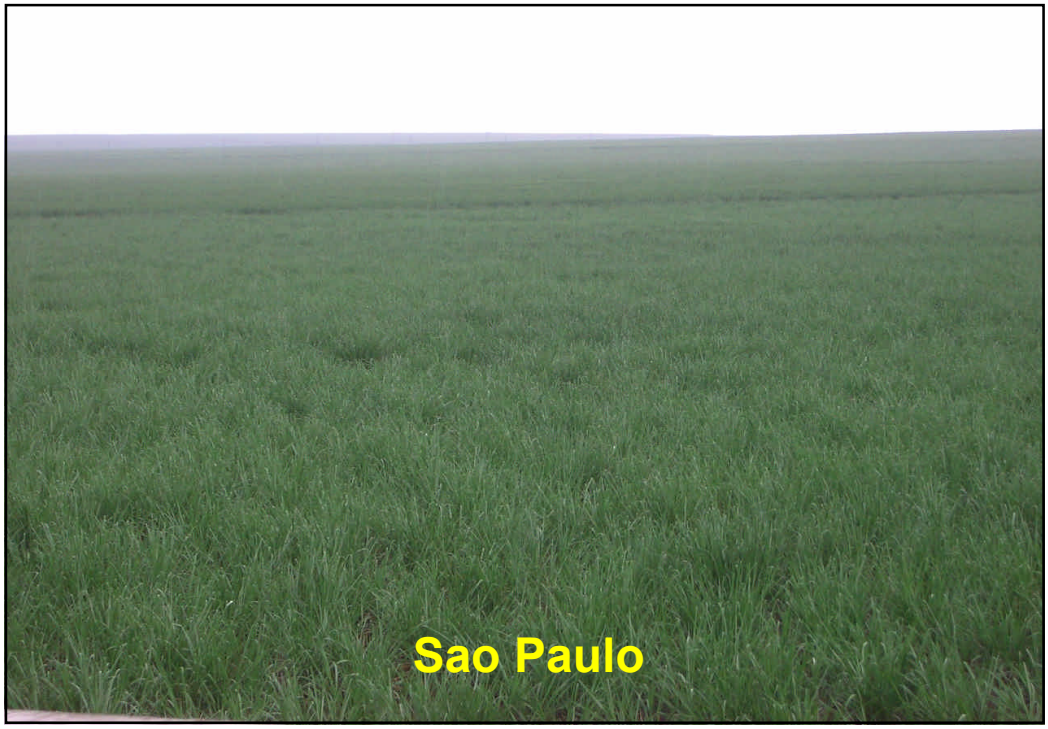


Bagasse as energy source
Brasilien


Burning of Bagasse
TOSHIBA
Brasilien

Bioethanol in Brazil

- Export 0,7 Mio. m^3 Ethanol (5 % of production)
- Strong increase of sugar cane production
  - From 5,4 up to 7 Mio. ha until 2015
  - 40 new sugar mills
- Additional sugar market of ca. 10 Mio. t next decade
- Remaining potential for export of max. 6 Mio. m^3
- Costs
  - Ethanol production cost: 15-20 cent/l
  - Transportation costs to Europe: 6 Cent/l
  - Import tax (Germany): 19,2 Cent/l
  - Total cost of supply for Europe: 40 Cent/l

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USA (Corn)

Thailand (sugar cane and cassava)


0,9 Mio. t today, 4 Mio t in 2010
Corn import around 10 Mio t
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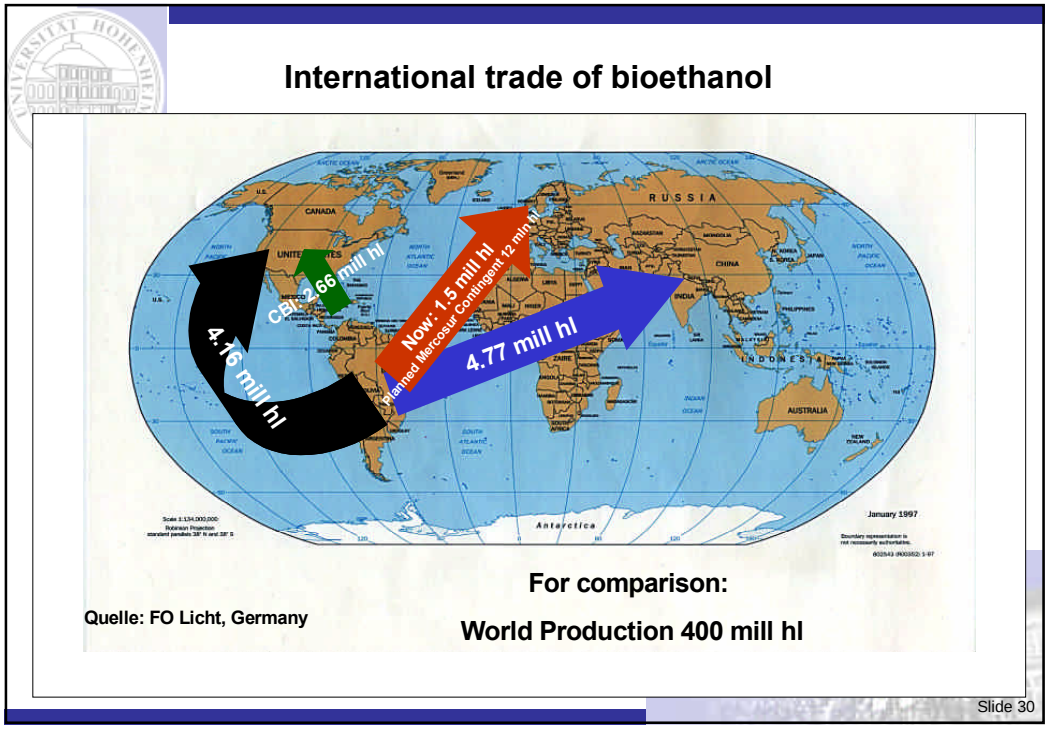
International trade of bioethanol
RUSSIA
CANADA
CHINA
INDIA
AUSTRALIA
4.16 mill hl
CBI: 2.66 mill hl
Now: 1.5 mill hl
Planned Mercosur Contingent 12 mill hl
4.77 mill hl
January 1997
Antarctica
Quelle: FO Licht, Germany
For comparison:
World Production 400 mill hl
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Bioethanol in USA

- Production 2005 around 16 Mio t
- Doubling of production until 2012
- Raw material: corn und soybean
- Net production cost about 25 €ct/l
- Import tax USA 10 €ct/l
- Government aid
  - Production: (7,9 €ct/l) for domestic use only
  - For users: Tax exemption 52 US-Ct/gal, about 11 €ct/l

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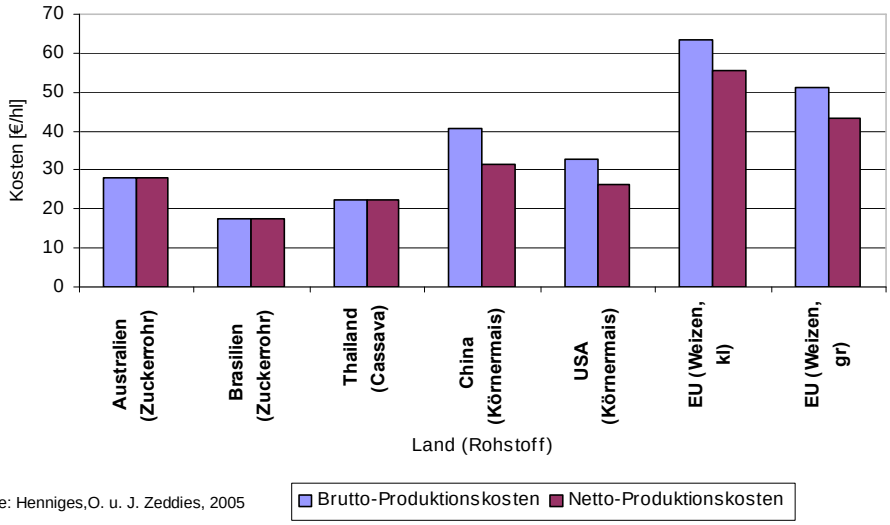
International comparison of production cost for bioethanol



Source: Henniges,O. u. J. Zeddies, 2005

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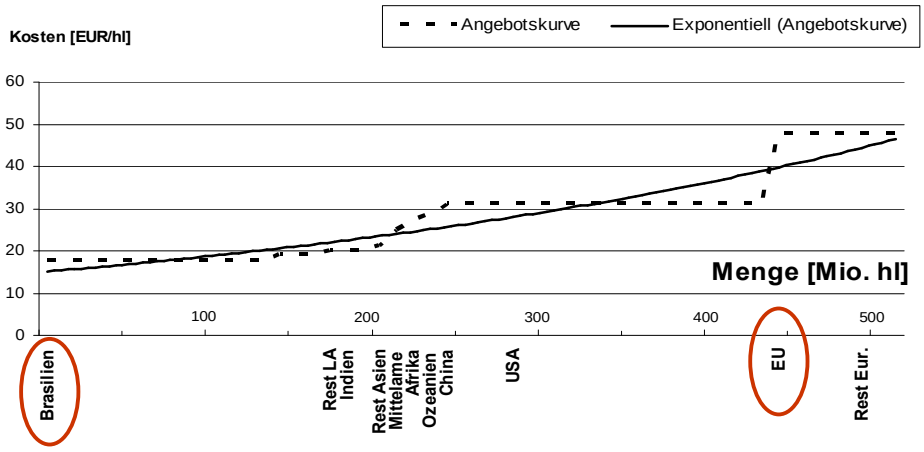
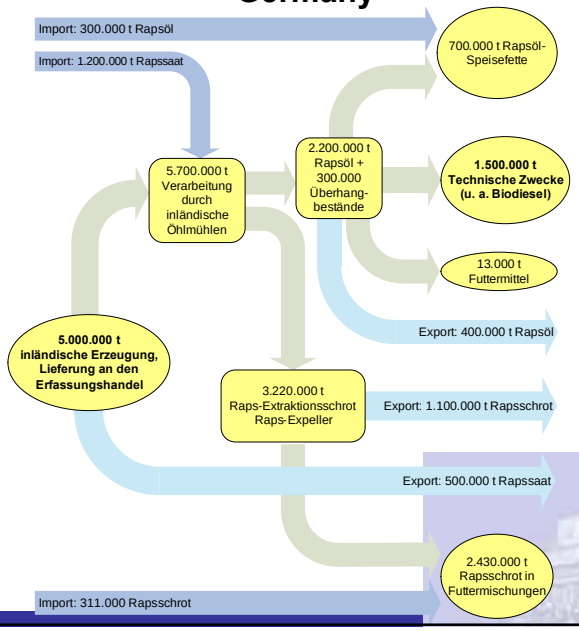
Global supply curve for ethanol



Trade with Biodiesel

- Germany is the world largest biodiesel producer
- Self-sufficiency with vegetable oils in Germany 80%
- Import of rapeseed (from France, Czech Republic, Canada) about 1,2 Mio t
- Import of rape oil 0,3 Mio t

Markets for rape seed and rape seed products in 2005 in Germany



Quelle: Thrän et al., 2006

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WTO conditions

- **Import tariff** on ethanol, 19,2 ct/l Germany
- **Mercosur**- negotiations:
  - 1 Mio. t ethanol without any tariff for EU
  - Sugar, beef, wheat, poultry meat and others

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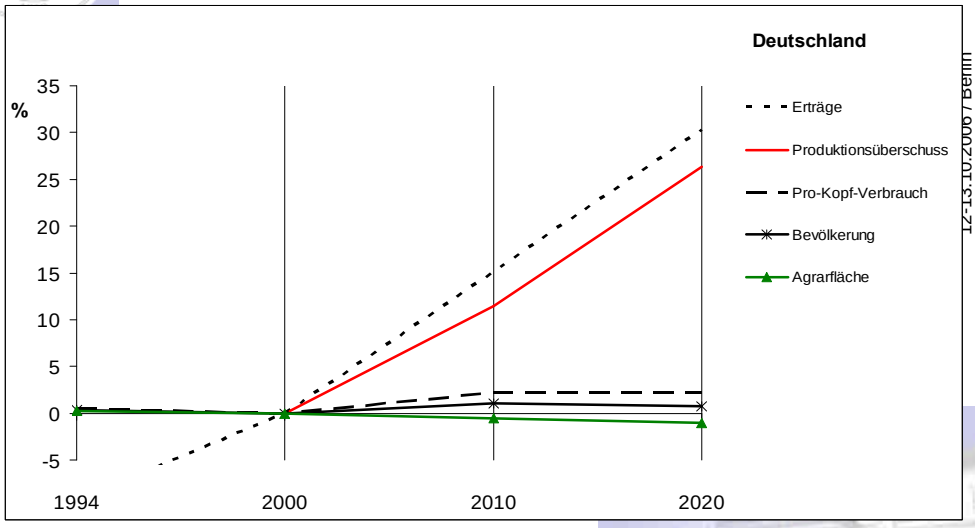
Trends in yields, agricultural land, population, per capita consumption and balance of surpluses in % in Germany



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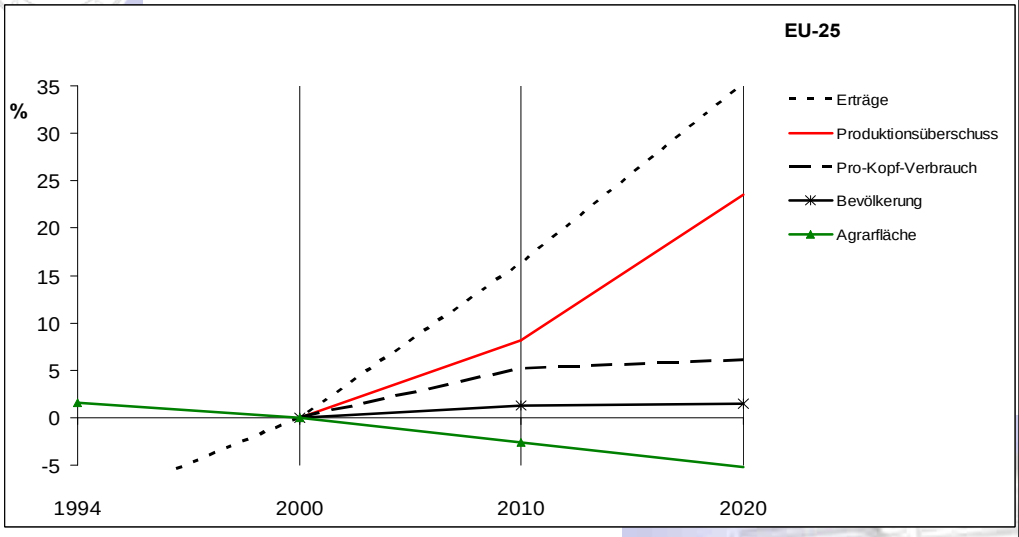
Trends in yields, agricultural land, population, per capita consumption and balance of surpluses in % in EU-25



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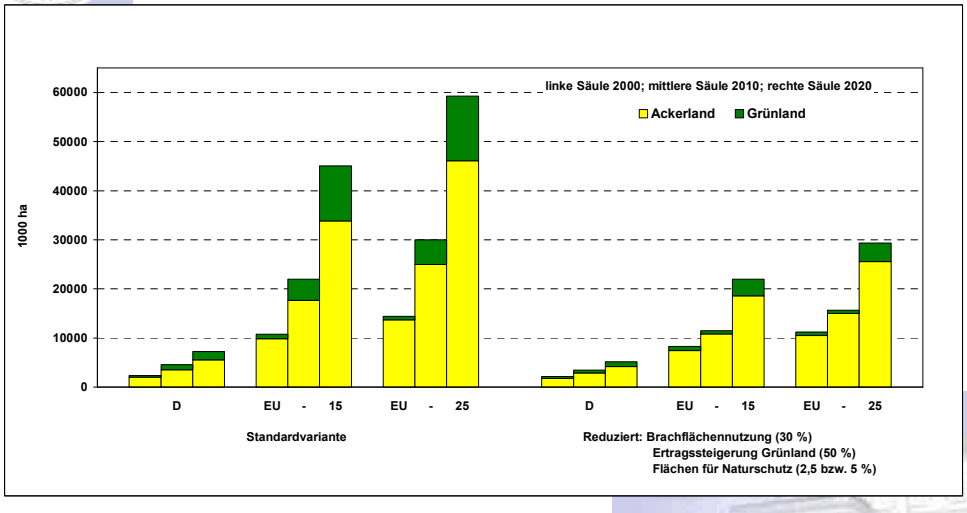
Technical potential for biomass to energy in ha 2000, 2010 and 2020 in Germany, EU-15 und EU-25



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Production potential for agricultural raw materials for liquid biofuels

Rohstoffquelle	Einheit	Deutschland			EU-25		
		2000	2010	2020	2000	2010	2020
Verfügbare Fläche							
feuchte Biomasse	1000 ha	119	323	640	677	1681	4187
Raps	1000 ha	111	335	611	540	1120	2715
Sonnenblumen	1000 ha	3	22	36	259	759	1097
Getreide	1000 ha	700	1871	3776	5291	15746	32187
Zuckerrüben	1000 ha	47	97	168	240	480	1084
Theoretisches Produktionspotenzial für Biokraftstoffe							
Rapssaat	Mio. t	0,37	1,29	2,73	1,50	3,60	10,14
Sonnenblumensaat	Mio. t	0,01	0,06	0,11	0,45	1,53	2,55
Getreide	Mio. t	4,61	14,31	33,61	25,45	87,86	208,54
Zuckerrüben	Mio. t	2,75	6,57	13,22	9,25	21,45	56,26

Source: Own calculation
Yield increase 1,5 %/year

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Theoretical Potential for Biodiesel

	Einheit	Deutschland			EU-25		
		2005	2010	2020	2005	2010	2020
Dieselkraftstoff							
Verbrauch Diesel	Mio. t	29,70	31,30	28,60	158,60	165,00 [5)]	178,20 [5)]
Biodieselpotenzial aus	Mio. t	1,80 [1)]	-	-	2,00	-	-
Rapssaat [8)]	Mio. t	-	2,316	2,892	-	3,44	6,06
Sonnenblumensaat[9)]	Mio. t	-	0,011	0,017	-	0,73	1,22
Summe	Mio. t	1,80	2,327	2,91	2,00	4,17	7,28
	Energieäquivalent [3)] Mio t	1,55	2,00	2,50	1,72	3,59	6,26
Möglicher Anteil an Diesel	%	5,20	6,40	8,75	1,10	2,18	3,52

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Theoretical Potential for Bioethanol

Ottokraftstoff							
Verbrauch Benzin	Mio. t	23,40	20,50	15,60	124,80	113,60	98,00 [6)]
Bioethanolpotenzial aus	Mio. t	0,48	-	-	1,03	-	-
Getreide [7)]	Mio. t	-	3,79	8,89	-	23,24	55,17
Zuckerrüben	Mio. t	-	0,54	1,05	-	1,70	4,47
Summe	Mio. t	0,48	4,81	10,72	1,03	25,97	60,67
	Energieäquivalent [4)] Mio t	0,32	3,25	7,03	0,70	17,53	40,95
Möglicher Anteil an Benzin	%	2,05	15,85	45,1	0,56	15,43	41,8

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Production potential for liquid biofuels

Biodiesel

- Currently 1,5 Mio. ha rape in Germany
- Additional 0,5 Mio. ha rape possible
- A quota of 5,75 % of diesel is possible
- Maximum potential 7 to 9 % in Germany
- Potential in the EU-25
  - 20 Mio. t production of oil seeds
  - Maximum 7 Mio. t available for biodiesel
  - Maximum 3 – 4 %-share of diesel consumption

Bioethanol

- Decreasing demand for gasoline
- Higher productivity per ha
- 30 – 40 %-share from gasoline is possible

Production potential for BtL

- Only a little competition in raw material supply which is used for biodiesel and bioethanol
- Preference for cheap raw material like straw and wood residues
- Cereals too expensive
- Dinjus: 30 Mio. t org. dry matter in Germany, whereof 9 Mio. t is surplus straw
- 5 Mio. t/year BtL possible, 11,3% of diesel and gasoline consumption in 2020

Total potential for liquid biofuels in Germany

- **Biodiesel: 2,91 Mio. t, according to 8,75% of diesel consumption**
- **Bioethanol: 10,7 Mio.t, according to 45% of gasoline consumption**
- **BtL: 5 Mio t, according to 11,3% of total consumption of diesel and gasoline**
- **Quotas from total consumption of diesel and gasoline:**
  - **5,6% Biodiesel**
  - **16% Bioethanol**
  - **11,3% BtL**

  Total: 33 % of diesel and gasoline demand

Perspectives for agricultural income

- **First stage of expansion:** Energy plants on set aside land (Germany)
- - **available set aside area 850 000 ha (maintenance cost 50 €/ha)**
- - **Gross margins from energy plants on set aside land: 250 €/ha + 50 €/ha maintanence cost;**
- **- Additional net added value: 250 Mio. € (Germany)**

- **Second stage of expansion: Energy plants on land used for subsidized exports of cereals and sugar.**
- - **Surplus of cereals 15 Mio. t: 2- 2,5 Mio. ha**
- - **Surplus of sugar 1,3 Mio t: ca. 0,2 Mio. ha**
- - **Savings of EU-Budget**
- - **15 Mio. t cereals; ca. 500 Mio. €**
- - **1,3 Mio. t sugar; 300 Mio. € savings for producers and consumers**

Further benefits for agriculture

Price effects

- Price increase, rapeseed about 30 €/t, for 5 Mio. t: 150 Mio. €
- Price increase for cereals: ca. 15 €/t for 40 Mio. t: 600 Mio. €
- Sales of straw for BtL: 9 Mio. t a. 40/t €= 360 Mio. €
- Net added value for agriculture = about 1,1 bln €/y
  - Related to agricultural land: 100 €/ha
  - Related to average farm: about 3000 €/farm

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Estimation of macroeconomic effects

- Charge of consumers: higher costs and additional consumption of gasoline
- Added value
  - Employment
  - Profits of biofuel companies
  - Net added value agrigulture (gross margins)
  - Cost advantage DDGS compared to soy shred (15€/t)
  - Additional tax income: VAT, income tax and others
  - Additional VAT on additional fuel consumption
  - Relief of support of unemployed
  - Additional social insurance income (pre-drawing effect)
  - Savings in EU/Budget (intervention, subsidies etc.)

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Conclusions

- Disproportionately high-growing world trade of agricultural raw materials
- Growing increase of potentials: biofuels instead of food production in the EU
- Import tariffs guarantee competitiveness of biofuel production in EU
- A liberalization of trade and a low crude oil price: only Brazil would be competitive to produce and export bioethanol
- The share of biofuels from total fuel consumption would stay low worldwide
- EU-25 and Germany have high potentials for liquid biofuels. The share of biofuels from total fuel consumption could theoretically reach 33% in Germany.

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Thank you for your attention

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