

International Conference

Biofuels for Transportation – Global Potential and Implications for Sustainable Agriculture, Energy, and Security in the 21st Century

Biofuels in Europe – Perspectives and Policy Approaches

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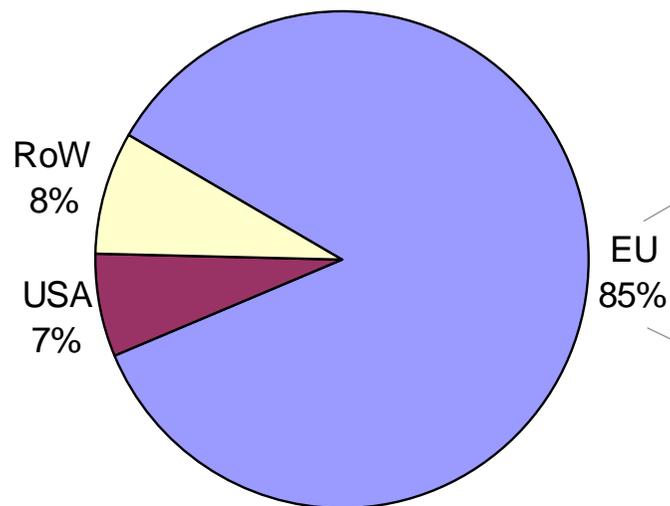
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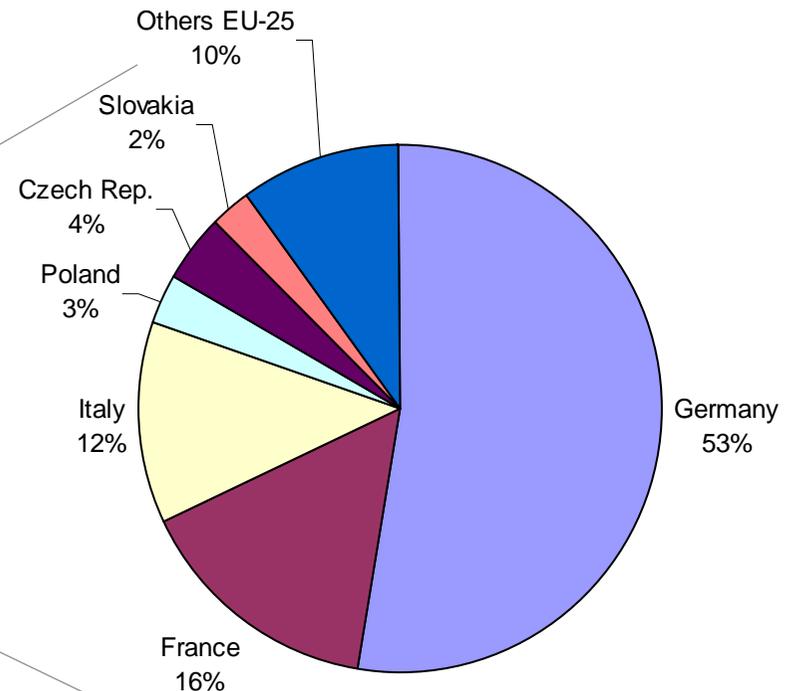
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Germany is the largest biodiesel producer and accounts for more than half of the European biodiesel production

Global biodiesel production has reached approx. 3.8 mill. tons in 2005

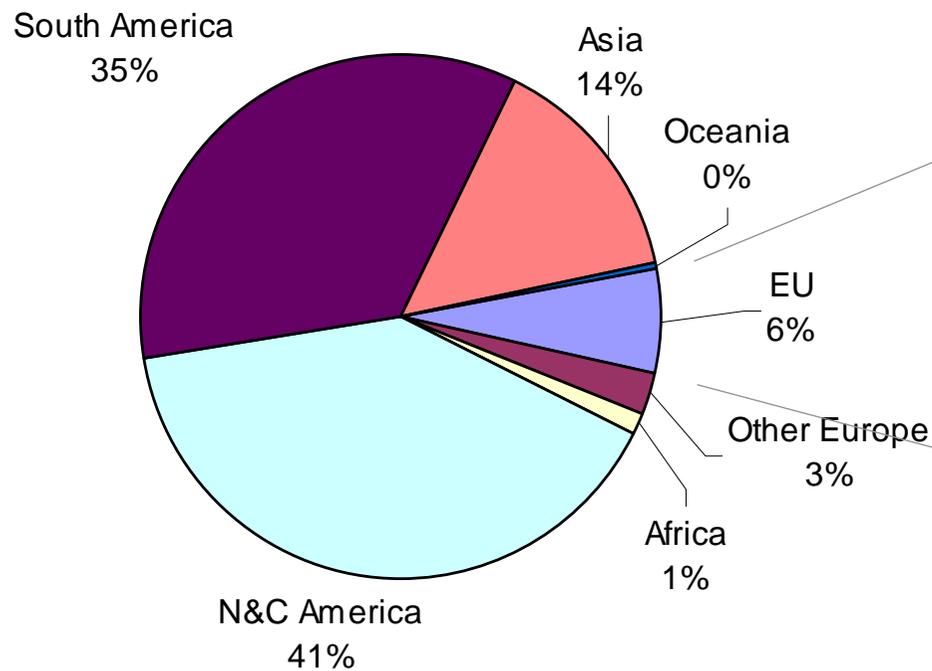


The EU biodiesel production has reached 3.2 mill. tons in 2005

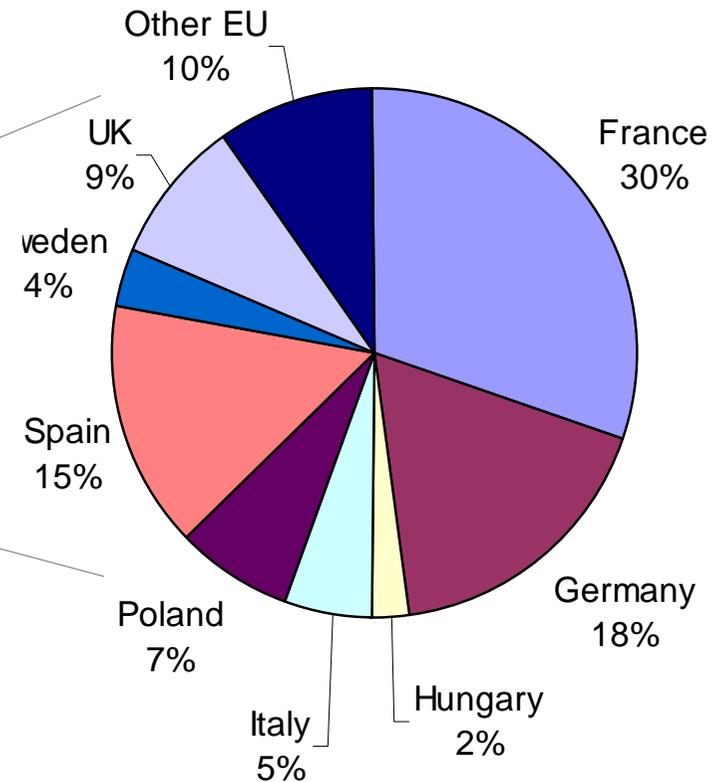


France is still the leading European ethanol producer due to its large potable market segment

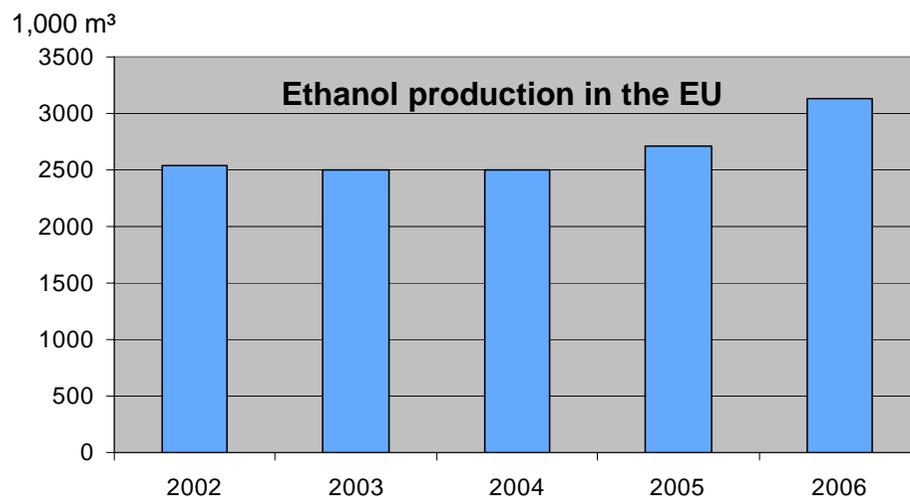
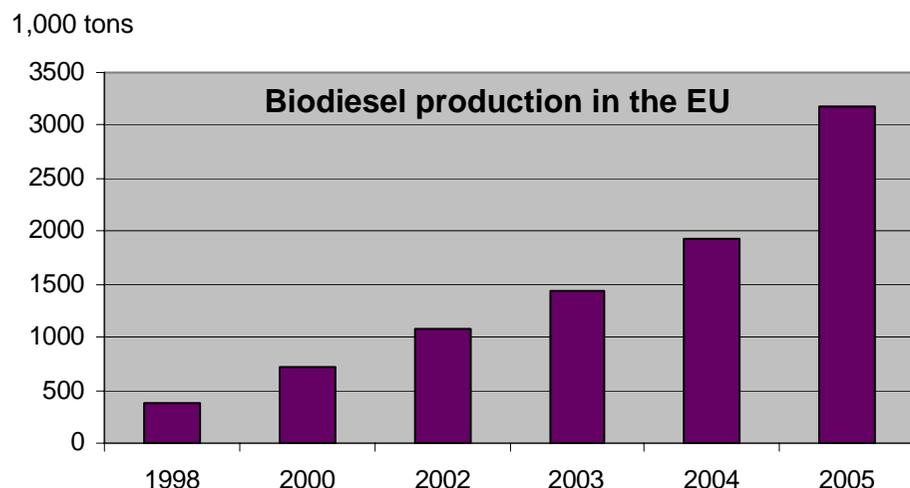
Global ethanol production will reach nearly 50 mill. m³ in 2006 after 45 mill. m³ in the previous year



The EU ethanol production will reach 3.1 mill. m³ in 2006 after 2.7 mill m³ in the previous year



The European biofuels market grows with accelerating pace



Source: Diester Industrie International/ EBB/ F.O. Licht

Drivers of the development

- Implementation of EU-Directive 2003/30 ("Biofuels Directive"; 5.75% biofuels target in 2010)
- More member countries have started implementing a biofuels policy; less member countries are lagging behind or showing no political will to implement
- More member countries have decided to introduce mandatory blending targets
- Continued strong political support
- Many new large-scale investments: The biodiesel production capacity within the EU will reach 6 mill. tons in 2006, a 44% increase from 2005. At least a dozen large-scale bioethanol projects are in the planning/ construction phase

The EU has adopted comprehensive legislation in 2003 aiming at creating an European biofuels market

The EU biofuels market is desired at political level

Action plan on alternative fuels (COM (2001) 547, 7.11.2001)

Use of biofuels promoted for the following reasons: sustainable development, CO₂ reduction, security of supply, additional positive influence on rural development and agricultural policy
Current biofuels are not seen as long-term high volume substitute for motor fuels (instead focus on 2nd generation biofuels)

Biofuels directive (2003/30/EC, 8.5.2003)

According to this directive, member states should ensure that a minimum proportion of biofuels and other renewable fuels is placed on their market. The directive sets indicative targets (5.75% in 2010). If the objectives set in the directive are achieved, the consumption of biofuels in the EU will increase from 1.4 mill. tons oil equivalents in 2001 to 19 mill. toe in 2010

Energy tax directive (2003/96/EC, 27.10.2003)

This directive gives the possibility to member states to grant tax reductions/exemptions in favour of biofuels, under certain strict conditions. Over-compensation not allowed

Several member countries apply tax reductions/exemptions in favour of biofuels or are considering implementing favourable fiscal measures

Traditional and new ethanol producers compete in the market



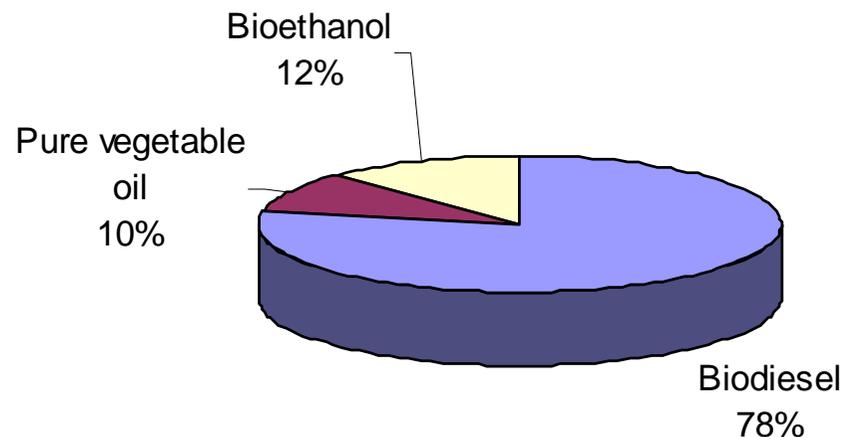
Several new biodiesel plants have been set up in Germany



Bildnachweis: Bio-Oelwerk Magdeburg / UFOP

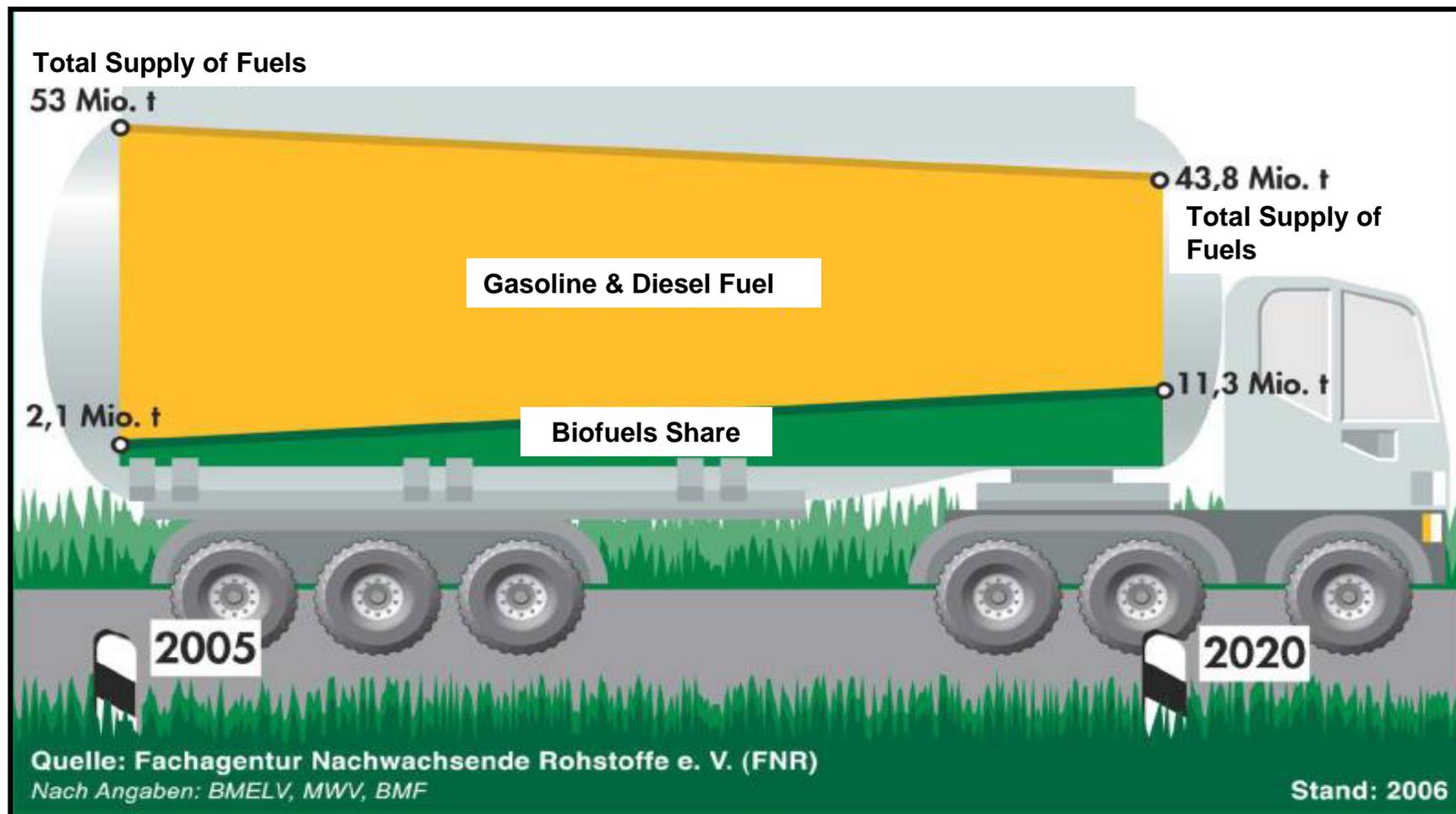
Germany has supported the market introduction of biofuels with high tax incentives. A new system will be in place from 2007 onwards

In 2005, approx. 2.5 mill. m³ biofuels have been sold in the German market



- Biodiesel and pure vegetable oil have been supported with 0.47 €/l tax incentive
- Bioethanol has been supported with 0.65 €/l tax incentive
- Overall, the German Government had tax income losses of approx. 1.3 billion € in 2005
- Therefore, the incentive scheme will be most likely replaced by a mandatory scheme, starting January 1, 2007:
 - 2% minimum blend of ethanol in gasoline, from 2010 onwards 3%
 - 4.4% biodiesel content in diesel
 - Total quota 2009: 5.7%
 - Total quota 2010: 6%
 - Ethanol share in E85 tax free until 2009
 - B100 will be taxed at 0,10 €/l, biodiesel used in blends will be taxed 0,15 €/l until 2009

While total fuels supply is shrinking, the German biofuels market will grow to 11.3 mill. tons in 2020



Incentive schemes should take into account the efficiency of current and 2nd generation biofuels

	Biodiesel	Pure Plant Oil	Bioethanol (sugar, starch)	Bioethanol (Lignocell.)	BTL	Biogas	Bio-Hydrogen
Gross energy yield (GJ/ha / litre fuel equivalent)	51 / 1408	51 / 1420	Sugar: 132 / 4054 Starch: 54 / 1660	21 / 640	135 / 3907	178 / 4977	160 / 4742
Net energy yield (GJ/ha)	38	35	Sugar: 88 Starch: 30	18	118	113	120
Production (2005, in% of substituted fossil fuel)	5,5	ca. 0,7	Sugar: 0 Starch: 1,0	0	0	0	0
Production cost (€/GJ)	19	14	Sugar: 24 Starch: 22	30	30	21	26 - 37
International Competitiveness	Factor 1,2 - 1,3	Factor 1,3	Compared to BRA: Factor 2,5	n.a.	n.a.	No internat. competition	n.a.
CO ₂ ^e -avoidance t/ha	3,4	3,3	Sugar: 7,2 Starch: 2,9	1,6	10	ca. 8	n.a.
CO ₂ ^e -avoidance costs (€/t CO ₂ ^e)	154	83	Sugar: 290 Starch: 252	295	272	273	n.a.

The EU has 25 member states and 25 different biofuels regulations in place

The point of no return has been passed, and the EU biofuels market will grow further in future, despite the fact that current biofuels are not very efficient in economic and ecological terms (expensive, high GHG avoidance costs. Substitution in stationary applications more efficient)

Demand will grow further in most EU member countries due to the introduction of mandatory blending. Bioethanol and biodiesel will remain most important. Standards will be adopted to allow higher blending (E10, B10). Most of the biofuels will be blended, B100 and E85 are likely to remain in niche markets

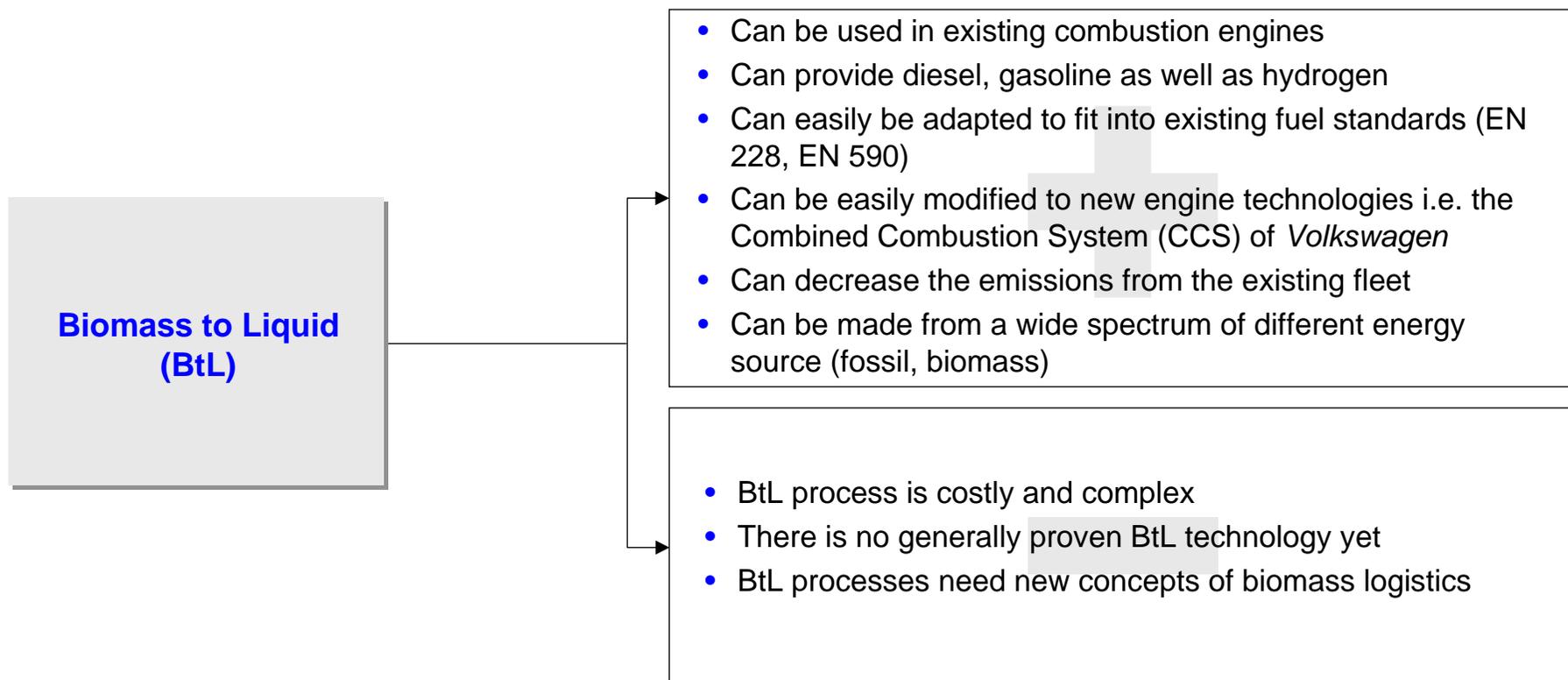
With the booming demand for biofuels, availability and prices of feedstock could become a problem. Competition is taking place between nutrition and energy markets

The market is supplied mainly by European production. Producers require long-term reliable framework conditions. The market is safeguarded with high tariffs and technical product requirements. If future WTO-agreements result in lower tariffs in particular European bioethanol producers may face serious problems

The EU biofuels market is very heterogeneous, it is not a real EU international market, offering a level playing field for all market members. Setting up the framework of a common market should be the objective of the EU Commission

Germany is highly involved in technology development, in particular in promising 2nd generation biofuels (BtL)

It is expected that synthetic gasoline and diesel from BtL-synthesis will cover more than 20% of total German fuel consumption in mid-term (2030). BtL (Biomass to Liquid) belongs to the group of synthetic fuels which are favored in particular by the automotive and fuels industry



First commercial BtL plants could be in operation by the end of the decade. But there is still significant research required

- **Choren Industries** uses a multi stage gasification process. The center-piece of the technology is the patented Carbo-V® process that made the production of tar-free synthetic combustion gas possible. A broad spectrum of biomass feedstock can be converted into clean transport fuel using Fischer-Tropsch synthesis
- A beta plant is currently set up and Choren will start production at the end of 2006. Four large scale industrial plants could be set up from 2008 onwards
- The **Fachagentur Nachwachsende Rohstoffe** (FNR; www.fnr.de) is a Center of Competence for 1st and 2nd generation biofuels R&D projects. Selected current BtL-projects
 - Gasification of Slurries through flash pyrolysis and synthesis of methanol from biomass, phase 1 (Forschungszentrum Karlsruhe)
 - Engineering and construction of a BtL-Pilot-Unit (Technische Universität Bergakademie Freiberg, IEC)
 - Adaption of the Fischer-Tropsch-Synthesis (Technische Universität Bergakademie Freiberg, IEC)