

# Biofuels in Germany

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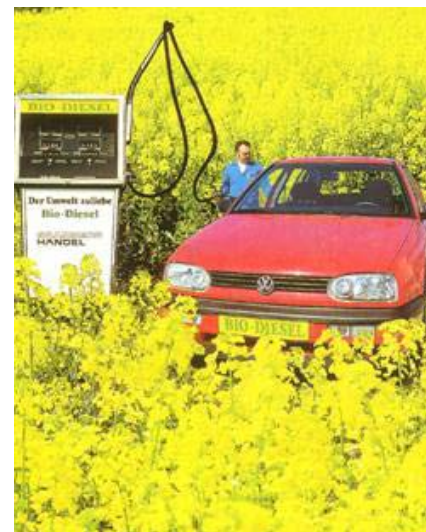
# Goals of the European Union

“Indicative goals” for the share of sold biogenic fuels\* in the total sold Otto and Diesel fuels (with respect to the energy content) acc. to Information Note 6795/03 of the Council of the EU dated 2003/02/25

year	share [%]
2005	2
2010	5.75

**Proposal of the European Commission, Jan 10, 2007:**

2020	10.00
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\*explicitly mentioned are: bioethanol, biofuels, biogas, biomethanol, biodimethylether, bio-ETBE, bio-MTBE, synthetic biofuels, biohydrogen, pure vegetable oil from oil plants

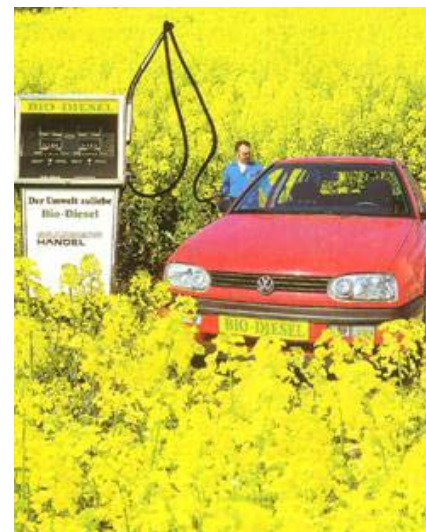
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**Proposal of the European Commission, Jan 23, 2008:**

2020	10.00
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Including the sustainability criterion:

Biofuels must exhibit a reduction of at least 35% in the GHG emissions

# But:.....Effects of Rising Food Prices within the EU

**State: Sept 11, 2008**

The largest political fractions in the European Parliament are in agreement that the objective for biofuels in the transport sector should be reduced to 6% in 2020. The 10% target remains valid and concerns the use of renewable energy in the transport sector. The further 4% shall be reached by sustainable electricity, hydrogen, and/or 2<sup>nd</sup> generation biofuels.



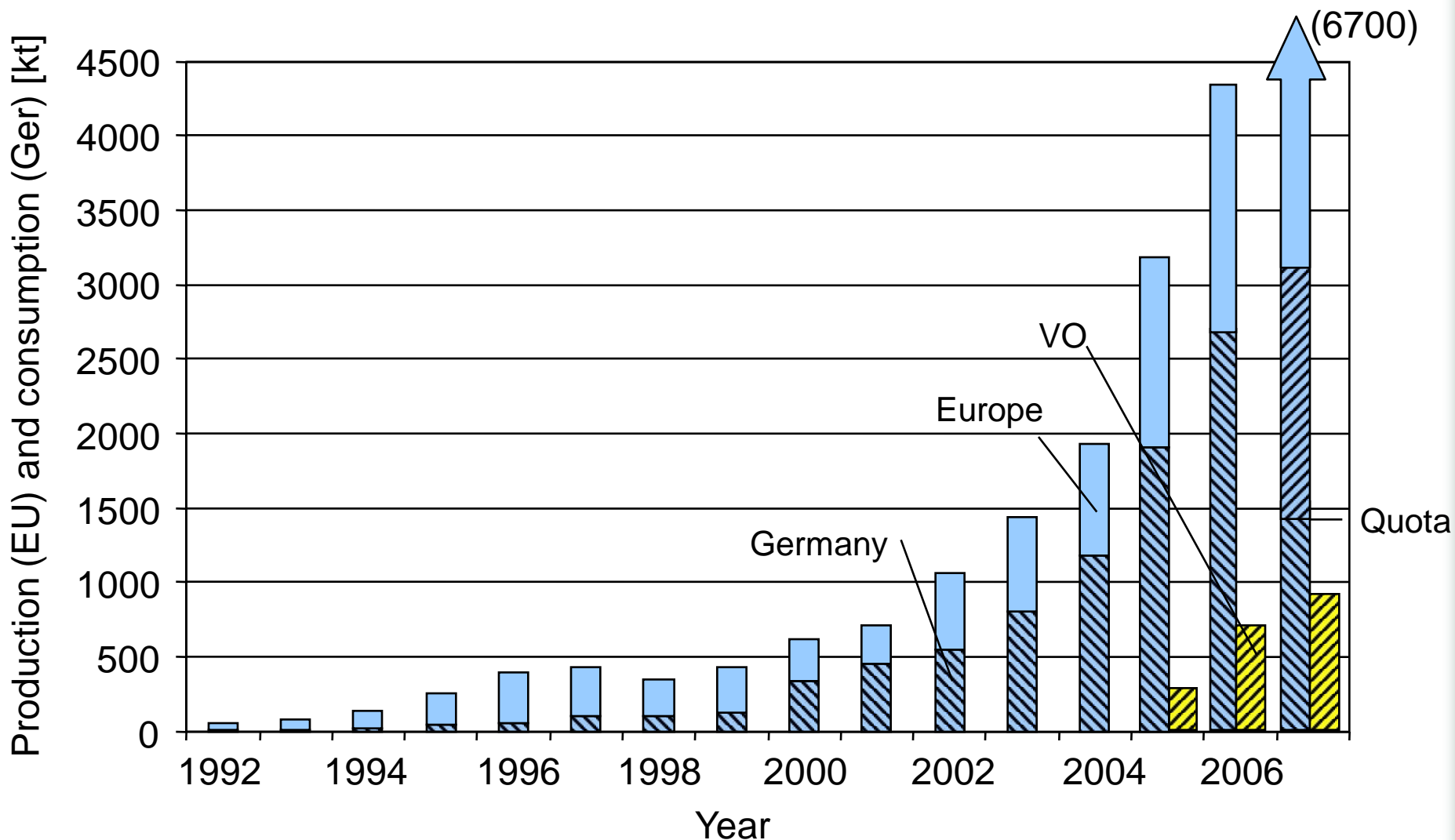
- Production and Consumption of  
Biodiesel and Bio-Ethanol

- Political Framework

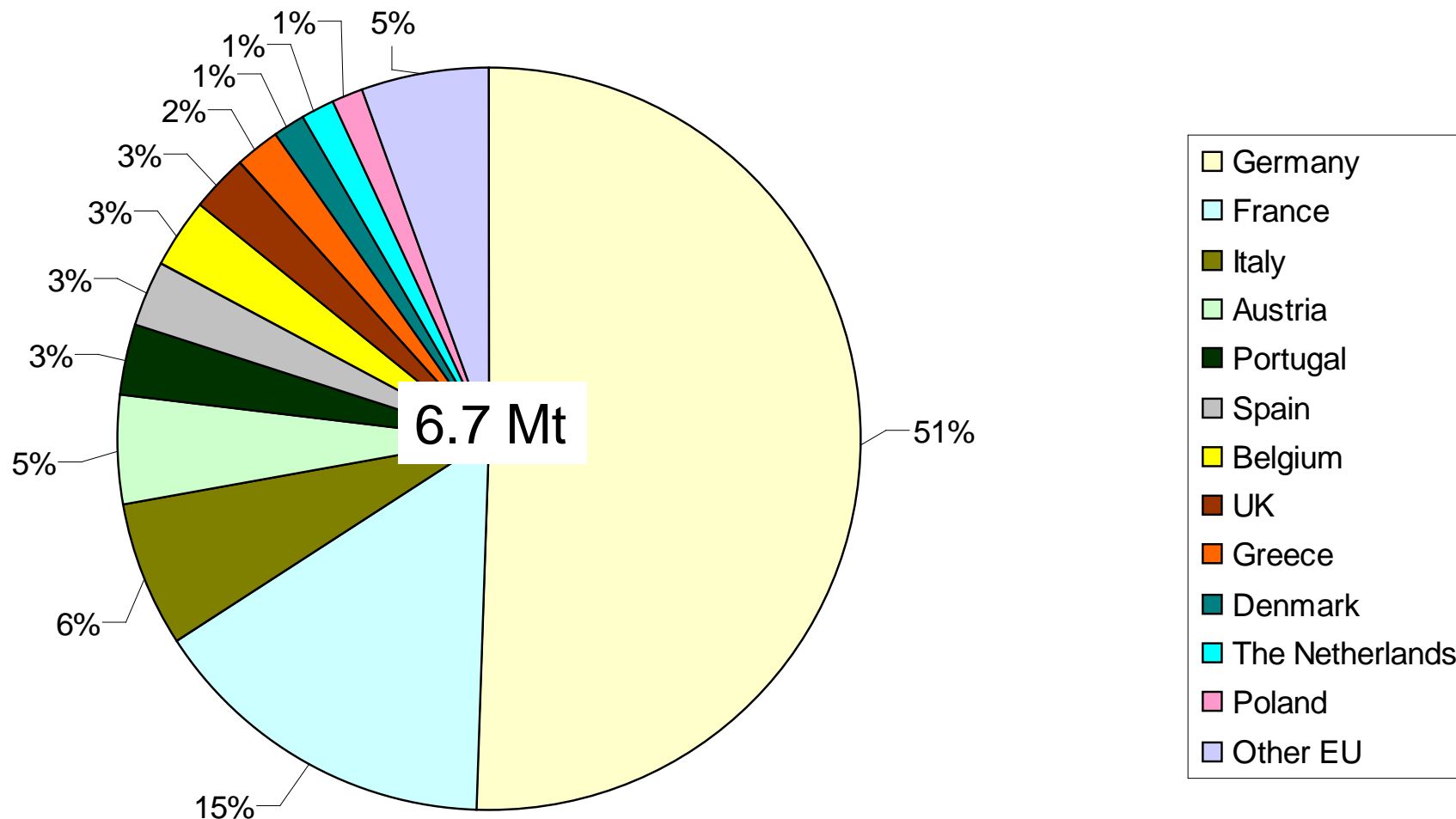
- Bio-Gas

- BtL and 2nd Generation Ethanol

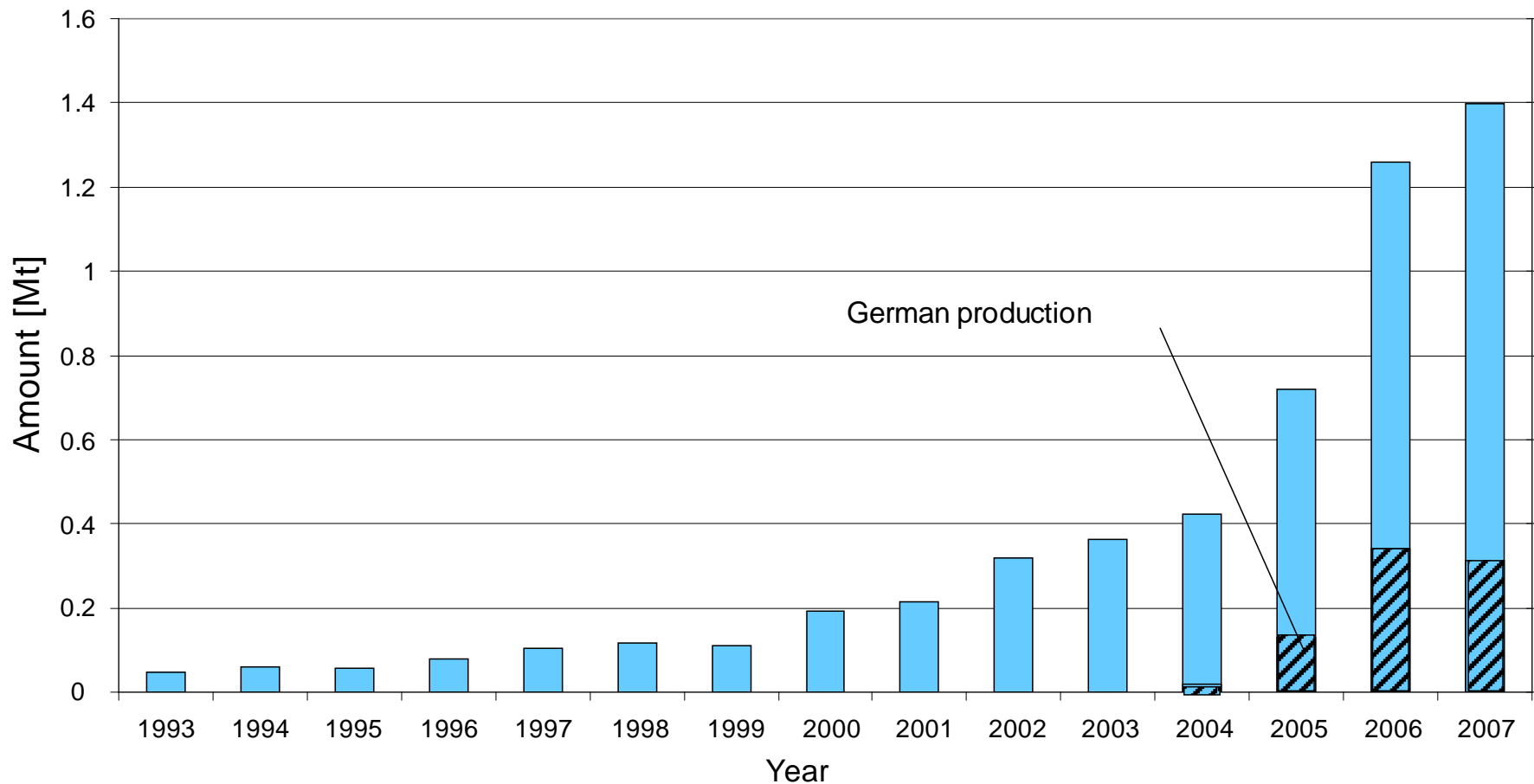
# Production of Biodiesel in Europe and German Consumption of Biodiesel and Vegetable Oil



# Production of Biodiesel in Europe (EU-27) during the Year 2007

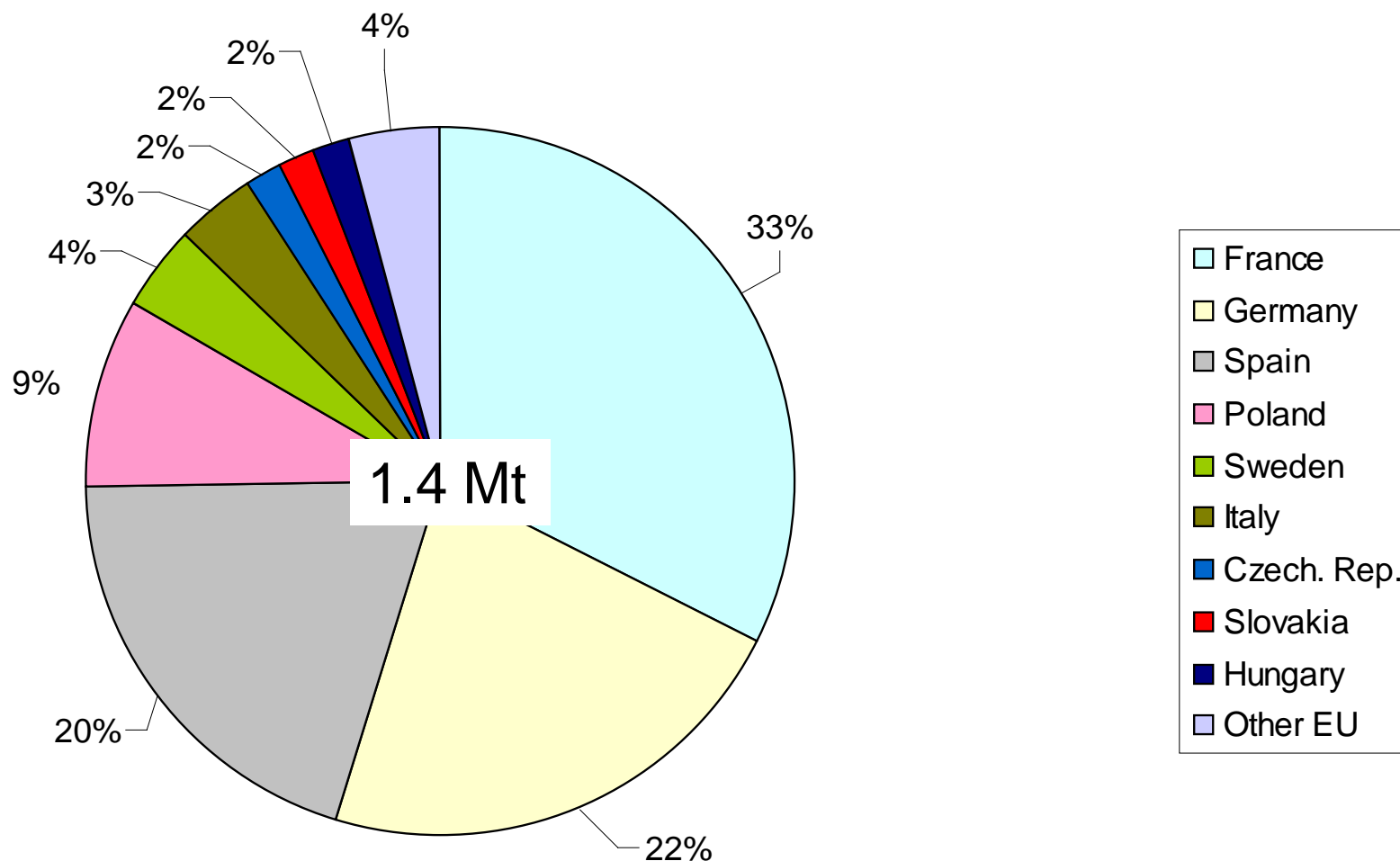


# Production of Bio-Ethanol in Europe (EU-15; since 2004: EU-25)





# Production of Bio-Ethanol in Europe (EU-27) during the Year 2007





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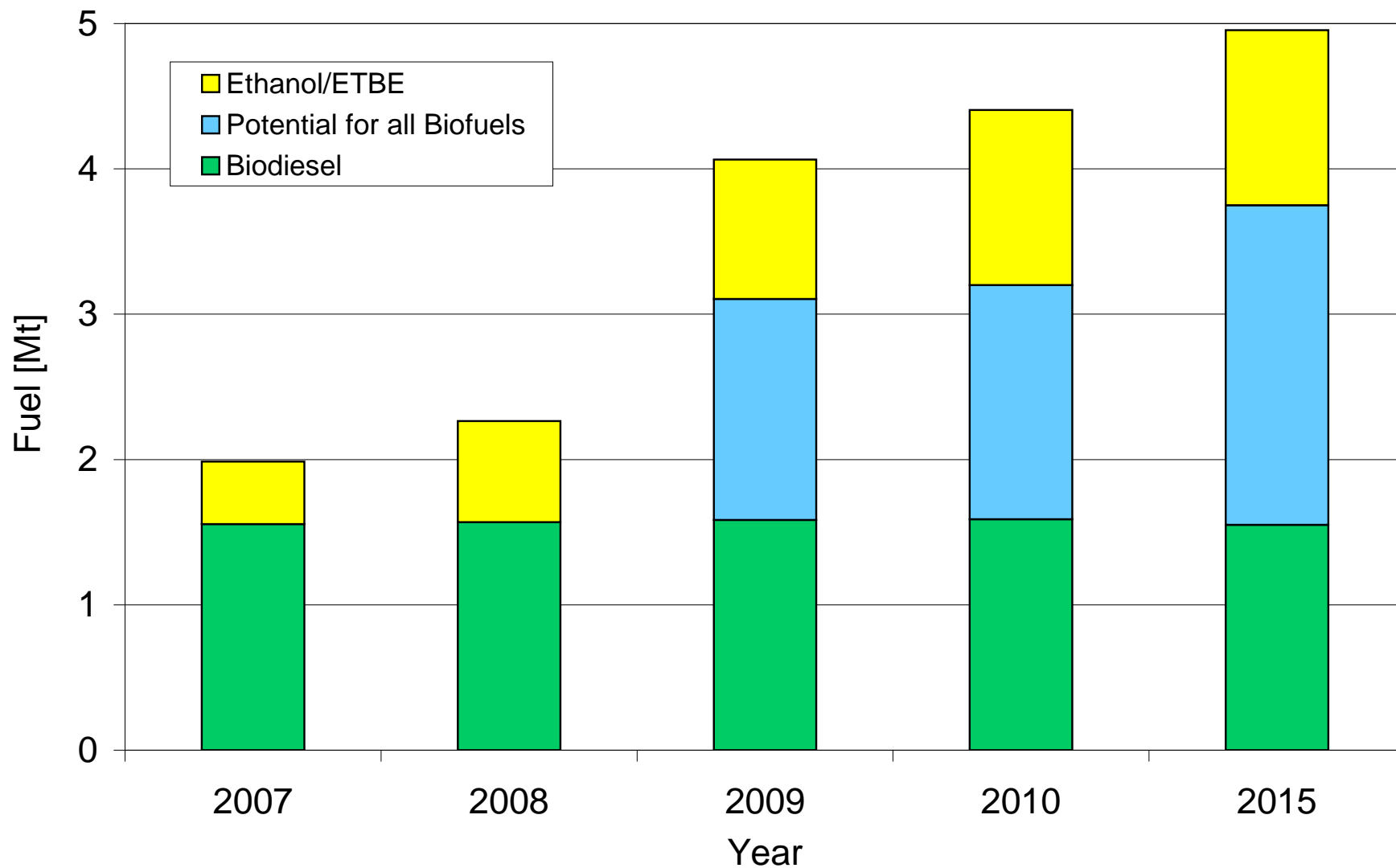
- ☐ The former complete tax exemption is ceased; instead, fuel-dependent rising taxes are scheduled (since 8/2006)
- ☐ Quotas for admixing biofuels to fossil fuels are introduced; these quota biofuels are fully taxed
- ☐ Biofuels for agricultural purposes remain tax-free
- ☐ 2<sup>nd</sup> generation biofuels remain tax-free until 2015

# Quotation; the Admixed Biofuels are Fully Taxed (Quotas Refer to Energy Content)

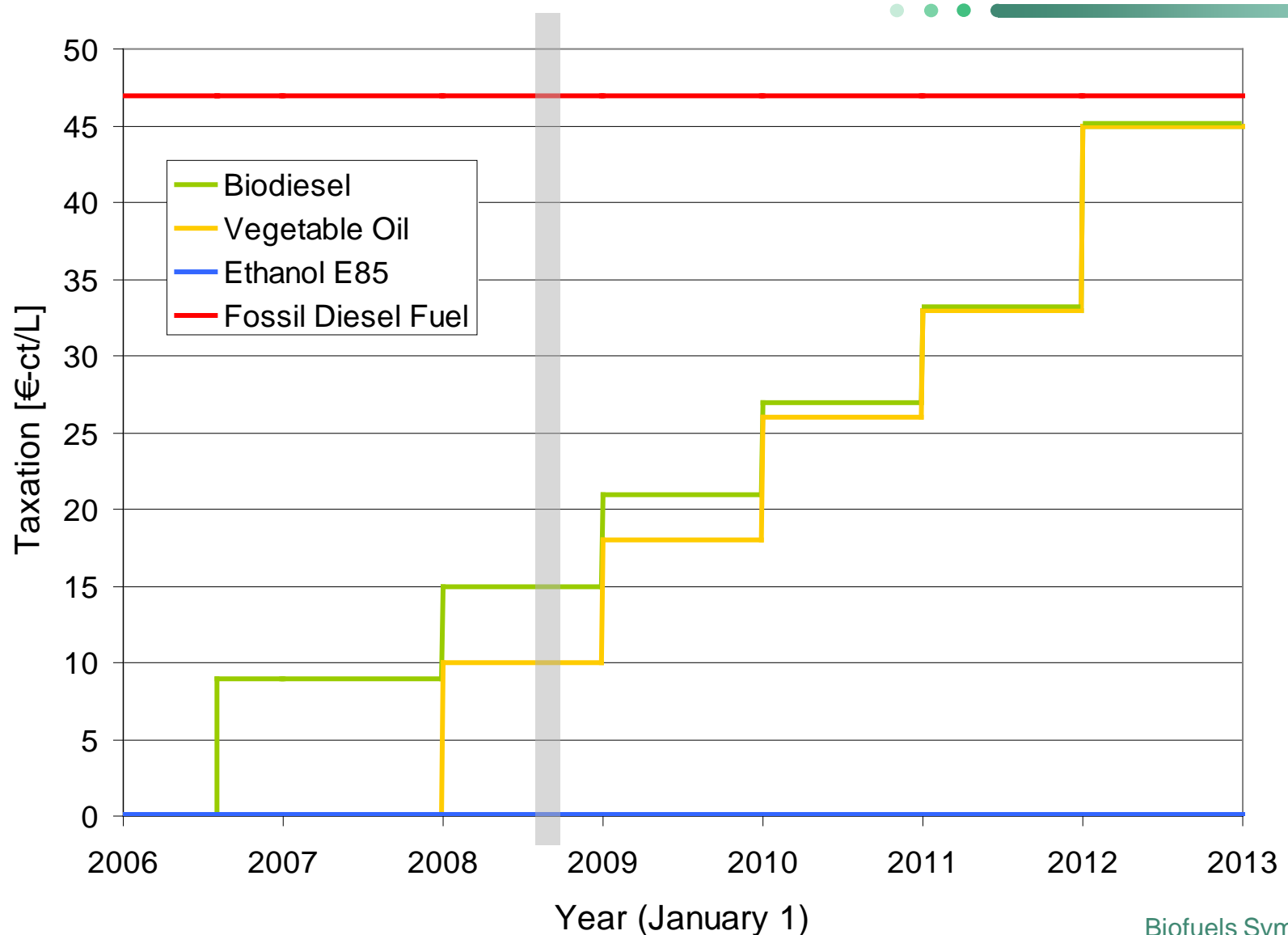
Year	Quota (Total)	Sub-Quota Diesel Fuel	Sub-Quota Gasoline
2007	--	4.4 %	1.2 %
2008	--	4.4 %	2.0 %
2009	6.25 %	4.4 %	2.8 %
2010	6.75 %	4.4 %	3.6 %
2011	7.00 %	4.4 %	3.6 %
2012	7.25 %	4.4 %	3.6 %
2013	7.50 %	4.4 %	3.6 %
2014	7.75 %	4.4 %	3.6 %
2015	8.00 %	4.4 %	3.6 %

Remark: The tax for diesel fuel is 47 €-ct/L and for gasoline 65 €-ct/L.

# Effects of the Quota Regulation on the Amounts of Biofuels' Admixtures to Fossil Fuels



# Reduced, but Yearly Increasing Taxation for Neat Biofuels



# Effects of the New Legal Framework on the German Biodiesel Producers



## State: March 2008

- ☹ 85% of the existing biodiesel production capacities of about 4.5 Mt/a are set aside
- ☹ 14% of the filling stations stopped selling biodiesel (B100) and further 36% are planning to do so
- ☹ 70% of the companies stopped production or went bankrupt
- ☹ 2/3 of the admixed quota biodiesel is imported (e.g. as B99 fuel from U.S. exporters – subsidized with 1 \$/gal)

# Effects of Rising Diesel Fuel Prices at the Filling Stations

**Since June 2008:**

- 😊 Biodiesel, as a neat fuel, is (partly) back again!





- The ministries for environment and agriculture, the German association of car manufacturers, the German farmers' association and some others agreed upon the formulation of a "Roadmap biofuels"

Cornerstones:

*immediately or within a short time:* release of E10; release of B7; B7+H3 with proof of the positive ecological balance of the hydrotreating component; FFV with E85; B100 in the utility vehicle area; certification system for check of sustainability and greenhouse gas efficiency (see below)

*in the medium term:* B20 – where the bio component still needs to be defined; tax exempt for 2<sup>nd</sup> generation should be extended into the years following 2015

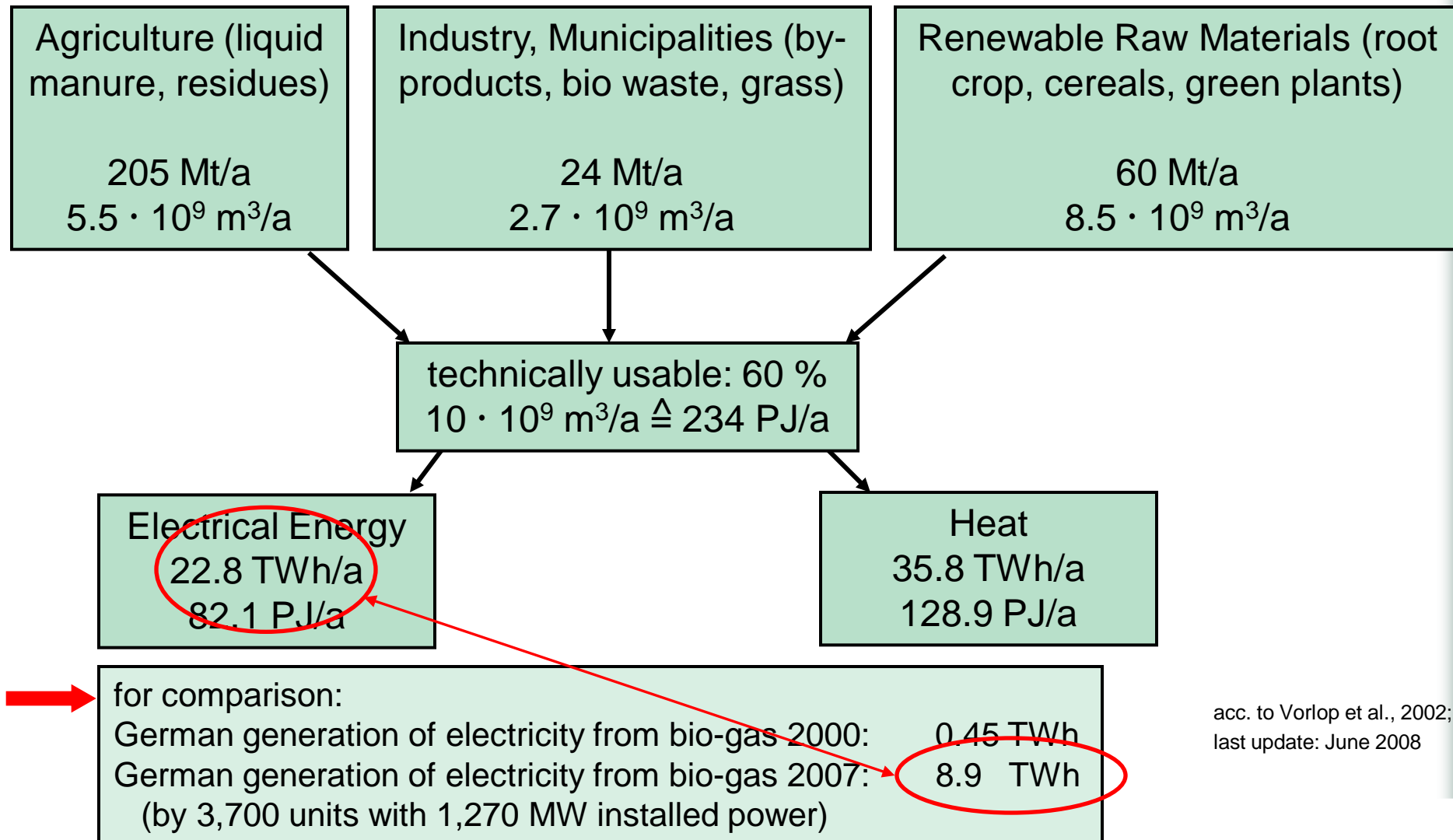
- A certification system is developed which should
  - (a) assess the sustainability of the production of biofuels and
  - (b) be extended afterwards on the assessment of the greenhouse gas efficiency

# Recent Changes in the German Biofuels Policy – Technical Questions to Be Solved

- Due to the regeneration strategy for exhaust gas particle filters a distinct dilution of the engine lubricant is expected for B20. Some sceptical people are worried about such behavior for B7, too.
  
- The biggest German drivers association, the ADAC, claims that at least 2.25 Mill passenger cars (with an uncertainty of 7 Mill more) are not suited for E10.

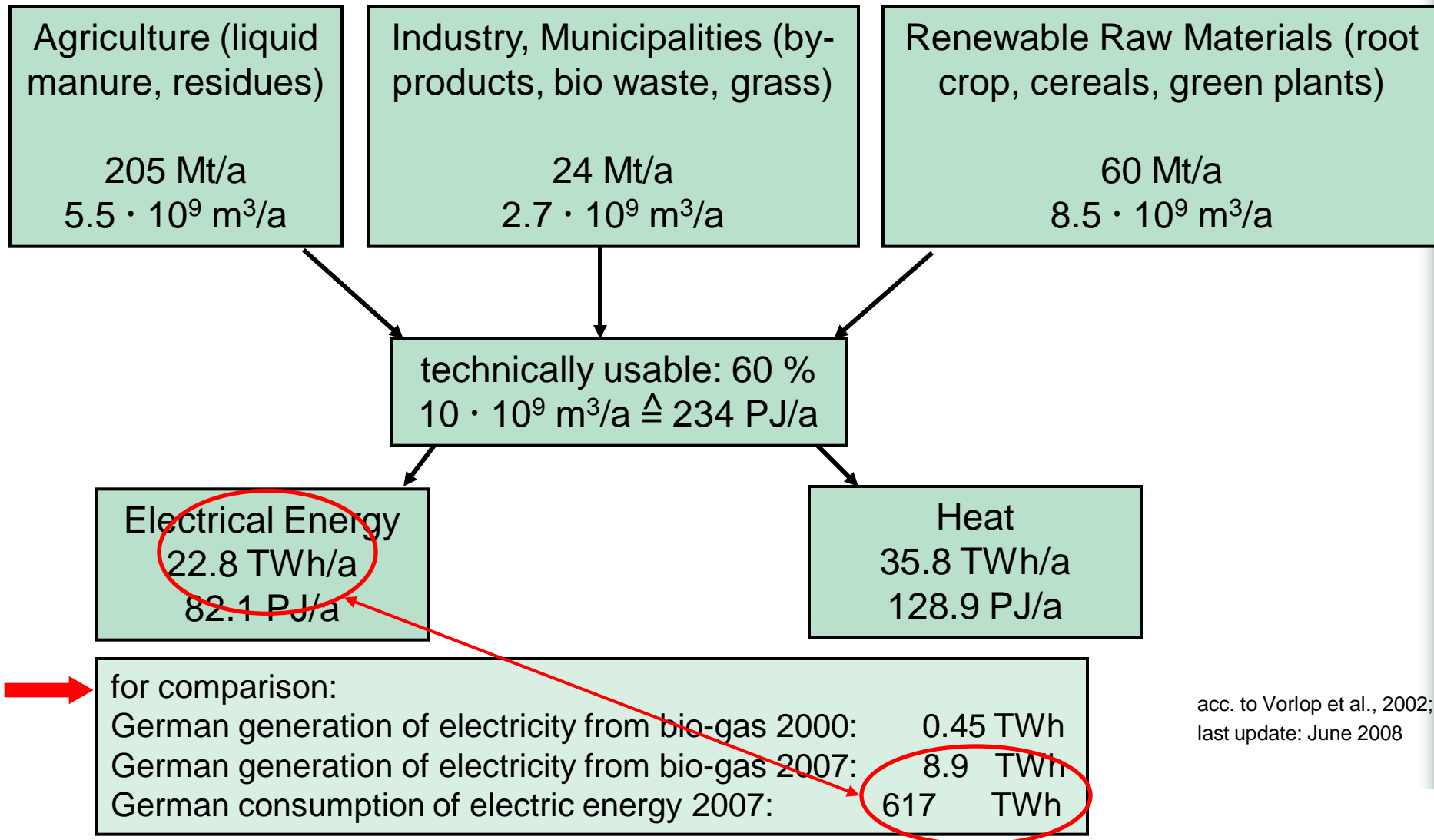
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# Bio-Gas: Potentials and Actual State in Germany



acc. to Vorlop et al., 2002;  
last update: June 2008

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# Potential New Fuels for Diesel Engines

## □ BtL – Biomass-to-Liquid; Synfuel, Sunfuel, Artfuel, ...

The CHOREN  $\beta$  plant was officially opened in Freiberg, Germany;  
capacity: 15 kt/a – biomass input: 68 kt/a – cost:  $\approx 100$  M€



# BtL Fuels: Some Questions to be Solved

Raw materials?

Fast growing wood, wood residues, straw,  
energy grains, silo maize, ...

Transport  
and logistics?

Catchment area as a function of raw material,  
transportation costs, processing and plant size

Process?

Standard syngas process; Pyrolysis to Slurry;  
Syngas to Methanol  $\Rightarrow$  MtS; Biomass Pellets  
(BioLog);

Plants: CUTECH, TU Wien, CHOREN, FZK/FE

Economics?

Production costs actually estimated  
as 70 €-ct/L ... 180 €-ct/L!

Reference: N. Paul in forum.new power 1/2007, S. 36-40



# Potential New Fuels for Spark Ignition Engines

## □ 2<sup>nd</sup> generation Ethanol

- Abengoa has, at present, a European ethanol production capacity of 725 Mill L/a (572,000 t/a);  
2<sup>nd</sup> generation: a demonstration plant with a production capacity of 5 Mill L/a (3,950 t/a) should be set into operation at the end of 2007



Salamanca, Spain

- Iogen / Volkswagen: new results have not been published yet

## □ Rising interest in Butanol (in the academic sector)

*Thank you very much  
for your kind attention*