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**THIRD NATIONAL REPORT ON THE IMPLEMENTATION
OF DIRECTIVE 2003/30/EC OF 8 MAY 2003 ON THE PROMOTION OF THE
USE OF BIOFUELS OR OTHER RENEWABLE FUELS FOR TRANSPORT
for 2005**

Preliminary comments

The third report under Article 4(1) of Directive 2003/30/EC of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport must be submitted to the Commission by 1 July 2006.

Germany achieved well in excess of the goal of increasing the proportion of biofuels to 2% of total fuel consumption in 2005, with biofuels accounting for 3.75% of total fuel consumption (see paragraph 4) in relation to energy content.

For 2010 Germany is aiming at biogenic fuels making up at least 5.75% of total fuel consumption in energy terms.

1. General development of the biofuels market in 2004

In addition to **biodiesel** which has been used as pure fuel since 1993, more rape methyl ester (RME/biodiesel) has also been added to fossil diesel fuel since the beginning of 2004. In 2005 some 600 000 t of biodiesel was used for adding to fossil diesel. Commercial vehicles refuelled with about 680 000 t at companies' private filling stations and about 276 000 t at public pumps. Another 244 000 t in 2005 went into private cars from public filling stations. Sales of pure fuel, at 1 200 000 t, thus make up the largest market share at about 66%. The addition of biodiesel to fossil diesel fuel up to the 5% limit by volume which standards allow is expected to continue increasing significantly.

The use of **pure rape oil** is steadily increasing, but fairly slowly due to the conversion systems for heavy diesel engines in lorries and tractors, which are still in development. Besides a figure, almost constant for several years, of about 4 000 cars using rape oil, mainly in southern Germany, pure rape oil is increasingly being used in heavy goods vehicles. Up to 30% rape oil by volume is

added to fossil diesel, sometimes in the vehicle's tank. At the same time tractor engines that can run on vegetable oil are also being developed now. The use of pure vegetable oil in agriculture is sharply increasing.

Overall, in 2005 a market volume of 196 000 t vegetable oil used as fuel was achieved.

With regard to the use of **bioethanol**, the development of the market in two sectors which began in 2005 continued. Almost all German ETBE (ethyl-tertio-butyl-ether) producers have converted their MTBE (methyl-tertio-butyl-ether) production plants and now supply the petroleum industry with ETBE based on bioethanol, which is used to improve the octane number of petrol, instead of fossil MTBE.

The direct addition of bioethanol to petrol requires the fossil fuel to be modified to reduce the vapour pressure of the mixture at the same time. Otherwise the requisite maximum vapour pressure – limit value 60Kpa – cannot be maintained in summer. In 2005 only a few small and medium-sized petrol manufacturers based on the modified fossil fuel and with a precisely defined network of filling stations converted their production to a mixture proportion of up to 5 vol. % bioethanol.

Altogether, bioethanol consumption in the two sectors in 2005 totalled 226 000 t.

2. Measures to promote the use of biofuels or other renewable fuels

2.1 Tax relief

The amendment to the Petroleum Tax Act (*Mineralölsteuergesetz*), which entered into force on 1 January 2004, has created the basis for tax relief – currently total tax relief for biofuels and bioheating fuels, provided they are produced from biomass – in Germany. Biogenic fuels in pure form and the fractions of biofuels and bioheating fuels in mixtures with fossil motor fuel and heating fuels are therefore currently exempt from petroleum tax. This measure makes use of Article 16 of Council Directive 2003/93/EC of 27 October 2003. The measure is limited until 2009, and the tax relief must be adjusted if any overcompensation is found in the meantime.

The Bundestag has now passed a new Energy Tax Act (*Energiesteuergesetz*). From 1 August 2006 this introduces a small partial tax on vegetable oil based fuels to take account of overcompensation detected in comparison with fossil fuels.

2.2 Research, development and demonstration activities

2.2.1 Pure rape oil

The trial referred to in the report for 2003 with 100 agricultural tractors running on pure vegetable oil finished in September 2005. The results show that tractors will run reliably on pure vegetable oil only if they are converted with suitable systems and that the use of a consistently high quality of vegetable oil is an important precondition for fault-free operation of the vehicles. This is why a Quality Standard for pure vegetable oil used as fuel is now in preparation in Germany, to be introduced as preliminary standard DIN 51605. With the aim of further developing vegetable oil technology in the tractors sector the Federal Ministry of Food, Agriculture and Consumer Protection has since the start of 2006 been promoting a project together with the University of Rostock and the firms of John Deere Mannheim and Vereinigte Pflanzenöl Werkstätten, Allersberg, to develop a tractor designed to run ex works on vegetable oil and meeting the latest emission standards. The first results are promising.

2.2.2 Biodiesel

In 2005 car manufacturers withdrew permission for new diesel cars to use biodiesel. The reasons are technical problems with new exhaust aftertreatment systems.

Germany is currently endeavouring to set up a research association to look into the development of vegetable oil ethyl ester.

2.2.3. Bioethanol

Since August 2005 some motor manufacturers have been offering flexible fuel vehicles. These can run on bioethanol and petrol in any mixture ratio. E85 in particular is used. So far, however, there are only a few filling stations where cars can be refuelled with E85. The further development of E85 depends in particular on how the funding conditions for this fuel turn out in the future.

At Otto von Guericke University in Magdeburg an R&D project has been carried out together with the Federal Agricultural Research Authority in Braunschweig and the firm O₂-Diesel to test a fuel mixture of bioethanol and fossil diesel in modern diesel engines. The aim of the project was to examine the possibilities of increasing the use of bioethanol as a CO₂-neutral fuel especially in mixtures with fossil diesel fuel, as regards emission potentials, suitability as a fuel in light and heavy diesel engines and the effect on performance as compared with fossil diesel. It was found that in light diesel engines a power loss of up to 30% was to be expected and in heavy diesel engines after appropriate precooling of the fuel there would still be an 11% power loss. As regards emissions, particulates were found to be reduced but hydrocarbon emissions (HC) were increased.

As regards the direct addition of bioethanol to petrol, different approaches are being tried out to resolve the vapour pressure problem and to comply with the requisite limit value of 60 KPa in summer as well. This is a precondition for the widespread use of bioethanol as an additive to petrol. The petroleum industry carried out a pilot project on the vapour pressure problem and is currently evaluating the results.

2.2.4 BTL fuels

Biomass-to-liquid (BTL) fuels as so-called “second-generation biofuels” offer a number of advantages compared with the main biofuels being used now.

For example, by using the whole plant substantially more fuel is obtained than in manufacture of, say, biodiesel or bioethanol, in which only part of the plant is used. Also, the composition of the fuel components can be controlled and thereby adapted to the needs of modern engines, which is why BTL is also called synthetic fuel. As a particularly high-quality mixture component, BTL fuel can improve fuel qualities generally.

The Federal Government considers that BTL fuels have great potential for increasing sustainable mobility, so it is promoting various projects in this field. These are intended to investigate ways

of producing BTL fuels on a pilot scale and to clarify outstanding issues regarding environmental and economic assessment.

The Federal Government is funding, amongst other things, the engineering of a pilot plant of TU Bergakademie Freiberg that is being co-financed by industry (including Total, Daimler, Chrysler, Volkswagen). On that basis the financing of the actual pilot plant will be decided later this year.

Karlsruhe Research Centre (FZK) has worked out a process whereby the economic feasibility and the possibility of transporting biomass occurring in the regions can be much improved by a fast pyrolysis method. A project on this is also being promoted.

With funding support from the Federal Ministry for Consumer Protection, Nutrition and Agriculture, the German Energy Agency (dena) is preparing a feasibility study for an industrial-scale BTL plant. The study will be ready shortly. It will cover questions of biomass availability, comparison of different BTL technologies, biomass logistics and possible financing tools.

2.3 The Federal Government's strategy on alternative fuels and drive systems

In the framework of the national sustainability strategy, in 2004 the Federal Government developed a long-term strategy for the promotion of alternative fuels and drive system technology in cooperation with industry. The strategy stresses that the development of synthetic biofuels is an important field of action. Of the renewable fuels, biodiesel and bioethanol are regarded as having the greatest short and medium-term potential. As renewable fuels, biofuels are an essential part of the strategy. The Federal Government's fuels strategy can be found on the Internet under: www.bundesregierung.de/Artikel/-,413.749643/dokument.htm . The Federal Government has decided to develop this fuels strategy further.

The Federal Government has announced its intention to reach the indicative EU target of 5.75% of the total fuels market in energy terms by 2010. To achieve this objective it has decided to introduce a quota obligation for biogenic fuels. The Government is currently working on a bill to this end, due to become law on 1 January 2007, which will require the petroleum industry to place a certain proportion of its fuel sales on the market in the form of pure or added biofuels.

2.4 Public relations

Public relations activities on biofuels were substantially stepped up in 2005. Rising conventional fuel prices ensured considerable consumer interest in biofuels, so that considerably more information and advice had to be provided. In addition to the Specialist Agency for Renewable Resources (*Fachagentur Nachwachsende Rohstoffe e.V.*, FNR), the Union for the Promotion of Oil and Protein Crops (*Union zur Förderung von Öl- und Proteinpflanzen e.V.*, UFOP) and the Association for the Quality Management of Biodiesel (*Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.V.*, AGQM) also played an active role.

The attention of agricultural target groups and interested consumers was drawn to the use of biofuels at various trade fairs and specialised and consumer affairs events as well as through the press and a wide range of published documents. Among these were brochures with user information, lists of filling stations and users' reports; additional PR activities were also launched. In 2006 the FNR set up a funding priority in which together with partners from the Federal Länder agricultural target groups throughout Germany are informed about the use of biofuels.

2.5 Administrative law

The Tenth Ordinance implementing the Federal Pollution Prevention Act (Ordinance on the nature and designation of the quality of fuels – *Verordnung über die Beschaffenheit und die Auszeichnung der Qualitäten von Kraftstoffen*, 10.BimSchV) of 24 June 2005 lays down the first quality requirements for biodiesel as fuel, among other things. The addition of bioethanol to petrol and biodiesel to diesel fuel for transport is regulated in accordance with Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels and other renewable fuels for transport.

3. Use of resources for generating biomass for uses outside the transport sector

3.1 Use of biomass resources

Around 67 percent of the renewable energies generated in 2005 are derived from biomass. Of the total amount of bioenergy produced, 68% went into heat recovery, 12% into power generation and 20% into fuels. For heat and power generation from solid biomass, the main source of energy

so far has been wood. Power generation has been largely based on the use of waste wood. In Germany there are currently some 2700 biogas installations operating, mainly for power generation. The raw materials for this are mainly slurry and other animal byproducts, as well as biogenic residues and waste from the food and catering industries. Increasing use is being made of energy crops.

In Germany there is no direct additional promotion of biomass production beyond the measures applicable in the framework of the common agricultural policy. Indirectly, the production of biomass for energy generation is stimulated by the following instruments:

3.2 Renewable Energy Act

In Germany the Renewable Energy Act (*Erneuerbare-Energien-Gesetz*, EEG) is one of the central instruments for increased development of renewable energy. The Act entered into force on 1 April 2000 and replaced the Electricity Feed-in Act (*Stromeinspeise-Gesetz*) which had been in force since 1991. One of the legislative purposes of the revision is to raise the proportion of renewable energy in Germany's electricity supply to at least 12.5% by 2010 and to at least 20% by 2020. Germany's target for this increase for 2010 in the EEG is based on the indicative target set for Germany in Directive 2001/77/EC.

The EEG has proved itself in Germany as an instrument for bringing onto the market electricity from renewable sources such as biomass. The revision of the Act in 2004 also created the conditions for continuing, at an intensified level, the development of power generation from renewable energy sources. The revision considerably improved the funding conditions and context for the legally guaranteed feeding in of electricity from biomass. This is especially true for electricity generation from agricultural biomass, since the EEG previously gave incentives for electricity production from relatively cheap non-agricultural and non-forestry biomass (e.g. waste wood, myogenic residues from the food industry). For electricity generation from biomass, the revision brought in particular the following major improvements: a bonus was introduced for electricity generation from agricultural and forestry biomass such as energy crops or slurry. This is 6 cents per kilowatt-hour (cts/kWh) for electricity from installations of up to 500 kilowatts (kW) electrical capacity and 4 cts/kWh for electricity from 5 megawatt (MW) capacity plants.

This provision of a bonus generated a powerful incentive effect especially for the biogas sector. For electricity production from timber from forestry the bonus is likewise 6 cts/kWh up to 500 kW and 2.5 cts/kWh above 500 kW. In addition, for electricity from biomass combined heat and power plants there is to be a bonus of 2 cts/kWh, creating incentives to use biomass for energy production. Together with the bonus mentioned above, this has made electricity generation from biomass more attractive. A bonus is also to be provided for electricity produced from particularly innovative electricity generation technologies with simultaneous combined heat and power generation. This bonus too is intended to contribute to improving efficiency in electricity generation from biomass. The period for which payments are made for biomass electricity fed into the grid remains 20 years.

With its still unused potential exploitation capacity, comparatively close to the agricultural and forestry markets, bioenergy can make a growing contribution to achieving national and EU targets in the electricity sector. This can be seen as well from the growth rates of biomass electricity fed into the grid under the EEG (2003 up 42%, 2004 up 51%). The proportion of renewable energy in electricity consumed is now (2005) around 10.2%, the share of biomass in that being about 21.1%. With appropriate further development, Germany will be one of the few EU Member States to achieve its national indicative target in the electricity sector for 2010.

3.3 Market incentives programme for renewable energies

The market incentives programme to promote measures for exploiting renewable energies, imposed in conjunction with the Environmental Tax Reform, primarily serves the expansion of heat production from biomass, solar and geothermal energy. Around €193 million were set aside for this in 2005. Since the start of the programme funding had been provided for over 421 500 solar collector installations with an area totalling 3.6 million square metres and over 60 000 small biomass boilers had been installed by the end of 2005. The Kreditanstalt für Wiederaufbau (KfW) additionally grants promotion loans in the case of biogas plants, larger solid biomass combustion plants and plants for the exploitation of deep geothermal energy. Between 2000 and 2005, 2 567 loans were granted for a total of over €741 million. All in all, since it started the market investments programme has funded more than 485 000 investment projects for renewable energy exploitation. The €665.4 million in aid handed out has generated a total investment volume of

almost €5 billion since the programme started in 2000, including some €3.2 billion for solar collectors and €0.96 billion for small biomass plants. The funding rates for the market incentives programme were last changed in June 2006.

4. Sales of biofuels and other renewable fuels in Germany in 2005

In 2004 **biodiesel** once again achieved by far the largest market share among biofuels in Germany. **Pure vegetable oil** is steadily making ground due to its growing use as a fuel for HGVs and tractors, while its sales as car fuel are stagnating at a low level. **Bioethanol** has replaced methanol in the manufacture of the octane enhancer MTBE but is used as a direct additive only in limited quantities.

Consumption of fuels in the transport sector in Germany in 2005

	'000 tonnes	'000 000 litres	Energy content in MJ/l	Energy consumption in TJ	% of energy consumption	% of consumption by volume
Fuel consumption	53 507	65 374		2 148 676	100	100
Petrol	23 124	30 846	32.48	995 861	46.3	47.2
Diesel	28 161	31 971	35.87	1 072 247	49.9	48.9
Biogenic fuels*	2 222	2 557		80 567	3.75	3.9
including:						
Biodiesel	1 800	2 057	32.65	67 166	3.13	3.15
Pure rape oil	196	213	34.59	7 369	0.34	0.33
Bioethanol	226	286	21.06	6 032	0.28	0.44
Biogas	0	0	23.50	0	0.00	0.00

* The proportion of biogenic components added has been subtracted for fossil fuels and is shown separately together with the biogenic pure fuels.

Source: Petroleum excise statistics, own calculations

The figures for biofuels sold in 2005 were accurately taken from the petroleum excise statistics.

The figures indicated correspond to the volume in Germany which is exempt from tax.

Neumann

Head of Department L