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Oilseeds and Products

Biofuels situation in the European Union

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Report Highlights:

The European Commission has set as a goal that by 2010, 5.75 percent of the energy used for transportation shall be biofuel. The most important biofuel in the EU is biodiesel, which represents some 80 percent of the biofuel production. Unlike the US, the biodiesel in the EU is mainly produced from rapeseed. Bio ethanol is the other important biofuel in the EU. It is mainly produced from cereals and sugarbeets.

To promote the production of biofuels the Member States have a legal framework to differentiate taxation between biofuels and conventional fuels. This is an essential tool given that the biofuel production costs currently are at least twice those of conventional fuels.

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Introduction

The European Commission has set as a goal that by the end of 2005, 2 percent of the energy used in transportation shall be biofuels. The use of biofuels is then to grow by 0.75 percent annually. The ambition is to have 5.75 percent biofuels in transportation by 2010. The actual share of biofuels in European consumption today is estimated to be 1 percent. These goals are part of the main energy policy target of the EU which is to double the share of Renewable Energy Sources (RES) in gross inland consumption from 5.4 percent in 1997 to 12.0 percent by 2010.

These measures are taken to meet the Kyoto goals, and to decrease the EU's vulnerability in the energy sector. The goals set by the Commission are not mandatory, however the Member States (MS) have to report¹ to the Commission yearly about their progress, and MS must have good reasons if they are not to comply. On the basis of findings in MS reports, the Commission can propose changes to the system of targets, including mandatory targets if it seems that national targets will be missed without good reason. By July 2004, all EU Member States were required to submit reports detailing how they would meet the EU biofuels directive. However, no state actually reported by that date, and therefore the deadline was extended until October. By that date 15 reports had been received. As of mid-March 2005, Belgium, Italy, Luxemburg, Slovenia and Poland have still not submitted their reports. Cyprus and Estonia have submitted reports but there are no targets for the share of the biofuels included in the reports.

Also, every second year, the Commission shall produce an evaluation report on the progress towards the biofuel targets. This report will cover: the cost effectiveness of promotional measures, the environmental and economic impacts of wider biofuel take-up, the impact on climate and greenhouse gas emissions and the sustainability of energy crops used for biofuels.

In Europe the most important biofuel is biodiesel. Biodiesel accounts for about 80 percent of the biofuels used for transportation. Unlike the US where the biodiesel is produced from soybean, the European Union uses mainly rapeseed, and to some extent sunflower seed to produce its biodiesel.

The European Commission has published a guideline in compliance with the "Comité Européen de Normalisation" CEN Standardization (EN 14214) in order to insure quality and performance for biodiesel. The guidelines in this publication make it more difficult to use 100 percent soybean oil as a base for the biodiesel in Europe.

The second biggest energy source for transport in the European Union is bioethanol, mainly produced from cereals and sugar beets. The bioethanol sector is growing quickly in the EU.

Energy in the European Union

Europe currently imports 50 percent of its total energy needs. In transports, which rely heavily on oil, 80 percent of the energy is imported. In a [Green Paper](#)², the Commission forecasts that passenger traffic in EU15 will rise by 19 percent between 1998 and 2010, and goods transport by 38 percent. Forecasts are that the growth in the new Member States will be even faster. Given that transport fuels account for 32 percent of the total energy consumption in EU and with road traffic forecast to increase massively, the use of substitute fuels is vital for the EU to reduce dependence on imports.

¹ Member State reports can be found at:

http://europa.eu.int/comm/energy/res/legislation/biofuels_members_states_en.htm

² The Green Paper is a European Commission paper on security in Energy supply.

In 2003 the total production of biofuels in the European Union was 1,735,500 tons. This represents a growth of nearly 26.1 percent with respect to 2002. In the EU biodiesel is the by far biggest biofuel and represents 82 percent of the biofuel production. In 2003 the total EU biodiesel production was 1,434,000 tons, and the total bioethanol production was 309,000 tons. The bioethanol decreased from 2002 as a result of the summer drought in 2003.

In 2001-2002, 5.6 million hectares of land not required for food production was set-aside under compulsory or voluntary programs. This land could be used to grow biofuel crops. It represents a potential of 7 to 14 million metric tons per year of renewable biofuels for typical yields of 2-3 metric tons/hectare for ethanol and 1-1.5 metric tons/hectares for biodiesel, or the equivalent of 2.5-5 percent of the automotive fuel (gasoline or diesel used for transportation in Europe). However, the amount of oilseed grown for biofuels on set-aside is limited by the Blair House Agreement (see page 8 of this report).

What are biofuels?

Biofuels are liquid or gaseous fuels made from biomass such as agricultural crops, municipal wastes and agricultural and forestry by-products. Biofuels can substitute conventional fuels in vehicle engines – either totally or partially in a blend. At present the EU directive [2003/30/EC](#) on the promotion of biofuels and other renewable fuels for transport recognizes ten biofuel types³. This report focuses on biodiesel and bioethanol.

Biodiesel

Biodiesel is a generic name for fuels obtained by transesterification of a vegetable oil. This produces a fuel with very similar combustion properties to pure diesel, but with lower viscosity. With properties very similar to those of fossil diesel, biodiesel can go almost directly into existing diesel vehicles and it mixes with fossil diesel in any ratio. In Europe the biodiesel is mainly made out of rapeseed, and to some extent sunflowerseed.

Bioethanol

Bioethanol is mainly produced by fermentation from grains rich in sugar or starch, for example cereal crops, sugar beet and sorghum plants. It is normally blended with conventional petrol, usually in any proportion up to 5 percent, and can be used in modern spark-ignition engines without modification. Modified engines, such as those used in so-called “flexible fuel vehicles”, can run on 85 percent ethanol blends as well as pure bioethanol and conventional petrol.

Biofuels from woody material

Bioethanol is currently produced from energy crops that are rich in sugars and starches. However, plants are mainly composed of lignin and cellulose, not starches. It is difficult to convert cellulose to bioethanol, but current research aims to solve this problem. One option, which is currently in the demonstration phase, is to develop an efficient lignocellulosic enzymatic fermentation conversion process. Another is to convert the biomass into so-called synthesis gas, which can then be catalytically converted into synthetic diesel or alcohol type biofuels. These processes would have important advantages. They would allow a wider range of raw materials for biofuels production, such as grasses, trees and many forms of agricultural residues; and they would significantly improve life cycle energy efficiency and further reduce greenhouse gas emissions.

³ *Biodiesel, bioethanol, biogas, biomethanol, biodimethylether, bio ETBE, bio MTBE, synthetic biofuels, biohydrogen and pure vegetable oil.*

ETBE

ETBE (Ethyl-Tertiary-Butyl-Ether) is produced from bioethanol by reaction with isobutylene. ETBE is used as a blend, up to 15 percent, with conventional petrol. It is less volatile than ethanol but requires an additional production process step. Bioethanol and ETBE share the advantage of being high-octane products.

Biogas

Biogas results from the anaerobic fermentation of organic matter to produce a mixture of methane (up to 60 percent) and carbon dioxide. Organic wastes such as livestock manure, food-processing residues, as well as municipal sewage sludge, are used as raw material to produce biogas in dedicated reactors. Biogas can also be recovered as landfill gas from urban waste landfill sites. Its use in transport is currently limited. Biogas can be used in vehicles adapted to run on natural gas.

Production of Biofuels

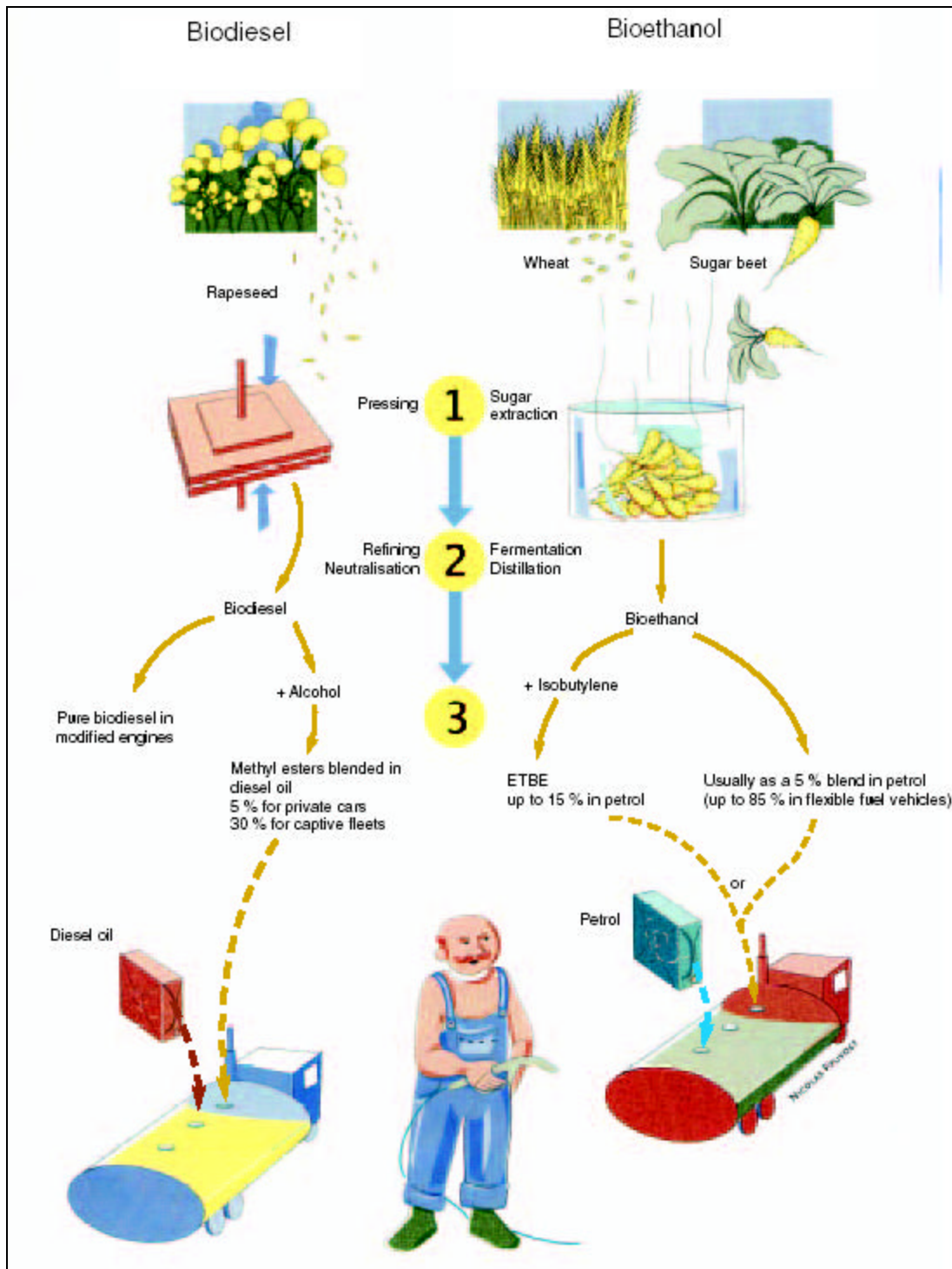
Biodiesel production uses around 1.4 million hectares of arable land in the European Union. The most important biodiesel producer is Germany (with about 40 percent of the production). There are approximately 40 plants in the EU, however the number of plants and the crushing capacity is growing quite fast. The plants are mainly located in Germany, Italy, Austria, the Czech Republic, France and Sweden.

In the New Member States only the Czech Republic has an important production of biodiesel. Poland and Hungary also have some production, however it is still insignificant, and not yet on a commercial level. Expectations are that the biodiesel production might be quite important in Poland in the future since Poland is a MS where an important amount of rapeseed is grown, and with better availability to newer technology and better genetics, harvests are expected to increase considerably.

Land use requirements for different biofuel-crop combinations to meet the target.

Biofuel – crop combination	EU15 (percent)	EU25 (percent)
All rapeseed	10.0-11.1	8.4-9.4
Half rapeseed, half wheat	9.0-15.5	7.6-13.1
Half sugar beet, half wheat	5.6-11.8	4.7-10.0
Half sugar beet, half woody biomass	4.8-6.4	4.1-5.4
All woody biomass	6.5-9.1	5.5-7.7

Source: European Environmental Agency



Biodiesel and Bioethanol production in 2004

Member State	Yearly Biodiesel Capacity 2004 (RME ⁴) ('000 tons)	Yearly Ethanol Capacity 2004 ('000 tons)
Austria	More than 100	Currently no plant
Czech Republic	100	Building up the industry
Denmark	44	Only experimental production.
France	321	100
Germany	1,088	None
Hungary*	2	Production capacity available
Italy	419	Building up the industry
Poland	1.2	36.8
Spain	70	150
Sweden	8	56
United Kingdom	15	Negligible quantities

Source: European Commission Member States Reports, EurObserver, FAS Stockholm, FAS Rome and FAS Warsaw.

* No biofuels have been used commercially in Hungary yet.

The production doesn't necessarily correspond to the amount used. For example in Sweden the produced quantity of bioethanol is far from being enough for how much bioethanol is consumed, and Germany is an important importer of rapeseed for biodiesel.

Biodiesel Production '000 tons

Country	2002	2003	2004*
Germany	450	715	1,088
France	366	357	502
Italy	210	273	419
Austria	25	32	100
Spain	-	9	70
Denmark	10	41	44
United Kingdom	3	9	15
Sweden	1	1	8
Czech Republic	68.8	70	47
Poland	0	0	1.2
Hungary	0	0	2

Source: European Biodiesel Board, FAS Budapest, FAS Warsaw and FAS Prague.

*Estimates.

Bioethanol production '000 tons

Country	2002	2003	2004
Spain	96	160	N/a
Sweden	39.5	52	56
France	88	83	100
Total EU25	221.6	292	N/a

Source: European Commission Member State reports on biofuels, European Union of Alcohol Producers (UEPA), FAS France,

⁴ RME - Rapeseed Methyl Ester

In the total EU production there is also included 85,000 tons annually of wine alcohol. This alcohol is distilled out of wine that the Commission buys to stabilize the wine market when the production in the EU is too high.

Imports

The European Union imports a large proportion of the ethanol it uses. The biggest exporter of ethanol to the EU is Pakistan, followed by Brazil and Guatemala. The reason for which Pakistan is a big supplier of ethanol is that due to the Generalized System of Preferences (GSP) Pakistan can sell ethanol to the EU with no taxes. This is an agreement that has been done because Pakistan is actively working against the production of narcotics in the country. This GSP has been prolonged until the end of 2006. Italy and the Netherlands are the biggest importers of ethanol in EU.

In the EU ethanol is subject to an import duty, €10.2 per hectoliter denatured alcohol and €19.2 per hectoliter undenatured alcohol. However, the EU has a number of free trade agreements with a number of third countries, and the EU has been negotiating an unprecedented free trade agreement with the Mercosur countries, including the biggest world alcohol producer Brazil.

Biofuel incentives

The directive on the taxation of energy products gives the MS a legal framework to differentiate taxation between biofuels and conventional fuels. Given that biofuel production costs are currently at least twice those of conventional fuels, it is essential to provide some kind of financial aid for the biofuel production to make it competitive. Reducing the tax burden on producers would also be a means to encourage investments as well as consumer take-up.

At least seven MS have so far used the possibility to partly, or completely, detax biofuels. These MS are Austria, France, Germany, Italy, Spain, Sweden and the United Kingdom.

Summary of Member State tax breaks for Biofuel production	
Austria	Full exemption of €310/m ³ , for pure biodiesel and blends up to 2 percent.
Belgium	Discussions to introduce full exemption underway.
Denmark	No measures currently in place.
Finland	No measures currently in place.
France	Partial exemption of €330m ³ , with a quota of 317,000t. Only for blends of up to 0.5 percent, and pure biodiesel is not covered by measure.
Germany	Total tax exemption of €0.88/liter, until at least 2009.
Greece	No measures currently in place.
Ireland	No measures currently in place.
Italy	Full exemption of €403m ³ up to a quota of 300,000t. Pure biodiesel used for heating (rather than transport) can avail of measure.
The Netherlands	Discussions to introduce full exemption underway.
Portugal	Discussions underway on incentives to introduce.
Poland	Full exemption and defined mandatory targets for biofuel market penetration.
Spain	Full exemption for biofuels.
Sweden	Full exemption of €365/m ³ , until at least 2008.
U.K.	Exemption of £0.20 per liter on bioethanol and biodiesel.

Sources: *Agra Focus* and *FAS Dublin*

Carbon credit

The CAP Reform of 2003 introduced the so-called Carbon Credit, which grants a payment of €45/ha to growers of energy crops, including crops grown for the production of biodiesel and bioethanol. Carbon credit is available for all agricultural crops except sugarbeets and hemp, as long as they are used for approved energy uses, and have a contract for this. EU farmers cannot get carbon credit for energy crops on set-aside land.

It is not yet clear how much take up there will be of this program. Provisional data for 2004, the first year that it was implemented suggest that around 300,000 hectares of carbon credits were claimed, the vast majority of this area planted to rapeseed. The main users have been France, Germany and the UK. The maximum acreage is 1.5 million hectares.

The €45/ha subsidy, due to its low level, is expected to have little impact in the short run on EU production of energy crops. However, a close watch on this policy should be maintained, as not only is it related to the issue of EU oilseeds and Blair House, but also the Commission could conceivably raise the amount of area to be subsidized in the future.

Blair House Agreement

The 1992 Blair House Agreement (BHA) between the US and the EU was an important element of the final Uruguay Round Agreement for Agriculture. BHA resolved a US-EU dispute over EU domestic support that impaired access to the EU oilseed market. The BHA limits the EU production of oilseeds. BHA restricts the maximum EU oilseed area for food use to 4.9338 million ha, and the annual output of oilmeal from oilseeds planted on set-aside land for industrial use to 1 million MT of soybeanmeal equivalent.

Is it possible to reach the goal?

The goal set by the European Commission on 5.75 percent renewable energy for transportation by 2010 will according to different forecasts be hard to accomplish.

When comparing the current trend and the EU Commission objective it doesn't seem likely that the 5.75 percent goal will be reached on time. The Directorate General for energy and transports has made estimations that the fuels for transports in EU25 by 2010 would be 330 million tons. To meet the Commission goal for 2010 it would take 19 Mtoe (million tons oil equivalent), and 1.9 Mtoe to reach the 2005 goal for renewable fuels in transportation. According to the current trend there will only be 11 Mtoe in 2010. However a lot of actions have been taken recently around Europe with new crushing plants for biodiesel as well as bioethanol plants being constructed.

The European Environment Agency (EEA) writes in their report that studies indicate that biofuels crops would take up between 4-13 percent of the total agricultural area in EU25 if the target of the biofuels directive is to be fully met and all crops are grown at home. According to EEA the lowest land use would come from an equal mix of sugar beet and woody biomass to produce biofuels while the most land-intensive single crop is rapeseed. Although in Europe, relative to production capacity the demand for diesel is higher than the demand for petrol, which makes the market for biodiesel stronger than the market for bioethanol.

A vast majority of the biodiesel used in the EU is produced out of rapeseed, currently supplying 80 percent of the total feedstock requirements. About 20 percent of the total rapeseed grown in the EU is at present being used for biodiesel production. However forecast are that this amount will increase, and that for example by 2007, biodiesel production will utilize a third of France's rapeseed production.

According to F.O Licht's the development of the biodiesel sector in Germany, which represents almost half the biodiesel production in the EU has been strong. In 2002 the biodiesel production in Germany was 550 thousand tons, in 2003 it was 720 thousand tons, 2004 the production capacity was 1.088 million tons and the expected production for 2005 is expected to reach between 1.4 and 1.6 million tons.

With an increase in rapeseed crushings it is likely that the imports of rapeseed will also increase, and according to F.O Licht's, it is likely that some Canadian rapeseed will continue to be imported to mainly Germany to fill the needs.

According to the American Soybean Association (ASA) the boost in EU biofuels production will create both extra meals and substitutes as by-products, and that these extra cheap by-products will to some extent compete with soybeanmeal. The main limiting factor of all these by-products is the lower protein content.

ASA also reports that the soybean opportunity is driven by three other factors: the ample availability of soybean oil from local crush which produces more soybean oil than the food industry uses, the low price on soybean oil vis-à-vis rapeseed oil, and if the crushing industry will have to export more and more surplus soybean oil, due to the GMO and biodiesel impact (soy oil does not meet the European EN 14214 biodiesel standard in some criteria, such as iodine value and stability), industry will reduce the soybean crush because the margins are lower when soybean oil has to be sold at lower prices to compete in world markets. As a result, more soybean meal will have to be imported, giving Brazil and Argentina a competitive advantage. Bottom line for ASA is that to avoid a drop of soybean imports and soybean crush in the EU the use of soybean oil in the EU domestic markets has to increase. This could be through use as biodiesel but also other non-food/feed uses.

ASA says that, after the growth induced by the Meat and Bone Meal (MBM) replacement some years ago, the EU imports of soybean meal has been more or less stable consumption of 34 MMT, is not increasing, but not shrinking either even with the simultaneous extra rapeseed meal from the increasing production of rapeseed oil.

The bioethanol industry in the EU also is to a partly depends on imports, mainly from Pakistan and Brazil. Some actors in the biofuels sector are criticizing this dependence on imports, saying one of the reasons for the biofuels directive was to reduce the dependence within the energy sector, and that while for the moment it is easy to buy cheap ethanol on the international market, but there may be problems when states like China start buying up huge amounts of this cheap energy.

Recent developments Biodiesel

According to the European Biodiesel Board (EEB) the most important thing is not necessarily to reach the goal, but that there is real political desire to develop biofuels. Furthermore, the biofuels sector is starting to develop. An increasing number of authorities in the different MS are taking measures to facilitate the development of the biofuels market.

Germany is the leading biodiesel producer. In Germany the rapid development can be explained by favorable legislation, the absence of quotas and a low price for vegetable oil associated with a high price for biodiesel fuel.

France used to be the leading biodiesel producer, but due to unfavorable French legislation France lost it's number one position. However the French Government recently announced that 4 new biofuel processing plants of 200,000 MT production capacity each will be built by 2007.

Italy's biodiesel production is also expanding rapidly, with an annual growth of more than 30 percent the last two years. The situation in Denmark is different since Denmark doesn't have any tax exemptions. This makes the biodiesel non-competitive in Denmark, explaining why almost all of it is exported, principally to Germany. Out of the New Member States only the Czech Republic has developed a significant biodiesel production.

Recent developments Bioethanol

Spain and Sweden are the two biggest ethanol producers in the EU. The success of ethanol production in Spain can be explained by the fact that the government does not collect any tax on ethanol. In addition there is an increasing number of plant projects and there is currently a new plant being built that will be operational in 2005. The production capacity of this plant will be 200 million liters per year.

Unlike the other big ethanol producing countries, Sweden transforms its ethanol into ETBE to distribute it. In Sweden more ethanol is being used than produced, and there are significant imports. According to the Swedish Energy Agency, the high price on oil and the Swedish tax exemption on ethanol have resulted in that basically all the petrol in Sweden now has a blend of 5 percent ethanol. There are two industrial production plants in Sweden, one uses cereals for the production and the other one uses waste from paper production.

Of the NMS only Poland has developed the bioethanol sector in a significant way. This is probably due to the law on tax exemption for production of ethanol mixed with petrol that was taken in November 2003. The definitive percentages and the size of this exemption are determined on a yearly basis after approval of the annual budget.

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