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## **Biofuels in the transport sector in Austria in 2004**

### **Report**

### **Summary of information from the Republic of Austria in accordance with Article 4(1) of Directive 2003/30/EC for the reporting year 2003**

Produced by the Federal Environment Agency on behalf of the Federal  
Ministry for Agriculture, Forestry, the Environment and Water  
Management

Vienna, June 2004

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## SUMMARY

In accordance with the Biofuels Directive 2003/30/EC, the Member States of the European Union must report each year on the quantities of biogenic fuels used in the transport sector. The information for this report was gathered by the Federal Environment Agency in cooperation with the BLT Wieselburg. The report will be forwarded by the Ministry for Agriculture, Forestry, the Environment and Water Management to the European Commission.

Currently only a very small proportion of the biofuels produced in Austria reaches the transport sector. Biogas and solid biomass were not used for transport in 2003. About 90% of the 55 000 tonnes of biodiesel produced were exported to neighbouring countries. Austria does not have a bioethanol production plant.

The draft revision of the Fuels Ordinance currently out for consultation provides that from 1 April 2005 at least 2.5% (calculated on the basis of energy content) of total fuels placed on the market must be of biogenic origin. This percentage should increase to 4.3% from 1 April 2007 and to 5.75% from 1 April 2008.

The current production capacity of biodiesel in Austria amounts to just over 100 000 tonnes per year. In order to substitute a proportion of 2.5%, approximately 220 000 tonnes of biodiesel are required.

The full implementation of the EU Biofuels Directive (5.75%) could reduce greenhouse gas emissions by up to 1.0 million t CO<sub>2</sub> equivalent per year. This would correspond to approximately 5% of the current greenhouse gas emissions from the transport sector.

# 1 INTRODUCTION

## 1.1 Legal framework

In the White Paper "European transport policy for 2010: time to decide", the European Commission expects CO<sub>2</sub> emissions from transport to rise by 50% between 1990 and 2010, to around 1 113 billion tonnes. The constantly expanding transport sector accounts for more than 30% of total energy consumption in the European Union. The White Paper calls for dependence on oil (currently 98%) in the transport sector to be reduced by using alternative fuels such as biofuels.

To this end, the Directive on the promotion of the use of biofuels or other renewable fuels for transport (Directive 2003/30/EC) was adopted by the European Parliament and the Council on 8 May 2003. This Directive aims at promoting the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes in each Member State, with a view to contributing to objectives such as meeting climate change commitments, environmentally friendly security of supply and promoting renewable energy sources.

Member States should ensure that a minimum proportion of biofuels and other renewable fuels is placed on their markets, and, to that effect, must set national indicative targets.

The reference value for these targets is 2%, calculated on the basis of energy content, of all petrol and diesel for transport purposes placed on their markets by 31 December 2005. The reference value will be increased by 31 December 2010 to 5.75% of all petrol and diesel.

In accordance with Article 4(1), the following information must be reported to the Commission each year:

- the measures taken to promote the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes;
- the national resources allocated to the production of biomass for energy uses other than transport;
- the total sales of transport fuel and the share of biofuels, pure or blended, and other renewable fuels placed on the market for the preceding year. Where appropriate, Member States must report on any exceptional conditions in the supply of crude oil or oil products that have affected the marketing of biofuels and other renewable fuels.

## 2 BIOFUELS

The draft report on the amendment of the 1999 Fuels Ordinance, which transposes the Directive into national law, contains the following analogous definitions:

### 2.1 Definition of biofuels and other renewable fuels

"Biofuels" are liquid or gaseous fuels produced from biomass and intended for the operation of vehicle combustion engines.

"Biomass" means biodegradable fractions of products, waste or residues from agriculture and forestry (including vegetal and animal substances) and related industries, as well as the biodegradable fraction of industrial and municipal waste.

"Other renewable fuels" means renewable fuels other than biofuels, which originate from renewable, non-fossil energy sources such as wind, solar, geothermal, wave, tidal or hydropower and which are intended for use in vehicle combustion engines.

### 2.2 Types of biofuels

As a minimum, the following products come under the term "biofuels" in accordance with the draft report on the amendment of the Fuels Ordinance, provided that these are used as fuels or a fuel component for the operation of vehicle combustion engines:

- "**Bioethanol**" is an ethanol produced from biomass and/or biodegradable fractions of waste;
- "**Fatty acid methyl ester**" (FAME, biodiesel) is a methyl ester produced from vegetable or animal oil or fat;
- "**Biogas**" is a gas produced from biomass and/or biodegradable fractions of waste by means of pyrolysis or fermentation;
- "**Biomethanol**" is a methanol produced from biomass and/or biodegradable fractions of waste;
- "**Biodimethylether**" is a dimethylether produced from biomass;
- "**Bio-ETBE (ethyl-tertio-butyl-ether)**" is an ETBE produced on the basis of bioethanol with a percentage by volume that is calculated as biofuels of 47%;
- "**Bio-MTBE (methyl-tertio-butyl-ether)**" is an MTBE produced on the basis of biomethanol with a percentage by volume that is calculated as biofuels of 36%;
- "**Synthetic biofuels**" are synthetic hydrocarbons or mixtures of synthetic hydrocarbons, which have been produced from biomass;
- "**Biohydrogen**" is a hydrogen produced from biomass and/or biodegradable fractions of waste;
- "**Pure vegetable oil**" is oil produced from oil plants through pressing, extraction or comparable procedures, crude or refined but chemically unmodified.

### **3 INFORMATION ON BIOFUELS IN AUSTRIA**

#### **3.1 Measures to promote the use of biofuels in the transport sector**

##### **3.1.1 Tax exemption**

In accordance with Article 4(1)(7) of the **Mineralölsteuergesetz** (Mineral Oil Tax Law), fuels produced from biogenic substances are exempt from mineral oil tax. The blending of up to 2% biodiesel with diesel is also exempt from tax. There is also a tax reduction for the blending of up to 5% biogenic fuels with petrol.

##### **3.1.2 Substitution requirement**

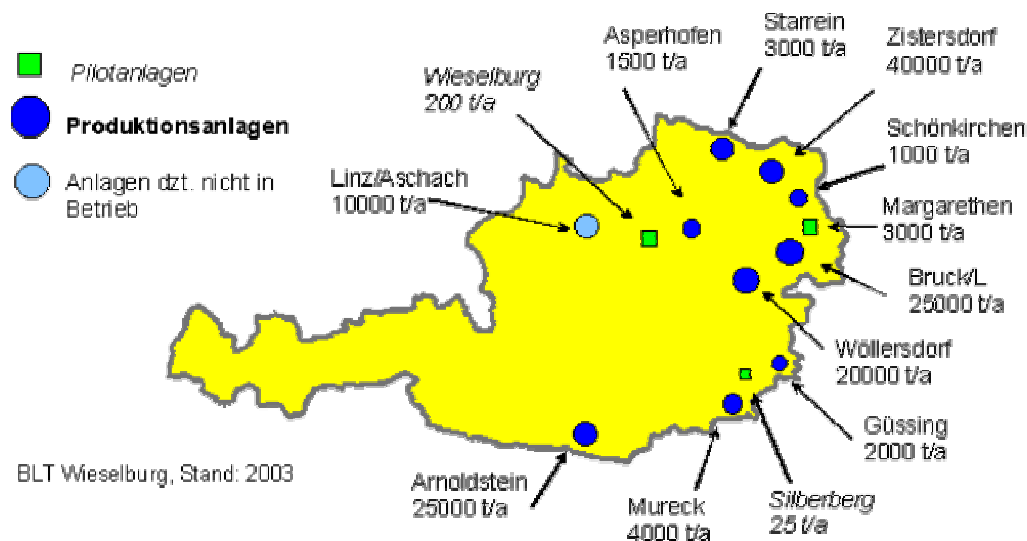
The proposal for Article 6a, which was amended in the framework of the draft report on the revision of the Fuels Ordinance (the national consultation process runs until 20 August 2004), requires those who are subject to the substitution requirement to place on the market from 1 April 2005 a proportion of 2.5% biofuels or other renewable fuels calculated on the basis of the total energy content of the petrol and diesel placed on the market in the transport sector each year by those subject to mineral oil tax in Austria. This proportion should increase to 4.3% from 1 April 2007 and to 5.75% from 1 April 2008. Persons subject to the substitution requirement are any taxable persons in accordance with Article 22 of the Mineral Oil Tax Law, who are liable to tax for petrol or diesel in accordance with Article 2(1) and (2) of the Fuels Ordinance.

#### **3.2 National resources for the production of biomass**

##### **3.2.1 Biodiesel**

There are currently nine large-scale and three pilot biodiesel plants in operation in Austria. The total capacity amounts to more than 100 000 tonnes per year. In addition the biodiesel plant in Linz/Aschbach has a capacity of 10 000 tonnes per year but is not currently in operation.

Diagram 1: Overview of biodiesel production plants in Austria<sup>1</sup>



In 2003, 55 000 tonnes of biodiesel were produced in Austria according to information from the producers. From this quantity, however, approximately 90% was sold abroad, as the price which can be obtained for biodiesel in Italy and Germany is currently higher than that in Austria.

### 3.2.2 Ethanol

There is currently no large-scale production of bioethanol in Austria.

### 3.2.3 Biogas

In 2003, approximately 34.5 million cubic meters of biogas were produced in 141 agricultural installations in Austria. In addition, 62 waste and 134 sludge treatment plants produce approximately 170 million cubic meters of biogas. In total, more than 200 million cubic meters of biogas are produced each year in Austria, almost 100% of which, however, is currently converted directly into electricity by the producers. However, some producers are very interested in using biogas as a fuel for transport.

### 3.2.4 Solid biomass

Owing to the multiple uses of solid biomass, in particular for residential heating and electricity in Austria, we have to rely on a statistical assessment. The current statistics give a figure of 67 194 PJ for solid biomass in 2001, which represents a proportion of 5.2% of the gross domestic consumption.

It can be assumed that energy use in 2003 from solid biomass was not stagnant. However, exact data on the energy use of solid biomass in 2003 are not currently available.

<sup>1</sup> Krammer, K., Prankl, H., „Verwendung von Pflanzenölkraftstoffen“, BLT Wieselburg, 2003

### 3.3 Sales of fuel in Austria in 2003

The quantity of fuel sold is ascertained by the Federal Ministry for Economic Affairs and Labour in accordance with the Oil Stockholding and Registration Law on the basis of a notification requirement. In addition to the quantities of fuel sold in 2003, the comparable figures for 2001 and 2002 are given.

Table 1: National sales of mineral oil products in the transport sector in Austria<sup>2</sup>

Type of fuel	Total national sales 2001 (tonnes)	Total national sales 2002 (tonnes)	Total national sales 2003 (tonnes)
Unleaded normal petrol (91<=RON<95)	599 831	603 783	597 989
Unleaded petrol (95<=RON<98) "Super"	1 311 286	1 444 538	1 530 973
Unleaded petrol (98<=RON) "Super Plus"	87 038	93 445	93 519
Diesel	4 674 751	5 175 368	5 741 610

### 3.4 National indicative targets for the minimum proportion of biofuels and other renewable fuels

The proposal from the Federal Minister for Agriculture, Forestry, the Environment and Water Management for the revision of the Fuels Ordinance provides that the following quantities should be substituted with biofuels or other renewable fuels:

- From 1 April 2005: **2.5%**, based on energy content, calculated on the basis of the total **petrol and diesel** placed on the market in Austria in the transport sector each year.
- From 1 April 2007: **4.3%**, based on energy content, calculated on the basis of the total **petrol and diesel** placed on the market in Austria in the transport sector each year. The figure given here relating to energy content corresponds to a proportion of biodiesel or ethanol of 5% by volume of total diesel or petrol placed on the market.
- From 1 April 2008: **5.75%**, based on energy content, calculated on the basis of the total **petrol and diesel** placed on the market in Austria in the transport sector each year.

<sup>2</sup> Source: Federal Ministry for Economic Affairs and Labour (2004).

## 4 QUANTITIES OF BIOFUELS

An estimate of the required quantities of biofuels for 2010 can be made from the prognosis of fuel consumption and an analysis of the Austrian transport fleet. The quantity is calculated from the energy content of the fuels. It was assumed that the mileage remains constant when biofuels are used, which can only be represented by maintaining the total energy quantity.

Fluctuations in fuel consumption resulting from the different levels of energy content of biofuels were taken into account in the calculation.

The following table shows estimated requirements of biofuels for 2005, 2007 and 2008 for the minimum proportions of biofuels placed on the market as set out in 3.4. As the biodiesel market currently seems to be the most developed market in Europe, the requirements for 2005 are only shown for biodiesel. The revision of the Fuels Ordinance leaves the choice of biofuels or other renewable fuels up to those who are subject to the substitution requirement. The requirements for 2007 and 2008 are shown in the following table based on the assumption that the substitution requirement has been met with biodiesel in the diesel sector and ethanol (also as raw material for ETBE) in the petrol sector. The draft report on the implementation of the Directive will lead to market opportunities for the other possible biofuels or renewable fuels owing to the freedom of choice of product.

*Table 2: Prognosis of the required quantities of biofuels based on achieving the objectives stipulated in the draft report on the Fuels Ordinance (assumed variants: reaching the targets with only biodiesel and ethanol).*

	<b>Biodiesel</b>	<b>Ethanol</b>
<b>2005</b>	220 900 tonnes	-
<b>2007</b>	317 500 tonnes	120 200 tonnes
<b>2008</b>	481 900 tonnes	150 000 tonnes

The following diagrams give an overview of the required quantities of biofuels in 2010 making use of the blending limits currently allowed in accordance with European fuel standards for petrol and diesel.

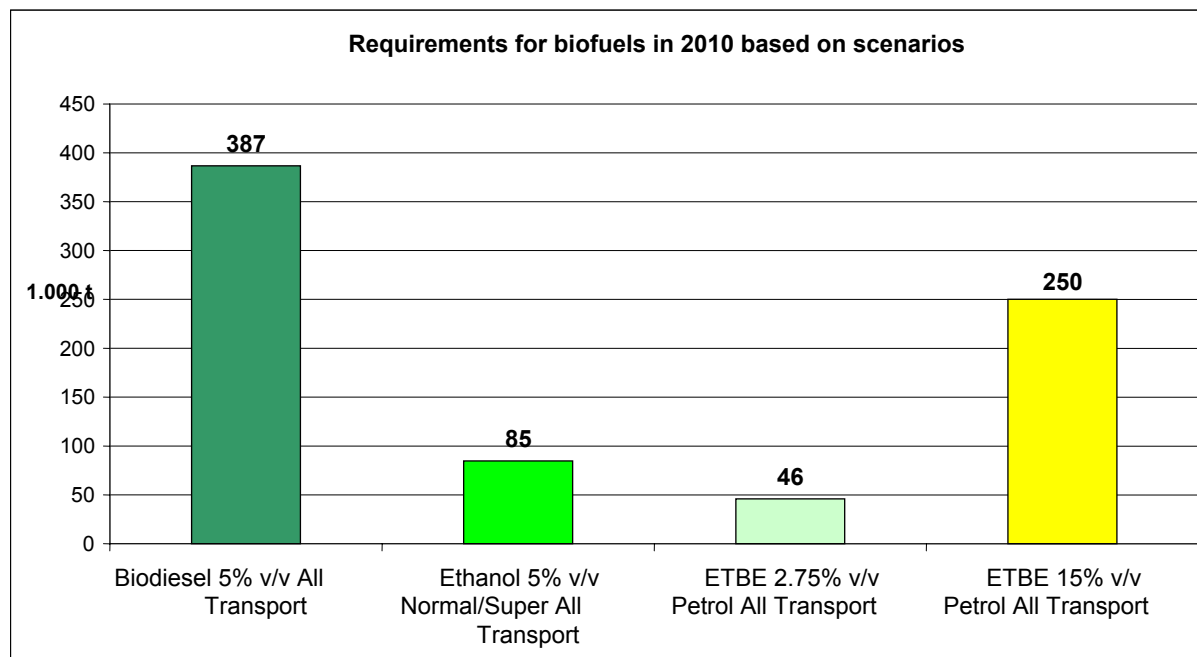
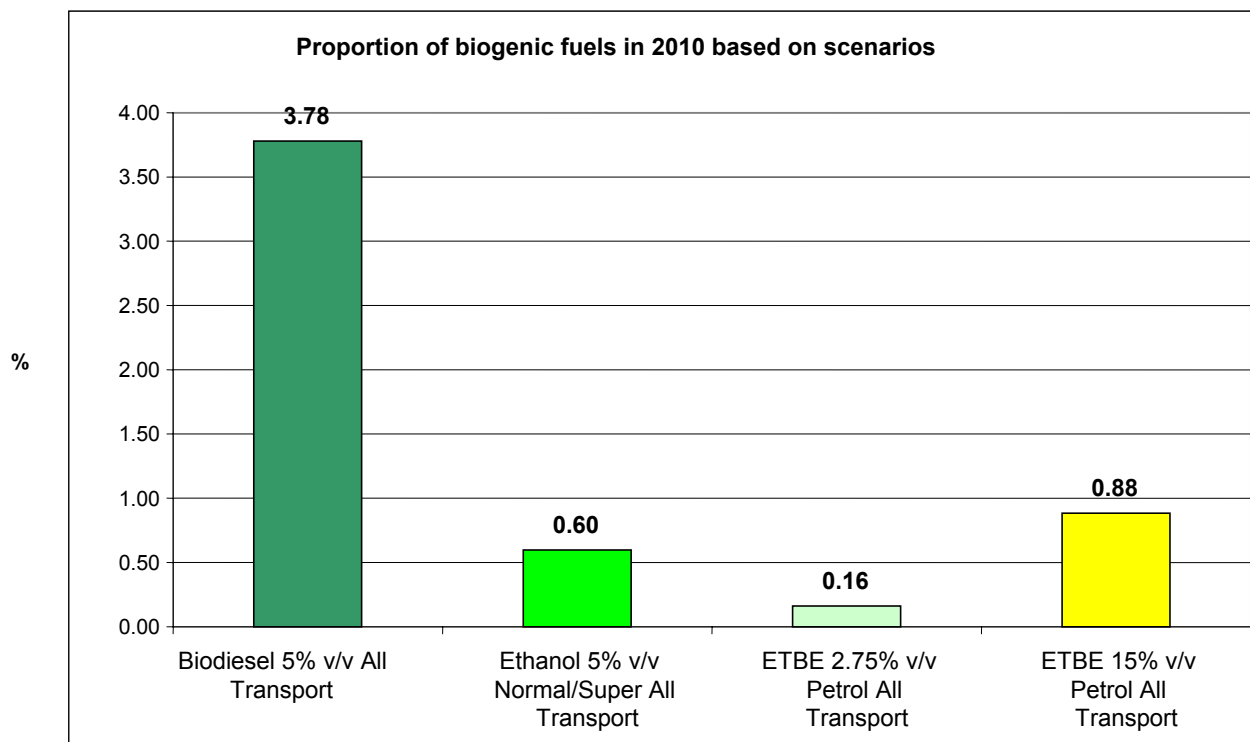
Diagram 2: Requirements for biofuels in 2010 based on scenarios<sup>3</sup>

Diagram 3: Proportion of biofuels in total energy consumption in 2010 based on scenarios



The analysis leads to the conclusion that substantial efforts will be required to achieve the target of the Biofuels Directive of 5.75% for 2010 or the national target for 2008. The possibility of blending ethanol or ETBE accounts for a relatively small proportion in terms of

<sup>3</sup> Kurzweil A., Lichtblau G., Pölz W., „Einsatz von Biokraftstoffen und deren Einfluss auf die Treibhausgasemissionen in Österreich“, Umweltbundesamt, 2003

achieving the Directive's target. The reason for this is partly the dwindling market for petrol and partly the low energy content of ethanol. The replacement of MTBE with ETBE accounts for the highest proportion together with an increase in the ETBE content of all petrol grades to 15%. With this measure, 0.88% of the total energy requirements of the transport sector can be replaced with biofuels. Furthermore, the product-specific undesirable properties of ethanol (water retention, turbidity, separation effects) will be minimised by processing ethanol into ETBE. However, the proportion of MTBE in fuel, which can be replaced by ETBE, currently required on the basis of the properties of the fuel product is 2.75% by volume and this is well below the 15% possible in accordance with the standard!

In contrast, biodiesel shows much higher potential for achieving the targets of the Biofuels Directive. This is primarily based on the marked increase in diesel sales in Austria as well as the higher energy content of biodiesel in comparison to ethanol. A 5% blending (volume-wise) of biodiesel with diesel results in a substitution of 3.78% of the energy consumption in the transport sector through biofuels.

A blending of biodiesel on the one hand and 5% bioethanol or 15% ETBE on the other is, however, not enough to achieve the target of 5.75% set by the Biofuels Directive. The maximum substitution of fossil fuels is effected with a blending of 5% biodiesel with diesel plus the use of 5% ethanol and 15% ETBE in petrol. The combination of these blending variants results in a proportion of biofuels of 4.66%. In order to achieve the required 5.75%, it is necessary to replace 1.09% of the total energy requirements of the transport sector with pure biofuels, which would correspond to a quantity of approximately 111 600 tonnes of biodiesel.

In order to be able to transpose the Biofuels Directive in the transport sector, it will be necessary to blend higher proportions of biofuels or market them in a pure form. A higher blending rate would require the construction of a separate infrastructure. For higher blending rates or as unmixed biofuel, biodiesel is a good solution because ethanol (from 10% blending) requires engine technology to be adapted, whereas biodiesel can be used in existing fleets.

The best place to use fuels with high blending rates or unmixed biofuels is in vehicle fleets. An analysis shows that both in road transport and in the off-road sector, there is a considerable potential for using biodiesel.

There is also potential for using biogas as a fuel for vehicle fleets. It should be noted, however, that at the end of 2003 there were only about 250 gas vehicles licensed for road transport in Austria. Over the next three years the Austrian gas industry is planning to build approximately 25 new natural gas filling stations. In Austria there are currently 14 public gas filling stations for natural gas vehicles, and there are over 30 company gas stations (as at January 2004).

#### **4.1 Emissions of greenhouse gases<sup>4</sup>**

The implementation of the EU Biofuels Directive could reduce greenhouse gas emissions by up to 1.0 million t CO<sub>2</sub> equivalent per year. This would correspond to approximately 5% of the current greenhouse gas emissions from the transport sector.

## **5 LITERATURE**

Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport.

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<sup>4</sup> Jungmeier G., Hausberger S., Canella L., „Treibhausgasemissionen und Kosten von Transportsystemen, Vergleich von biogenen mit fossilen Treibstoffen“

Order of the Federal Minister for the Environment, Youth and the Family on fuel quality (BGBl. II No 418/1999).

Federal law aligning mineral oil tax with Community law (BGBl. No 630/1994).

Krammer, K., Prankl, H., „Verwendung von Pflanzenölkraftstoffen“, BLT Wieselburg, 2003.

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