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**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 2006
SWEDEN**

Report pursuant to 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

This Memorandum is Sweden's fourth report pursuant to Directive 2003/30/EC of 8 May 2003 on the promotion of biofuels or other renewable fuels for transport.

1) Measures taken to promote the use of biofuels

National targets

As indicated in previous reports, the national targets for the use of biofuels and other renewable fuels in Sweden were fixed at 3% in 2005 and 5.75% in 2010, calculated on the basis of energy content.

Promoting clean vehicles

The proportion of new car sales comprising clean vehicles has risen dramatically in recent years, from 5% in 2005 to 13% in 2006 (clean vehicles mean fuel-efficient cars with maximum 120 g/km CO₂-emissions and cars which can use alternative fuels). The proportion of clean vehicles has continued to rise in 2007. Preliminary figures give a 16.6% market share in May 2007.

Some of the contributing factors to this development are shown below.

Taxation strategy for alternative fuels

The taxation strategy which has been described in previous reports was also applied in 2006.

Carbon dioxide-based vehicle tax

A carbon dioxide-based vehicle tax was introduced in 2006 to promote purchases of fuel-efficient vehicles and hence reduce emissions in the transport sector.

Obligation to provide renewable fuels

A new Act on the obligation to provide renewable fuels entered into force on 1 April 2006. It requires Sweden's larger filling stations to offer a renewable fuel for sale alongside petrol and diesel. The Act initially covers filling stations with a sales volume of over 3 000 m³ of petrol/diesel. These make up around 15% of the total of just under 4 000 filling stations in Sweden. The aim is for around 60% of all filling stations to offer a renewable vehicle fuel by 2010.

A subsidy is granted to investments in filling stations for biogas or other renewable fuels. SEK 150 million was set aside for this purpose in 2006 and 2007.

Environmental policy for State-owned cars

Vehicles purchased by the public sector must as a general rule be clean vehicles. From 2007 onwards a minimum 85% of cars purchased or leased by the State authorities must be clean vehicles. In the case of emergency vehicles, in 2007 a minimum 25% of vehicles purchased by the State authorities must be clean vehicles.

Clean vehicle premium

The Government introduced a premium in spring 2007 to induce private individuals to switch over to clean vehicles, so as to provide an incentive for fuel-efficient cars and vehicles using environmentally-friendly fuels. The premium covers conventional fuel-efficient cars, cars powered by alternative fuels, electric hybrids and electric cars of a certain level of efficiency. A private individual buying a new clean car in the period 1 April 2007 to 31 December 2009 will receive a SEK 10 000 premium. The Government has set aside a total of SEK 250 million for the clean car premium.

Congestion charge in Stockholm

A 'congestion charge' was trialled in Stockholm between 3 January and 31 July 2006. Clean vehicles were exempt, and this contributed to a rise in sales in the Stockholm region. Given the positive results of the trial, the Swedish Parliament decided to make it permanent. It is therefore to be levied in Stockholm from 1 August 2007 onwards. The aim of the charge is to improve access and Stockholm's environment, and also to help finance investments in the road network in the Stockholm region. Clean vehicles will continue to be exempt, but only for a period of five years.

Production of biofuels

Both of Sweden's new biofuel production plants came into operation in 2006, and decisions were made to build new plants. The latest plants being built or planned have state-of-the-art technology for the production of ethanol, RME (rapeseed methyl ester) and biogas (and upgrading plants for biogas).

Since the access to raw materials, conversion efficiency and intensity of cultivation of today's raw materials will probably place severe restrictions on expansion potential a few years hence, the Swedish Energy Agency is investing in the research and development of cellulose-based fuels. Efforts are being concentrated in three areas: ethanol produced from cellulose, gasification of biofuels and gasification of black liquor.

As a result of the Energy Agency's initiative to launch a biofuel platform in the EU, in 2006 it set up the platform's secretariat in cooperation with interested parties in Germany and England. A European research strategy in this field is currently being drawn up.

Miscellaneous

Commission on Sustainable Development

The Government has set up an advisory Commission on Sustainable Development. On the basis of sustainable development, the Commission is to develop cross-sectoral work, establish an international perspective and consider ecological, social and economic aspects. The Commission's work is to be action-oriented and focus on selected themes identified as essential to create the conditions for sustainable development. The Commission is to analyse obstacles and develop cross-sectoral action strategies. Its work

is to be scientifically sound. It is to examine how improving effectiveness and modernisation of the organisation, legislation and instruments can facilitate the work towards sustainable development and environment-driven growth. The Commission is to be a forum for discussion, analysis and dialogue, and stimulate broader debate in society through open and transparent working.

Scientific Council on Climate Issues and parliamentary committee on climate

In January 2007 the Government set up a Scientific Council on Climate Issues. The Council is tasked with proposing objectives for Swedish climate policy, etc., and has the remit of contributing scientific assessments to the Government bill on climate policy in 2008. The Council is to submit its report on 1 September 2007. The Government has also set up a parliamentary committee on climate issues to draft climate proposals.

Commission against dependence on oil

In December 2005 the previous Government set up a Commission to draw up a comprehensive programme to reduce Sweden's dependence on oil. In its final report in June 2006 the Commission proposed a number of measures which it felt could, by 2020, end Sweden's dependence on oil and significantly reduce the use of oil products. The oil commission's report (ref: dnr N2007/1050/E) was circulated for comment in spring 2007. The report and the comments comprise a base for the climate committee.

Swedish agriculture as a producer of bioenergy

On 21 June 2005 the Government commissioned a special rapporteur to analyse the conditions needed for Swedish agriculture to develop as a producer of bioenergy. The rapporteur submitted the report on 9 May 2007. The general perspective of the report is that the market in many cases effectively fails to assess the development potential of business ideas. The report suggests among other things that a contract premium be granted in 2008-13 to heating and electricity companies which sign a contract for new plantings of willow and a limited-period investment aid for manure-based biogas production be granted within the framework of the rural development programme.

The Government plans to send out a report for comment to a broad group of interested parties, state authorities, municipalities, universities, enterprises and organisations by autumn 2007.

2) National resources earmarked for the production of biomass for energy uses other than transport

The biofuels market in Sweden

Sweden has a fully commercial biofuels market. In 2006 Sweden's total supply of biofuels, peat, etc. amounted to approximately 117 TWh¹. Most of these fuels are produced domestically and include ligneous fuels (wood, bark, chips and wood from short rotation forestry), spent liquor (by-products of chemical pulp production), peat, waste (industrial waste, refuse, etc.) and a smaller quantity of agricultural raw materials. These

¹ *Energiförsörjningen i Sverige, Energimyndighetens korttidsprognos 2007-03-15, ER2007:09 [energy sales in Sweden, Energy Agency's short-term forecast, 15 March 2007].*

fuels are mainly used within the forestry industry for heating (district heating and small houses) and to produce electricity.

Efforts to promote the use of biomass for energy purposes

Renewable electricity certificates

The Government decided in June 2006 to develop system of 'electricity certificates', which requires that a certain proportion of consumers' electricity consumption come from renewable energy sources (Bill 2005/06:154, Renewable electricity with a green certificate). The system has been extended to 2030. Sweden has a target of 17 TWh of renewable electricity production by 2016, compared with 2002.

Aid for conversion from electric heating and oil-fired heating systems

A special investment aid for converting from direct-acting electric heating in residential buildings entered into force in January 2006. Up to 31 December 2006 4 329 applications had been granted aid totalling SEK 246.9 million. Conversion to district heating makes up 73% of the measures carried out.

A similar investment aid for conversion from oil-fired heating in residential buildings entered into force in January 2006. Aid is granted for conversion to district heating, biomass-fuelled heating systems, mountain, lake or geothermal heat pumps, or solar power. One objective of the aid is to reduce the use of fossil fuels and increase the proportion of renewable energy used for heating purposes. A total of SEK 450 million in aid has been set aside for the five-year period 2006-10. There has been extremely high interest in the aid, and the total amount was already fully committed by the end of 2006. The aid is reasonably equally split between conversion to heat pumps, biofuels and district heating, although conversion to heat pumps has a slight lead.

Aid for energy efficiency and renewable energy in public places

A special investment aid for energy efficiency and conversion to renewable energy sources in premises used for public services, which was introduced in 2005, has been extended and now applies until 31 December 2008. A total of SEK 2 billion has been set aside for this aid.

Climate investment programmes

Within the framework of aid for climate investment programmes (Klimp) approximately 20 biogas projects were granted subsidies totalling around SEK 100 million in 2006. Most of these involve the production of biogas as a vehicle fuel, but also cover upgrading and distribution. Total investments in the projects amount to approximately SEK 350 million and around 25% of the subsidies went to private companies. Climate investment programmes approved in previous years also cover biogas measures being implemented in 2006.

3) Total fuel sales last year and the proportion of biofuels, etc.

Vehicles powered by biofuels

At the end of 2006, there were about 4.2 million private cars on the road in Sweden, including around 47 000 biofuel vehicles². Even though the number of biofuel vehicles has risen dramatically in recent years, they still comprise only around 1% of the total number of vehicles. This is comparable to the proportion of diesel-powered passenger cars, which, at the end of 2006, had increased from 5.2% to 6.2%. The use of biofuels has increased more than the number of biofuel vehicles, as most biofuel use is through a low blend of ethanol and FAME in petrol and diesel respectively.

Several Swedish cities have invested in biogas as a fuel for local buses. In 2006, biogas buses were operating in twelve cities and there will gradually be more. In connection with this, filling stations for private cars have also been established and the increased accessibility is also increasing the number of these vehicles. Another positive effect of the investments in buses powered by biogas is that the number of heavy vehicles powered by gas is increasing, e.g. refuse collection lorries. In 2006 Skåne was the first Swedish county to introduce gas-fuelled busses in its regional bus transport. However, these are currently powered by natural gas due to insufficient supplies of biogas.

Out of Sweden's around 3 800 filling stations, only around 20% offered any kind of alternative fuel at the end of 2006. In 2005, it was just 9%.

The number of clean vehicles, including vehicles equipped to run on biofuels, is continuing to rise. At the end of 2006 there were almost 10 000 light 'bifuel vehicles' which could also be fuelled by gas (natural gas and/or biogas), and around 6 000 light electric hybrids. The largest increase has been in vehicles using E85, known as 'Flexible Fuel Vehicles' (FFV). At the end of 2006 there were 47 000 FFV on the roads, more than double the 23 000 FFV the previous year.

The average fuel consumption of new ethanol cars has increased by 20% over the past two years. For petrol-fuelled vehicles the average fuel consumption of new ethanol cars (FFV) was 8.2 litres per 100 km in 2006 compared with 6.9 litres per 100 km in 2004. This is probably due to the introduction of larger models in recent years, resulting in higher average fuel consumption. In the same period average fuel consumption for new petrol-fuelled cars fell by 3.6% and that of diesel-powered passenger cars fell by 2.8%³. One difficulty in interpreting the statistics for biofuel vehicles is that biogas cars can be powered by fossil fuels (natural gas), or by a mixture of natural gas and biogas. Another example is cars using petrol as the first fuel and an alternative propellant as the second fuel. These vehicles can be driven either by fossil fuels or by biofuels.

Number of filling stations

² Biofuel here means ethanol, E85, biogas and FAME. Hybrid vehicles are not included in the number of biofuel vehicles.

³ Swedish Road Administration, *Bilarna blir snålare - men betydligt mer krävs för att nå klimatmål* [cars are becoming more economical – but much more is needed to achieve climate goals], 13.3.2007.

At the end of 2006 74 filling stations in Sweden carried vehicle gas while 706 offered ethanol.

Use of biofuels in Sweden

The biofuels widely used in Sweden are bioethanol, rapeseed methyl ester (RME) and biogas. Very small quantities of some other types of biofuels are also used.

As requested by the Government, the Energy Agency has drawn up a list of indicators which can be used as the basis for an annual review of energy policy targets. This year's edition⁴ gives an indicator which is in line with the national indicative targets for biofuels laid down in Directive 2003/30/EC of 8 May 2003 on the promotion of the use of biofuels and other renewable fuels for transport.

Fuel		1998	1999	2000	2001	2002	2003	2004	2005	2006
Petrol	(energy volume, TWh)	48.96	49.18	48.36	48.63	49.28	48.81	47.75	47.54	46.31
Diesel for transport	(energy volume, TWh)	24.79	25.10	24.44	24.84	28.49	29.83	33.99	36.93	37.25
Ethanol	(energy volume, TWh)	0.09	0.09	0.16	0.25	0.45	0.88	1.54	1.68	1.89
RME	(energy volume, TWh)	0.09	0.11	0.06	0.03	0.04	0.05	0.09	0.10	0.60
Biogas	(energy volume, TWh)	0.03	0.04	0.05	0.06	0.09	0.11	0.13	0.16	0.17
Proportion of biofuels calculated on the basis of energy content		0.3%	0.3%	0.4%	0.5%	0.7%	1.3%	2.1%	2.2%	3.1%

The total quantity of biofuels, as regards energy content, replacing petrol and diesel for transport on the market, was 3.1% in 2006. This means that the proportion has increased appreciably compared with 2005. The 3% target for 2005 can therefore be said to have been achieved a year late.

After somewhat of a slowdown between 2004 and 2005, the quantity of biofuels is now on the rise once again. The reason for the former slower rate of increase was largely because the low blend of 5% ethanol in petrol in 2005 had practically reached the maximum extent.

The main reason why the proportion of biofuels is now increasing again is that low blends of FAME in diesel increased substantially in the second half of 2006. This followed on from the legislative amendment that entered into force the previous year to increase the permitted amount of FAME in diesel from 2% to 5%. In December 2006 64% of the diesel supplied contained 5% FAME, which can be compared with December 2005 when just 11% of diesel contained 2% FAME.

⁴ *Energiindikatorer 2007* [Energy indicators 2007]. Swedish Energy Agency, 2007, in press.

There are no vehicle-related barriers to having a low blend of up to 10% ethanol in petrol for cars in the existing vehicle fleet. Instead, it is the EU fuels Directive⁵ that is at present limiting the low blend to 5%. With an amendment of this EU Directive and a continued tax exemption for ethanol, the amount of low blend ethanol may be expected to rise. This is of course in turn dependent on sufficiently high access to ethanol in Sweden and beyond.

The amount of biogas sold to the transport sector increased in 2005 by about 25% to about 0.16 TWh. The increase in the use of ethanol, RME and biogas is also shown in the diagram below.

[Diagram: see Swedish original]

Key:

Andel biodrivmedel	Biofuel share
Andel Etanol	Ethanol share
Andel FAME	FAME share
Andel biogas	Biogas share
Total andel biodrivmedel	Total biofuel share
År	Year

As shown above, ethanol is the most widely used biofuel, although the share of FAME has increased significantly. In 2006 ethanol accounted for almost 71% of biofuel use in 2006, calculated in terms of energy volume. Biogas accounted for around 6% and FAME (RME) for almost 23%.

In Sweden ethanol is produced from grain by Agroetanol. The company is currently building a new plant which will help increase production four-fold. Other production in Sweden is based on by-products of paper pulp production by SEKAB in Örnsköldsvik.

Sweden's domestic production capacity for RME increased sharply in 2006 as a result of two major plants becoming operational in Karlshamn and Stenungsund.

In 2003 imports of ethanol increased significantly from a relatively low level. These imports continued to rise in 2004-06. Imported ethanol constitutes about four-fifths of Sweden's total use of ethanol in fuels (approx. 320 000 m³). Imports come mainly in the form of sugar-cane ethanol from Brazil, but also wine and cereal ethanol from Europe.

The price of the imported ethanol is between SEK 4.20 per litre to SEK 5.50 per litre including customs duties. The cost of Swedish production, which is based on cereals, is reported to be about SEK 5 per litre.

The quantity which went to E85 is around ca 56 000 m³ (around 18%), which is a vast increase from 18 000 m³ in 2005. Around 19 000 m³ of ethanol (approx. 6%) has been used for blending in fuel for buses and coaches.

The cost of Swedish production is based on cereal prices and is about SEK 5 per litre.

⁵ Directive 98/70/EC.