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Bio-Fuels

Bio-Fuels Annual

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Report Highlights:

Sweden is firmly in the forefront with regard to bio-fuel utilization within the transportation sector. This is due in large part to measures taken by the Government of Sweden to promote the utilization of bio-fuels and other renewable fuels, mainly through tax incentives.

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SECTION I. DOMESTIC POLICY ENVIRONMENT

A. Policies for Supporting and/or use of Bio-Fuels

The Government of Sweden (GOS) has established a long-term energy policy aimed at supplying domestic needs solely from renewable energy sources. In September 2005, Sweden's Prime Minister Goran Persson announced a new policy target to create the conditions necessary to break Sweden's dependence on fossil fuels by 2020. Sweden is, indeed, among the leading countries worldwide in the utilization of renewable resources for energy production and is firmly in the forefront with regard to bio-fuel utilization within the transportation sector as well. This is due in large part to measures taken by the GOS to promote the utilization of bio-fuels and other renewable fuels, mainly through tax incentives.

Sweden promotes the use of ethanol and bio-diesel through tax relief. There are no energy taxes for ethanol or bio-diesel. Without tax relief, these fuels would be unable to compete with conventional gasoline and diesel at today's production costs. Total energy taxes for gasoline and diesel amount to about € 0.08/ KWh and € 0.05/KWh, respectively. These taxes represent about 30% of the price for gasoline and about 40% of the diesel price.

Table 1. Swedish Energy Taxes 2005

Energy Source	Energy Tax	Carbon Dioxide Tax	Sulfur Tax	Total	SEK/KWh
Conventional Gas (SEK/liter)	2.84	2.12	0	4.96	0.68
Diesel Oil (SEK/liter)	0.74	2.61	0	3.35	0.42
Ethanol/RME	0	0	0	0	0

SEK 1 equals about € 0.11 and US\$ 0.14

In addition, the Swedish government promotes the use of ethanol and bio-diesel through lower taxes on and free parking for "clean" vehicles. The Swedish Road Administration defines a clean vehicle as one that runs with renewable fuels if they are not too fuel consuming, as well as very low consumption petrol and diesel cars if their emissions of nitrogen oxide and particle matter are relatively low. Companies that use clean vehicles in their fleets receive a 30% investment subsidy. The GOS has also set the target that 35% of all cars purchased by the central government should be environmentally friendly. In addition, the Swedish government has proposed to abolish the VAT on bio-fuels.

In December 2005, the Swedish government imposed a regulation requiring that larger gas stations sell at least one type of bio-fuel. Gas stations selling more than 3,000 cubic meters of fuel per year (60% of total Swedish gas stations) are affected by this new requirement. In 2006, the Swedish government set aside SEK 50 million (USD 6.25 million) for this purpose and an additional SEK 100 million (USD 12.5 million) in 2007. In 2009, small gas stations will also be required to offer at least one type of bio-fuel.

EU Directive 2003/30/EC requires that 5.75% of energy used for transportation in 2010 shall be from bio-fuels. For 2005, Sweden has set a more ambitious goal of 3% ethanol utilization for transport, compared to the EU's goal of 2%. Eight EU countries have national goals between 2-3% while the rest have goals below 1.5%.

Sweden, along with Spain, has requested that the European Commission establish a new Directive on the quality of petrol and diesel fuels to permit gasoline to contain 10% ethanol, rather than the current 5%.

Policy for Supporting Production of Bio-Fuels Feedstock

When it comes to support for bio-fuels feedstock production, EU regulations offer farmers two systems for encouraging the cultivation of energy crops: the energy aid that was introduced with the 2003 CAP reform and the already existing scheme for using set-aside land for the cultivation of crops for non-food uses. The energy aid of €45 per hectare is available to farmers who produce energy crops. It is applied on a maximum guaranteed area in the whole EU, of 1.5 million hectares. Interest in applying for this support was limited among Swedish (and EU) farmers in 2004, probably because of the lack of awareness that the scheme existed. In 2005, however, the number of applicants in Sweden more than doubled, from 867 in 2004 to 1,750 in 2005.

Within the EU Rural Development Program, the GOS has funded SEK 20 million to support projects developing bio-energy as a complementary activity at farm level.

B. Size of Total Motor Vehicles Petroleum Based Energy Market

Total Swedish motor vehicle utilization of gas and diesel amounted to about 5.5 million cubic meters in 2005. The share of bio-fuels amounted to 3%, calculated on the basis of energy content.

Sales of clean vehicles have been hampered by the fact that there were not enough gas stations offering bio-fuel at the pump. Nevertheless, sales of clean cars increased from 5,386 in 2004 to 22,618 in 2005. The GOS decision to require that larger gas stations sell at least one type of bio-fuel is expected to further increase sales of clean cars.

Volvo, Saab and Ford all have clean flexible fuel vehicles currently available on the Swedish market. Volvo and Saab have also announced plans to introduce hybrid vehicles within the next few years.

C. Bio-Fuels Production Capacities

Ethanol

Ethanol is the most common liquid bio-fuel in Sweden, comprising almost 90% of all liquid bio-fuel use in 2004. It is considered the highest potential bio-fuel with regard to production as well as consumption. Swedish consumption of ethanol has increased substantially over the past year. The Swedish government's promotion of bio-fuel utilization has certainly helped the rapid increase of consumption of ethanol. Expectations are that consumption will continue to increase, which is also reflected in increased sales of clean cars and buses.

About 80% of Sweden's ethanol production is based on cereals. The remaining 20% is based on wood through fermentation of sulphite liquor, a by-product of chemical paper pulp production. Cereal-based ethanol is the additive used to reach the 5% ethanol requirement for gasoline in Sweden. Ethanol produced from sulphite liquor is utilized in 85% ethanol (E85) for clean flexi-fuel vehicles.

Two Swedish companies produce ethanol for bio-fuel: Agroetanol and Domsjo Fabriker. In addition, the company Etek is running a GOS-financed pilot project to produce ethanol from wood raw material.

Agroetanol is the largest ethanol producer with a yearly capacity of 43,000 MT and plans for expansion. The company produces ethanol from wheat, barley and rye cultivated in neighboring areas. This ethanol is used for the 5% mandatory ethanol blend in gasoline. Wheat comprises two-thirds of the raw material. Swedish cereal production is between 5.0 and 5.5 million tons per year, out of which 0.15 million tons are currently utilized in ethanol production (25,000-30,000 hectares). Agroetanol plans to invest in a new plant with a yearly capacity of about 120,000 MT. Production is expected to start in the summer of 2008.

Domsjo Fabriker produces ethanol for E85 clean vehicles from sulphite. This company has a capacity of about 10,000 MT (13,000 m³) of ethanol per year.

The greatest potential for increased domestic production of ethanol in Sweden lies in wood ethanol. Etek's pilot project has resulted in the construction of a pilot plant which began operations in early 2005. Production costs are currently high but are expected to decline substantially in the future – but not lower than the cost of producing ethanol from sugar in Brazil. Further expansion in Swedish production capacity for wood ethanol is expected to take place in about five years.

Bio-Diesel

Bio-diesel utilization in Sweden has not developed as rapidly as ethanol, but is expected to increase substantially in the coming years. From August 2006, Swedish regulations will allow a 5% blend of bio-diesel in conventional diesel – an increase from 2%. As a result, the market for bio-diesel in Sweden will increase substantially to about 250,000 MT per year.

Swedish bio-diesel (rapeseed methyl ester or RME) is produced from rapeseed. Current domestic RME production in Sweden is relatively small, amounting to about 4,000 MT. About 50% of the rapeseed used for RME production is imported, mainly from Germany and Denmark.

As a result of the increased blending of bio-diesel in conventional diesel, two new bio-diesel production plants were established in Sweden. The company Lantmannen began production in late April 2006. Total production is expected to be about 40,000 MT per year. From 2008, Lantmannen hopes to produce 100,000 MT of RME annually. Preem Petroleum and Pestorp are jointly developing a biodiesel production plant with yearly capacity of 160,000 MT. Production is expected to start in January 2007. Both plants will produce their RME mainly from imported rapeseed oil and include other oils to a lesser extent. With these new plants, total capacity for RME production in Sweden will amount to 300,000 MT in 2007.

SECTION II. IMPORT REGIMES

As an EU member, Sweden applies EU import regimes for bio-fuels. Current custom duties in force are:

- Biodiesel Custom Code 38249099 Import Duty 6.5%
- Bioethanol denatured Custom Code 22072000 Import Duty €10.2/hl
- Bioethanol undenatured Custom Code 22071000 Import Duty €19.2/hl

The above import duties do not apply to imports from countries that are part of the GSP program or from countries that have concluded Association Agreements with the EU. (GAIN Report E36056)

In January 2006, the Swedish government closed a loophole that allowed imports of ethanol at a reduced duty rate. Under the old loophole, ethanol imported to reach the required 5% bio-fuel blend could be classified under the "other chemicals" tariff line (38249099) by mixing the ethanol with 20% gasoline. "Other chemicals" are subject to a lower tariff (about €0.25/hl) than plain ethanol intended for the 5% blend (€19.2/hl per liter). Ethanol imported under the "other chemicals" tariff code could also benefit from Swedish tax relief for bio-fuels. Reportedly, many Swedish ethanol importers took advantage of this loophole.

Effective January 1, 2006, tax relief is only available for ethanol imported under the higher €19.2/hl duty. The import price is eventually expected to rise by about €0.16 per liter as a result of the closed loophole.

SECTION III. TRADE

A. Ethanol Trade

Sweden's rising ethanol consumption is based on imports, of which a large share is sourced in Brazil. In 2005, total imports are estimated at about 290,000 MT. This figure represents both imports under HS codes 220710 and 220720 as well as imports under HS code 38249099.

As mentioned above, a big part of Swedish ethanol imports have been classified under tariff line 38249099. Imports of ethanol under tariff line 38249099 from Brazil have, indeed, increased substantially over the past years as a result of Sweden's increased ethanol consumption. After closing the loophole in January 2006, imports under tariff line 38249099 have declined. During the first two months of 2005, Sweden imported almost 6,000 MT under tariff line 38249099 from Brazil. In 2006, there are no reported imports from Brazil under that tariff line. Swedish imports of un-denatured (220710) ethanol originate in Italy, Brazil, Belgium, the UK and Norway. Imports of denatured ethanol (220720) originate in the Netherlands, the UK and Italy.

Prior to closure of the loophole, import prices were about SEK 3.61 (€0.38) per liter – approximately a 20% advantage compared to domestically produced ethanol. At the higher tariff rate following closure of the loophole, import prices are expected to settle around SEK 4.48 (€0.48) per liter – slightly higher than the cost of domestic production. Despite the loss of a price advantage, dependence on imported ethanol is expected to continue for another ten years due to the lag in technology and infrastructure development.

Before 2005, Swedish exports of ethanol were very small. In 2005, however, exports increased more than five times to about 37,000 MT due to increased exports of un-denatured ethanol mainly to Finland but also to Portugal and Belgium.

B. Bio-Diesel Trade

Swedish imports of bio-diesel are small, about 4,000 MT, due to the limited utilization of bio-diesel in Sweden. With the 5% blend of bio-diesel in conventional diesel, however, imports

are expected to increase to about 40,000 MT next year. Sweden exports virtually no bio-diesel.

SECTION IV. PRODUCTION

A. Bio-Diesel Produced from Oilseeds, Vegetable Oils, Palm/Coconut Oil, Animal Fats/Oils

Production and Distribution of Rapeseed (1,000 MT)

	Rapeseed Production	Rapeseed Imports	Rapeseed Total Supply	Rapeseed for Export	Rapeseed for Bio-Diesel	Rapeseed Other Use	Rapeseed Total Use
2001/02	109	169	278	3	10	265	278
2002/03	164	76	240	0	10	230	240
2003/04	137	132	269	1	10	258	269
2004/05	230	104	334	0	10	324	334
2005/06	200	50	250	0	10	240	250

Production and Distribution of Bio-Diesel (MT)

	Production	Imports*	Exports	Total Use
2001	1,000	6,000	0	7,000
2002	1,000	6,000	0	7,000
2003	1,000	5,000	0	6,000
2004	4,000	4,000	0	8,000
2005	4,000	4,000	0	8,000

*Due to the fact that large amounts of ethanol have been imported under HS code 342490 to Sweden (loophole in Swedish tax regulations), it is impossible to quantify the share of bio-diesel in the 382490 imports. The loophole was closed as of January 1, 2006. Imports are post's estimate based on production and consumption.

B. Ethanol Produced from Grains (Wheat)

Production and Distribution of Wheat (1,000 MT)

	Wheat Production	Wheat Imports	Wheat Total Supply	Wheat for Export	Wheat for Feed	Wheat for Bio-fuel	Wheat Other Use	Wheat Total Use
2001/02	2,362	80	2,442	493	925	100	924	2,442
2002/03	2,113	188	2,301	485	800	100	916	2,301
2003/04	2,282	27	2,309	638	800	100	771	2,309
2004/05	2,409	60	2,550	425	800	100	1225	2,550
2005/06	2,247	50	2,297	375	800	100	1,022	2,297

Production and Distribution of Ethanol (Metric Tons, MT)

	Production	Imports	Exports	Total Use
2001	52,000	29,300	5,600	50,000
2002	52,000	68,600	2,400	58,000
2003	52,000	127,800	2,600	135,000
2004	52,000	184,600	5,600	205,000
2005	52,000	291,000	36,900	306,100

*Large amounts of ethanol have been imported under HS code 342490 to Sweden (loophole in Swedish tax regulations).

E. Bio-Fuel's Impact on Traditional Uses

The share of bio-fuels produced from agricultural products in Sweden is still rather small. About 2% of Sweden's agricultural land is used for energy production (see below).

Table 1. Cultivation of Agricultural Raw Material for Bio-fuel Production

Raw Material	Area, in hectares
Grains, ethanol	25,000
Grains, heating	5- 10,000
Straw, heating	(30,000)*
Rapeseed, RME	2,000
Salix, heating	14,000
Reed Canary Grass, heating	600
Grassland	300

*Bi-product from grains.

Since Sweden is more than self-sufficient in wheat, the planned 120,000 MT increase in ethanol production would only affect Swedish exports of wheat. In 2004/05, Swedish production of wheat amounted to about 2.4 million MT, of which 425,000 MT was exported. Swedish exports of wheat depend heavily on the volume of production and can vary by more than 200,000 MT from year to year. It takes about 275,000 MT of wheat to produce 120,000 MT of ethanol (two thirds wheat). Hence, the planned expansion in ethanol production would reduce Swedish wheat exports by about 275,000 MT per year.

Sweden's rapeseed harvested area in 2005 totaled about 80,000 hectares. Should Karlshamns meet their increased production of 40,000 MT of RME with domestic rapeseed, the area harvested would need to increase by 30,000 hectares. Swedish rapeseed growers see this as a great opportunity. However, the increased demand for rapeseed oil from the planned RME production at Lanmannen and Perstorp's plants is expected to be met through imports.