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Sweden

Biofuels

Biofuels Annual

2008

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Report Highlights:
Sweden is among the leading countries worldwide in the utilization of renewable resources for energy production and is firmly in the forefront with regard to biofuel utilization within the transport sector as well. This is due in large part to measures taken by the Government of Sweden to promote the utilization of biofuels and other renewable fuels, mainly through tax incentives.

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SECTION I. DOMESTIC POLICY ENVIRONMENT

The Government of Sweden (GOS) has established a long-term energy policy aimed at supplying domestic needs solely from renewable energy sources. Increasing energy efficiency and renewable energy sources are high priorities for Sweden, which already obtains 28% of its energy supply from renewable sources.

Environment taxes, fees and other policy measures have been introduced in order to achieve the objectives set out in the government's ambitious energy and climate policy. The Swedish Government is investing SEK 420 million in energy efficiency measures in 2008-2010. These measures will be implemented in policies related to environment, forestry, agriculture and energy in areas such as climate research, pilot projects for second-generation bio-fuels, wind power, sustainable yield of bio-energy in agriculture and forestry etc. In addition, the Government is providing a further SEK 1 billion in the field of climate and energy policy for the same period of 2008-2010.

Although Sweden has a strategy for reducing national emissions of greenhouse gases, Sweden's efforts in the climate change negotiations are largely channeled through the European Commission. Sweden has been a driving force in EU decisions for ambitious climate targets and was one of the leading member-countries in bringing about an agreement to cut greenhouse gas emissions by at least 20% from 1990 levels by 2020. Sweden wants to set an example that it is possible to link economic growth with proactive climate policies. In Sweden, emissions of greenhouse gases have decreased by almost 9% between 1990 and 2006 while the GDP increased by 44% during the same time. A key reason for this is believed to be the introduction of the carbon dioxide tax in 1991.

In January 2008, the European Commission presented a new climate and energy package. According to the new EU climate target proposal, Sweden is to reduce carbon dioxide emissions by 17 percent and increase the use of renewable energy sources to 49% by 2020, using 2005 as a base year. Negotiations have begun in the EU, and the decision should be made in the beginning of 2009. Sweden will play an active role in persuading the world's countries to agree on a new climate treaty by 2009 at the latest. Sweden will hold the Presidency of the EU in the second half of 2009 when the new global climate agreement beyond 2012 will be finalized and thus, Sweden will have an important role to play in fighting climate change and leading negotiations to a successful conclusion.

The share of renewable energy sources in the Swedish energy system has increased rapidly during the past decade, from 18% of the total energy supply in 1970 to 28% today. Biomass accounts for the greater part of the increase. Despite rising industrial output, the use of oil has fallen from more than 70% of the total energy supply in 1970 to around 30% in 2006. Electricity production in Sweden is basically fossil-free and comes mainly from hydro power and nuclear power.

Supply and Use of Energy in Sweden 1970 and 2006, TWh

	1970	2006
Nuclear power	0	194 (33%)
Crude oil and oil products	350	201 (31%)
Biofuels incl. peat	43	116 (17%)
Hydro power	41	62 (11%)
Coal and coke	18	28 (4%)

Natural gas, gasworks gas	0	11 (1.5%)
Heat pumps	0	6 (1%)
Wind power	0	1 (0.15%)
Import-Export electricity	4	-6
Total energy supplied	456	623

In the transport sector, Sweden is ahead of most other European countries. Sweden was one of the few countries that met the goal of the European Commission's biofuel directive, which instructed member countries to replace 2% of all gasoline and diesel with biofuels by the end of 2005.

Adapting transport to climate concerns is one of the main challenges facing Sweden. Although sales of green cars continue to set new records in Sweden (every third new car now is a green car) and the carbon dioxide emission for new cars is falling quickly, the transport sector still accounts for a large share of national emissions. The government is working for a transport sector that has a decreasing impact on the climate by developing taxes, regulations and economic instruments that favor environment-friendly choices. As an example, the Swedish Government increased the carbon dioxide tax by SEK 0.06 per kg carbon dioxide from January 1, 2008.

EU Directive 2003/30/EC requires that 5.75% of energy used for transportation in 2010 shall be from biofuels. The EU has also set a new target for 2020; by then 10% shall be biofuels in all fuel use. In order to reach these goals, Sweden is working actively in the EU for an increase of low-level blends of ethanol to 10% in gasoline. Sweden sees the EU directive that permits a maximum of 5% blend a major obstacle to the continued rapid introduction of biofuels. In Sweden, all traditional gasoline contains 5% ethanol.

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

In Sweden, the promotion of biofuels is a component of the government's strategy of long-term sustainable development, including the promotion of renewable energy sources and a more environment-friendly transport sector.

Sweden promotes the use of ethanol and biodiesel through tax relief. There are no energy taxes for ethanol or biodiesel. Without tax relief, these fuels would be unable to compete with conventional gasoline and diesel at today's production costs.

Swedish Energy Taxes 2008, SEK

Energy Source	Energy Tax	Carbon Dioxide Tax	Sulfur Tax	Tot.Carbon Dioxide and Energy Tax	VAT	Total
Conventional Gas (SEK/liter)	2.95	2.34	0	5.29	1.23	6.61
Diesel Oil (SEK/liter)	1.23	2.88	0	4.11	0.47	4.58
Ethanol/RME	0	0	0	0	0	0

SEK 1 equals about US$ 0.17

In addition to the tax incentives, there are a number of different policy instruments currently used in Sweden for promoting the use of biofuels and environment-friendly cars, for example:

- Access to environment-friendly fuels throughout the country. Since April 2006, all major fuel stations in Sweden are required to sell at least one type of biofuel.
- The Swedish government has introduced a cash bonus of SEK 10,000 (USD 1,665) to private individuals who buy a new "green" car. The program is scheduled to run from April 1, 2007 until December 31, 2009.
- Free parking for green cars.
- As of August 2007, there is a permanent congestion charge in Stockholm which has had a positive impact on the environment. Green cars are exempt from this charge.
- A tax for light-duty vehicles based on carbon dioxide emissions instead of weight was introduced in 2006. It is aimed at motivating car buyers to choose fuel-efficient vehicles.
- As of 2007, at least 85% of all cars purchased by government authorities and 25% of emergency services vehicles have to be environmentally friendly.
- Expansion of biogas stations continues.

According to a recent report issued by the Government's Globalization Council on May 27, 2008, Sweden is changing its strategy for environment-friendly cars. According to the report, electric is better than ethanol. The report proposes that a cash bonus of SEK 20,000 (USD 3,330) for buying an electric car should be introduced (compared to SEK 10,000 for other types of environment-friendly cars). It is believed that the report will have a certain impact, considering the fact that five ministers are members of the council, including the Minister of Enterprise and Energy.

In addition, the Swedish Government recently announced that it is investing SEK 240 million (USD 40 million) to partially finance research into environmentally friendly vehicles. This project is a collaboration between the Swedish car and power industries to develop plug-in hybrids, the next generation of hybrid vehicles that can be charge directly from a wall socket.

B. Policy for Supporting Production of Bio-Fuels Feedstock

When it comes to support for biofuels 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 2 million hectares.

The Swedish Board of Agriculture is proposing to the Government that special investment support for biogas should be created under the Rural Development Program over the period 2009-2013.

Also, there is an investment support for planting forestry for energy use in Sweden.

D. Size of Total Motor Vehicles Petroleum Based Energy Market

The transport sector is Sweden's single largest source of greenhouse gases and emissions are still increasing. Sweden has a large number of fuel-thirsty vehicles compared with other

European countries. At the same time, Swedish motorists are increasingly choosing environmental-friendly cars.

Sales of green cars continue to set new records and Sweden is currently showing the world's strongest growth in green car sales. During the first six months of 2008, green car registrations increased by 89%. In June 2008, a total of 8,110 new green cars were registered, representing 33.8% of the market (17.2% in 2007) of which 62% were run on something other than gasoline, namely, diesel, E85, gas or electric hybrids. Three years ago, in 2005, the share was only 15%. The sector estimates that 100,000 green cars will be sold in 2008, representing an increase of 86% compared with 2007.

In 2007, a total of 55,000 green cars were registered in Sweden, an increase of 49% from the year before and 18% of all newly registered cars (13% in 2006). The increase reflects the Swedish Government's decision to require that larger gas stations sell at least one type of biofuel, the introduction of the green car rebate in April 2007 and raised carbon dioxide taxes.

In 2007, ethanol cars were the most common type of green cars (64.9%). Green cars also include cars powered by gas (3.1%), hybrid cars (6.2%) and gasoline (13.7%) and diesel cars (12.1%) that emit less than 120 grams of CO2 per kilometer.

Use of biogas in Sweden has increased in the past few years. Many Swedish communities choose biogas to run local buses and distribution vehicles. The Swedish Government is providing grants for investments in building more filling stations for biogas. It is estimated that about 20% of Swedish vehicles will run on biogas in about 10-20 years.

SECTION II. Production of Bio-Fuels

A. Ethanol Production

Ethanol is the most common liquid biofuel in Sweden, comprising almost 90% of all liquid biofuel use in 2007. Swedish consumption of ethanol has increased substantially over the past few years. The Swedish government's promotion of biofuel 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 green 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. In 2007, the price increase on grains made the investments unprofitable and many planned ethanol production plants were postponed. Ethanol produced from sulphite liquor is utilized in 85% ethanol – 15% gasoline blend (E85) for clean flexi-fuel vehicles.

In Sweden, ethanol is produced from grain by Agroetanol in Norrköping and from by-products of paper pulp production by SEKAB Örnsköldsvik. In addition, SEKAB 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 57 million liters. The company produces ethanol from wheat, barley and rye cultivated in neighboring areas. 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 is investing in a new plant which will be

ready in the fall of 2008 with a yearly capacity of about 200 million liters. Reportedly, Agroetanol is also looking for other raw material alternatives than wheat due to the high grain prices.

SEKAB supplies ethanol for a number of different applications from Sweden's only factory manufacturing ethanol from forestry raw materials. This ethanol is produced in cooperation with Domsjö Fabriker's plant for sulphite pulp and is used for E85 vehicles. This company has a capacity of about 18 million liters of ethanol per year. SEKAB also buys ethanol produced from the wine surplus in Europe and upgrades it to vehicle fuel quality. Furthermore, SEKAB buys sugar cane ethanol from Brazil, also for upgrading to vehicle purposes.

In a press release on May 26, 2008, SEKAB announced that it is the first company in the world to supply verified sustainable ethanol. This is ethanol from Brazilian sugarcane for inclusion in E85 and ED95 (for buses and heavy vehicles) and will be available in August. It is quality assured from environmental, climate and social perspectives. SEKAB has together with progressive Brazilian producers developed criteria that cover the entire lifecycle of ethanol from the sugarcane field to its use in cars. The criteria is in line with demands highlighted in the ongoing processes being led by organization like the UN, EU, ILO and a number of NGOs.

Cellulosic Ethanol

The greatest potential for increased domestic production of ethanol in Sweden lies in wood ethanol. SEKAB's pilot project has resulted in the construction of a pilot plant that produces ethanol from cellulose, a feedstock that could in the future replace cereal and sugarcane in the production of ethanol. Higher raw material prices and the current food verses fuel discussion have led to a push for second generation biofuels, such as cellulosic ethanol. In a press release on May 12, 2008, SEKAB announced that the Swedish Energy Agency is investing SEK 33.8 million (USD 5.6 million) in the development of ethanol processing at the pilot plant in Örnsköldsvik.

The pilot plant has been in continuous operation, producing ethanol from forestry waste products, since 2005. The pilot plant produces 300-400 liters of ethanol per day from a feedstock input of 2 tons of dry biomass. The feedstock is wood chips from pine trees, but other raw materials are also of future interest for the project.

An intensive development project is under way at the facility with the aim of verifying and further developing the technology process prior to the next stage of technological development. The target is to have the technology ready for production of large-scale second generation ethanol in 5-8 years using cellulose as raw material. SEKAB plans to start building its first, second-stage industrial development plant at the end of 2008. The development plant will have a capacity of 6,000 cubic meters of cellulosic ethanol per year.

Ethanol Producing Companies in Sweden

Company	**Area and Products**	**Prod. Capacity, ethanol/year**	**Feedstock**
Lantmännen, Agroetanol AB, Norrköping (operational)	-ethanol -animal feed -carbon dioxide	57 million liters	Cereal

Lantmännen, new plant (start production October 2008)	-ethanol	150 million liters	Cereal
SEKAB/Domsjö Fabriker AB, Örnsköldsvik	-paper pulp -etanol -steam	18 million liters	Wood rawmaterial (sulphite)
SEKAB E-Technology, Örnsköldsvik	-research/pilot plant	2 million liters	Wood rawmaterial
Nordisk Etanolproduktion AB, Karlshamn (planning phase, start production 2011)	-ethanol	135 million liters	Wheat
Lantmännen Lantbruk/Sala Heby Energi (start production 2009/2010)	-ethanol	44 million liters	Wheat

B. Bio-Diesel Production

As of August 2006, Swedish regulations allowed a 5% blend of biodiesel in conventional diesel. As a result of the increased blending of biodiesel and the tax exemption on biodiesel, very extensive plans for new biodiesel plants were advertised in Sweden. However, due to the high rapeseed and rapeseed oil prices in 2007/2008, many planned projects have been cancelled or postponed.

In Sweden, there is only one large-scale biodiesel plant in operation today, Perstorp AB (in cooperation with Preem Petroleum AB), which produces 160,000 tons and opened in May 2007. Lantmännen Ecobränsle (farmer owned), which produces 40,000 MT yearly and opened its operations in April 2006, decided to put its operation on hold due to high rapeseed and rapeseed oil prices.

Swedish bio-diesel (rapeseed methyl ester or RME) is produced from rapeseed. About 50% of the rapeseed produced in Sweden is used for biodiesel. In addition to domestic raw material, imported rapeseed oil, mainly from Germany and Denmark, is used. The planted area for rapeseed is estimated to increase to 100,000 ha in 2008, from 90,000 ha in 2007.

Bio-Diesel Producing Companies in Sweden

Company	**Area and Products**	**Prod. Capacity, biodiesel/year**	Origin
Lantmännen, Ecobränsle AB (on hold)	-biodiesel	45 million liters (115 million liters)	Rapeseed
Preem Petrolium/Perstorp	-biodiesel	60 million liters (180 million liters)	Rapeseed

Energigårdarna	-biodiesel	12 million liters	Rapeseed
SunPineDiesel/Piteå (start prod. in 2009)	-biodiesel	100 million liters	Residues from pulp industries, such as pine-tree oil

C. Biofuel from Biomass

The share of biomass in the total energy production is over 25% in Sweden. The reasons for the wide use of bioenergy in the Swedish economy is mainly the availability of forests and raw materials, a developed forest products industry and wide use of district heating systems. About 90% of bioenergy used in Sweden today comes from the forestry sector. The raw materials used include forestry residues such as brash (branches and tree tops) and waste products from the saw mill and pulp industry such as sawdust and bark. The largest source of bioenergy in Sweden today is black liquor from the pulp industry. Most of this energy is used directly in the pulp production process but also for district heating and electricity production.

District heating, in which a central facility provides heat for surrounding homes and businesses, has a significant position in Sweden, accounting for about 40% of the heating market in Sweden. Compared to 1970, when oil was the main fuel, oil accounts for only a few percent today. Over 60% of district heating fuel today is biomass.

The use of wood fuels by the district heating sector has increased by more than fivefold since 1990. The main form of these fuels is felling residues and solid by-products from the forest products industry, although processed fuels such as briquettes and pellets are also being increasingly used.

Electricity production in Sweden is almost entirely fossil-free and is mainly based on hydro power and nuclear power. The use of oil has fallen from more than 70 % of the total energy supply in 1970 to around 30 % today, largely because of diversification of fuels and more efficient use of energy.

The most important policy instrument in promoting renewable electricity production is the electricity certificate system that was introduced in 2003. The system is technology-neutral and includes different types of renewable energy sources to promote the most cost-effective, renewable electricity production. Since the introduction in 2003, about 400 plants have been built with expected production of renewable electricity of about 2.1 TWh per year.

In 2007, 12.7 TWh of renewable electricity was produced in Sweden under the electricity certificate system. Electricity production from biofuels received 68.3 percent of all allocated electricity certificates in 2007, hydro power 16.5 percent, wind power 10.8 percent and peat 4.4 percent. Renewable electricity production has increased by 6.2 TWh since 2002.

SECTION III. IMPORT REGIMES

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

- Biodiesel Custom Code 3824 Import Duty 6.5%
- Bioethanol denatured Custom Code 22072000 Import Duty €10.2/hl
- Bioethanol undenatured Custom Code 22071000 Import Duty €19.2/hl

In January 2006, the Swedish government closed a loophole that allowed imports of ethanol at a reduced duty rate. Under this loophole, ethanol imported to reach the required 5% biofuel 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 biofuels. 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 eventually rose by about €0.16 per liter as a result of the closed loophole. Brazil is the main exporter to Sweden of ethanol for the 5% blend and thus, particularly hit by the higher import tariffs. In September 2007, the Swedish government revealed that it intends to abolish the protective duty on ethanol, i.e. opening the loophole. The move is expected to take effect on January 1, 2009 at the latest. If Sweden would re-open the old loophole, Brazil would again be able to export ethanol to Sweden at a lower tariff and still benefit from the Swedish tax relief. However, the measure first needs to be approved by the European Union.

Sweden has invested largely in promoting E85 as an alternative biofuel and believes that cheaper biofuels benefit both the climate and consumers. On February 4, 2008, the EU approved Sweden's application for permission to continue to import Brazilian ethanol for processing into the biofuels E85 and E95 at the lower tariff that a chemical product carries and blend the imported ethanol with the chemicals in Sweden. This approval went against several other EU countries wish to treat ethanol from third countries as an agricultural commodity subject to high tariffs.

Sweden continues to work in the EU and the WTO to bring about more general tariff reductions on climate-friendly goods and services.

SECTION IV. TRADE

A. Ethanol Trade

Sweden's rising ethanol consumption is based on imports, of which a large share is sourced in Brazil. In 2007, total imports are estimated at about 250 million liters according to Swedish statistics. This figure represents only imports under HS codes 220710 and 220720. Import figures for biofuels are difficult to obtain since there is no strictly defined HS code on either bioethanol or biodiesel.

As mentioned above, a big part of Swedish ethanol imports prior to January 2006 had been classified under tariff line 38249099. After closing the loophole in January 2006, imports under tariff line 38249099 have declined. In 2006 and 2007, there are almost no reported imports from Brazil under that tariff line. The price of the Brazilian ethanol almost doubled in 2006 and had to compete with the European ethanol. A large part of Swedish ethanol

imports in 2006 and 2007 consisted of wine alcohol from Europe with favorable import duties and taxes. However, there is a perception that the share of import from Brazil is higher than shown in the Swedish statistics, imports may come in under another code and/or thru other EU countries.

Swedish imports of undenatured (220710) ethanol originate in Brazil, Italy, the Netherlands and Spain. Imports of denatured (220720) orginate in the Netherlands and the UK.

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 settled around SEK 4.48 (€0.48) per liter. Despite the loss of a price advantage, production costs for domestic ethanol are still higher due to the high grain prices. Dependence on imported ethanol is expected to continue for another 8-10 years due to the lag in technology and infrastructure development.

The raising prices on gasoline and diesel have made ethanol an attractive alternative and the sales of ethanol have tripled in the first three months of 2008 compared to 2007.

According to Swedish statistics, Swedish exports of ethanol (220710 and 220720) in 2007 amounted to 43 million liters, mainly to Belgium and the Netherlands.

B. BioDiesel Trade

Swedish imports of bio-diesel in 2007 are estimated at 57 million liters. The increase in imports are mainly due to the 5% blend of biodiesel in conventional diesel. Please note that import figures are post's estimates based on production and consumption and industry information, due to difficulties in quantifying the share of biodiesel in the 382490-imports. Sweden exports virtually no biodiesel.

C. Biofuel's Impact on Traditional Uses

The share of bio-fuels produced from agricultural products in Sweden is still rather small. About 3% of Sweden's agricultural land is used for energy production. The main crops used are wheat for ethanol production, rapeseed for bio-diesel and willow (Salix) for heating (see below).

Cultivation of Agricultural Raw Material for Bio-fuel Production in 2007

Raw Material	Area, in hectares
Grains, ethanol (wheat)	23,000
Grains, heating (oats)	1,500
Straw, heating	(30,000)*
Rapeseed, RME	25,000
Willow (Salix), heating	14,000
Reed Canary Grass, heating	300
Grassland (for biogas)	1,518

*Bi-product from grains.

Since Sweden is more than self-sufficient in wheat, an increase in ethanol production would only affect Swedish exports of wheat. In 2006/2007, Swedish production of wheat amounted to about 2 million MT, of which 615,000 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. Hence, an expansion in ethanol production would reduce Swedish wheat exports by about 275,000 MT per year.

Sweden's rapeseed harvested area in 2007 totaled about 88,000 hectares. An increased demand for rapeseed oil from the many postponed RME production plants is expected to met through imports of rapeseed oil.

According to a government report in which Swedish agriculture's potential to produce bioenergy is analyzed, Swedish agriculture can contribute to the increase of renewable energy. Today, agriculture's contribution to the Swedish energy supply is very modest, 1-1.5 TWh. The report investigated the conditions needed for Swedish agriculture to develop a competitive production of bioenergy. Based on the analysis, national support was recommended within three areas: production of willow, production of biogas and development of second-generation biofuels. Also, the report discussed the ethical aspects of using food crops for bioenergy and its possible effects on consumer food prices.

SECTION IV. STATISTICAL SECTION

Quantity of Feedstock Use in Biofuel Production in MT						
		2005	2006	2007	2008	2009
Ethanol						
	Wheat	100,000	115,000	135,000	135,000	135,000
	Barley	25,000	30,000	33,000	33,000	33,000
	Rye	25,000	30,000	33,000	33,000	33,000

Quantity of Feedstock Use in Biofuel Production in MT						
		2005	2006	2007	2008	2009
Biodiesel						
	Rapeseed Oil	4,500	36,000	64,000	55,000	55,000

Biofuel Production/Consumption/Trade (million liters)					
Ethanol	**2005**	**2006**	**2007**	**2008**	**2009**
Beginning Stocks	-	-	-	-	-
Production	66	76	89	89	101
Imports	234	325	334	507	507
Total Supply	300	401	423	596	608
Exports	7	71	43	44	51
Consumption	293	330	380	552	557
Ending Stocks	-	-	-	-	-

Biofuel Production/Consumption/Trade (million liters)					
Biodiesel	**2005**	**2006**	**2007**	**2008**	**2009**
Beginning Stocks	-	-	-	-	-
Production	5	23	80	68	68
Imports	5	46	57	91	91
Total Supply	**10**	69	137	159	159
Exports	0	0	0	0	0
Consumption	10	69	137	159	159
Ending Stocks	-	-	-	-	-