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Report Highlights:
On June 16, 2009, the Swedish Parliament approved the Government's new energy and climate strategy, described as Europe's most ambitious strategy to improve energy efficiency and cut greenhouse gas emissions. The Swedish government aims by 2020 for renewable energy to comprise 50% of all energy produced, for the Swedish car fleet to be independent of fossil fuels 10 years later and for the country to be carbon neutral by 2050.

General Information:

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.

On March 11, 2009, the GOS raised the climate ambition level even further when it laid out the key proposals in its new energy and climate strategy. The Government Bill proposes a 40% target for Sweden's reductions in emissions of

greenhouses gases by 2020; half of Sweden's energy coming from renewable sources in 2020, a vehicle fleet that is independent of fossil fuels in 2030; and Sweden's net emissions of greenhouse gases being equal to zero by the middle of century. On June 16, 2009, the Government Bill was passed the Swedish Parliament.

Tighter economic instruments, including changed taxes, fees and other policy measures are being introduced in order to reach the targets set out in the government's proposal. By putting a price on emissions that impact the climate, the GOS is showing that emissions involve a cost that must be paid.

The GOS is presenting three action plans for conversion to a low carbon society:

1. Action Plan for Renewable Energy

Initiatives to reach the target of at least 50% renewable energy by 2020 include: new target of 25 TWh for the certificate system for renewable electricity production, new planning framework of 30 TWh for wind power, stimulating the development of biogas for vehicles and improving the conditions for connecting renewable electricity production of the electricity grid.

2. Action Plan for Energy Efficiency

A new five-year support program for more efficient energy use of SEK 300 million per year during the years 2010-2014 will be implemented. A number of measures are presented in order to achieve the proposed goals and to comply with the EU Directive on the Promotion of End-use Efficiency and Energy Services.

3. Action Plan for a Fossil-Free Transport Sector

The goal is that Sweden, by 2030, should have a car fleet that is independent of fossil fuels. General economic policy instruments that put a price on greenhouse gas emissions coupled with beneficial conditions for cars with a low environmental impact running on alternative fuels will encourage a different choice of fuel. The Swedish Government is keen to implement the new EU biofuel directive that enables a blending of 10% ethanol and 7% biodiesel, hopefully by July 1, 2010. Development of plug-in hybrid vehicles and electric cars will be supported.

Measures to Reduce Emissions of Greenhouse Gases

Sweden plans to reduce emissions of greenhouse gases by 40% by 2020. This applies to the sector outside the European Emissions Trading System and is equivalent to a reduction in greenhouse gas emissions of 20 million tons compared with the 1990 level. The target will be achieved by a combination of measures taken in Sweden (2/3) and green investments in other EU countries and in developing countries.

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. In December 2008, the European Commission reached an agreement on a climate and energy package. According to the new EU climate targets, Sweden is to reduce carbon dioxide emissions by 17 percent and increase the use of renewable energy sources to 49% by 2020. However, with the new Government Bill, Sweden is raising its ambition level and proposes higher targets than the ones established in the EU directive.

The GOS is now continuing its international work aimed at a far-reaching global climate agreement at the UN Climate Change conference in Copenhagen in December 2009, where Sweden will have a central position as President of the EU.

Sweden has made a radical change from oil to non-fossil based energy sources including biofuels, which has led to a reduction of its greenhouse gas emissions by more than 40% since the mid-1970s. Emissions of greenhouse gases have decreased by almost 9% between 1990 and 2007 while the GDP increased by 48% during the same time. Sweden wants to set an example that it is possible to link economic growth with proactive climate policies.

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 2007. 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 2007, TWh

	1970	2007
Nuclear power	0	191 (31%)
Crude oil and oil products	350 (77%)	196 (31%)
Bio-fuels incl. peat	43 (9%)	122 (17%)
Hydro power	41 (9%)	66 (11%)
Coal and coke	18 (4%)	29 (5%)
Natural gas, gasworks gas	0	11 (2%)
Heat pumps	0	8 (1%)
Wind power	0	1
Import-Export electricity	4 (1%)	1
Total energy supplied	457	626

One of the main challenges facing Sweden is to adapt transport to climate concerns. Although Sweden is ahead of most of the European countries when it comes to the transport sector, that sector remains dependent on fossil fuels and accounts for about 30% of national emissions.

The new Government Bill proposes a fossil-free transport sector by 2030. General instruments that put a price on greenhouse gas emissions should form the basis of the efforts to reduce the impact on the climate caused by the transport sector. The government is now proposing several taxation changes and tighter economic instruments, such as vehicle tax relief for green cars, making it more expensive to use fossil energy and cheaper to use environmentally friendly fuels. There will be continued focus on biogas, electric vehicles and plug-in hybrids. The development of second-generation biofuels will be supported and SEK 875 million will be earmarked between 2009 and 2011 for the commercialization of new energy technology, including biofuel demonstration plants.

The Swedish Government is keen to implement the new EU fuel quality directive that allows a mixture of up to ten

percent of ethanol and seven percent of biodiesel as soon as possible, hopefully by July 2010.

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

In Sweden, the promotion of bio-fuels 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 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.

Swedish Energy Taxes 2009, SEK

Energy Source	Energy Tax	Carbon Dioxide Tax	Sulfur Tax	Tot.Carbon Dioxide and Energy Tax	Total Tax Incl. VAT
Conventional Gas (SEK/liter)	3.08	2.44	0	5.52	6.90
Diesel Oil (SEK/liter)	1.33	3.01	0	4.34	5.42
Ethanol/RME	0	0	0	0	0

Source: Swedish Energy Agency
SEK 1 equals about US$ 0.13

In addition to the tax incentives, there are a number of different policy instruments currently used in Sweden for promoting the use of bio-fuels and environment-friendly cars. In addition, the new Government Bill provides for several taxation changes and tighter economic instruments, for example:

- New green cars shall be exempted from vehicle tax for the first five years, while the vehicle tax will be raised by SEK 5 (USD 0.65) per gram of carbon dioxide a car emits. The current cash bonus of SEK 10,000 (USD 1,300) to private individuals who buy a new "green" car will be replaced by a long-term tax concession. The change should come into force on January 1, 2010, but will apply retroactively to vehicles taken into use as of July 1, 2009. In addition, gasoline and diesel cars emitting less than an average of 120 grams of carbon dioxide per kilometer will also be exempt from vehicle tax.
- The energy tax on diesel will be raised by a total of SEK 0.40 per liter by 2013.
- The tax on household waste combustion should be abolished from September 1, 2010.
- As of August 2007, there is a permanent congestion charge in Stockholm which has had a positive impact on the environment.
- 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.
- Access to environment-friendly fuels throughout the country. All major fuel stations in Sweden are required to sell at least one type of biofuel.

- As of February 1, 2009, all cars purchased by government authorities and 50% of emergency services vehicles must be environmentally friendly.
- Expansion of biogas stations will continue.
- Initiatives will be taken on plug-in hybrids and electric vehicles.
- The blend of renewable fuel in gasoline and diesel will be increased.
- The development of second-generation biofuels will be supported.

B. Policy for Supporting Production of Biofuels 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. In addition, there is an investment support for planting forestry for energy use.

The new Government Bill directs that Sweden's rural development program for 2007-2013 should be utilized to support and improve the production and processing of renewable energy. A more detailed action plan to reach the renewable energy target will be presented in June 2010.

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

C. 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 environment-friendly cars.

Although new car sales declined in 2008, green car sales set new records in Sweden where every third car now is a green car. In 2008, a total of 84,541 green cars were registered in Sweden, an increase of 57% from the year before and 33.3% of all newly registered cars (17.8% in 2007). Ethanol cars were the most common type of green cars (68.4%) followed by gasoline (12.9%) and diesel cars (12.8%) that emit less than 120 grams CO2 per kilometer, hybrid cars (4.3%) and cars powered by gas (1.6%).

In Sweden, new car sales have declined by about 30% so far in 2009. Green car sales declined by 46% in the first two months of 2009, but in May the green car share was 41.7%, which is the highest ever for a specific month. This is believed to reflect the Swedish Government's decision to abolish the green car premium as of July 1, 2009 and thus, many people made their planned car purchase prior to that date. Also, on January 1, 2009, the congestion charge exemption and free parking of green cars in Stockholm disappeared. This has made it more expensive to drive a new green car at the same time as the price of gasoline was low at the time.

In Sweden, the use of biogas as vehicle fuel has increased in the past few years. In 2008, the volume of biogas was

more than 34 million normal cubic meters (Nm3), which is an increase of 19% compared to 2007. There are 92 gas filling stations for about 17,000 vehicles run by gas and further 30 gas filling stations for heavy vehicles run by gas.

Many Swedish communities choose biogas to run local buses and distribution vehicles. Reportedly, Taxi Stockholm is upgrading its taxi fleet and recently ordered 350 natural gas vehicles to be fuelled by biomethane, with plans for more. Reportedly, the company says it will only purchase green cars and aims to reduce emissions by 70% by 2012.

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 2008. 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.

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.

In Sweden, ethanol is produced from grain by Agroetanol in Norrköping and from by-products of paper pulp production by SEKAB in örnsköldsvik. In addition, SEKAB is running a GOS-financed pilot project to produce ethanol from wood raw material.

Agroetanol is the largest ethanol producer in Sweden. The company produces ethanol from wheat, barley and rye cultivated in neighboring areas. Approximately 550,000 tons of grain is needed for one year's production. The company's first ethanol plant opened in 2001 and in the fall of 2008 a new plant four times its capacity was built. Together with the old plant, Agroetanol now has a yearly capacity of about 160,000 MT of ethanol. In addition, Agroetanol has become one of the country's largest producer of protein raw material for feed by producing about 175,000 MT of the so called Agrodrank, a bi-product from the ethanol production.

SEKAB is a leading European provider of renewable vehicle fuels, focusing on distribution of ethanol in the Northern European area as well as development of large-scale ethanol production. Surrounded by the pulp and paper industry in Northern Sweden, SEKAB is producing ethanol from black liquor waste from the pulp and paper industry. SEKAB imports about 200,000 tons of ethanol from Brazil each year, supplying nearly 90% of the Swedish ethanol market. SEKAB also buys ethanol produced from the wine surplus in Europe and upgrades it to vehicle fuel quality.

In February 2009, SEKAB announced that a major restructuring of the company will take place and it will discontinue its sales of ethanol fuel E85 (15% gasoline and 85% ethanol). Instead, the importation and distribution of ethanol will be transferred to the gasoline companies, SEKAB's customers. In order to secure the supply of E85 to the Swedish customers, SEKAB will fulfill its contracts covering 90% of the Swedish market during 2009. SEKAB will concentrate its resources on a profitable core operation consisting of green chemicals, diesel substitutes and cellulosic

research.

SEKAB is one of the world leaders in developing technologies for production of ethanol from cellulose with a pilot plant in operation since 2005. The pilot plant has been in continuous operation (24 hours per day), producing ethanol from forestry waste products. It produces 300-400 liters of ethanol per day from a feedstock input of 2 tons of dry biomass, mainly wood chips from pine trees, a feedstock that could in the future replace cereal and sugarcane in the production of ethanol.

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 (45,000 MT)	Cereal
Lantmännen, new plant (start production October 2008)	-ethanol	150 million liters (120,000 MT)	Cereal
SEKAB/Domsjö Fabriker AB, Örnsköldsvik	-paper pulp -ethanol -steam	18 million liters (14,000 MT)	Wood raw material (sulphite)
SEKAB E-Technology, Örnsköldsvik	-research/pilot plant	2 million liters (1,600 MT)	Wood raw material
Nordisk Etanolproduktion AB, Karlshamn (planning phase, start production 2011)	-ethanol	135 million liters (110,000 MT)	Wheat
NBE Sweden AB Pilot Plant, Sveg (production start October 2008)	-ethanol	3,000 tons	Wood raw material

Please note that there might be other plants under construction not listed above.

B. Bio-Diesel Production

Bio-diesel utilization in Sweden has not developed as rapidly as ethanol. As of August 2006, Swedish regulations allow a 5% blend of bio-diesel in conventional diesel – an increase from 2%. As a result of the increased blending of bio-diesel in conventional diesel and the tax exemption on bio-diesel, very extensive plans on new bio-diesel plants were advertised in Sweden. However, due to the high rapeseed and rapeseed oil prices in 2007/2008, many planned projects were cancelled or postponed.

The interest for producing biodiesel is slowly increasing again as the rapeseed/rapeseed oil prices have gone down somewhat. In addition, the Government of Sweden has the ambition of implementing the new EU biofuel directive that enables a blending of 7% biodiesel by July 1, 2010.

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 the Netherlands and Lithuania was used in 2008.

There are two large-scale biodiesel plants in operation in Sweden today, Perstorp BioProducts AB, which is a subsidiary of the specialty chemicals company Perstorp AB, and the farmer-owned Lantmännen Ecobränsle.

Perstorp BioProducts AB opened in May 2007 and has a capacity of 160,000 MT yearly. Lantmännen re-opened its production in February 2009, after being put on hold in 2008 due to high rapeseed and rapeseed oil prices, and has a capacity of 40,000 MT yearly. Neither of the plants run at full capacity today.

Bio-Diesel Producing Companies in Sweden

Company	**Area and Products**	**Prod. Capacity, biodiesel/year**	Origin
Perstorp BioProducts AB (operational)	-biodiesel	180 million liters (160,000 MT)	Rapeseed
Lantmännen, Ecobränsle AB (restarted Feb. -09)	-biodiesel	45 million liters (40,000 MT)	Rapeseed
Svensk Biobränsle, Norrköping (planning phase)	-biodiesel	370 million liters (330,000 MT)	Rapeseed (Jatropha)
Prosbio Group (small scale biodiesel producers)	-biodiesel	1,800 MT	Rapeseed
SunPineDiesel/Piteå (prod. Start end -09, first del. 2010)	-biodiesel	100 million liters	Residues from pulp industries, such as pine-tree oil

Please note that there might be other plants under construction not listed above.

C. Biofuel from Biomass

The proportion of bioenergy used in the Swedish energy system has steadily increased, from a little over 10% in the 1980s to 28% today. Biomass accounts for the greater part of the increase. The availability of forests and raw materials, a developed forest products industry, and the wide use of district heating systems are the main reasons for the

wide use of bioenergy in the energy system.

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), 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 forestry industry. Most of this energy is used directly in the pulp production process but also for district heating and electricity production.

Sweden is the largest producer and consumer of wood pellets. There are over 90 pellet factories supplying nearly 2 million metric tons of pellets to the Swedish market. The major raw material for pellets has traditionally been sawdust and by-products from sawmills. With the increasing competition for the sawdust resources there is now increased interest in searching for alternative raw material. The issue of pellet raw material and the pricing will be crucial for future market development.

SECTION III. IMPORT REGIMES

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

- Biodiesel Custom Code 38249091 Import Duty 6.5%
- Bioethanol denatured Custom Code 220720 Import Duty €10.2/hl
- Bioethanol undenatured Custom Code 220710 Import Duty €19.2/hl

In April 2009, the EU approved Sweden's request for continued lower import duties on ethanol imported from Brazil for use in E85 (for cars) and ED95 (for buses and trucks) fuels. Sweden received permission from the EU Customs Code Committee to classify the ethanol as a chemical product for blending with gasoline, thereby exempting the product from the much higher duties that are imposed on imported agricultural products from third countries.

The EU's decision on reduced duties is conditional upon the ethanol being verified as sustainable, which is the type of ethanol that SEKAB has been importing from Brazil. This ethanol from Brazilian sugar cane is quality assured from an environmental, social and ethical perspective. The permission is valid for one year and will be re-evaluated at the end of that period.

Sweden has invested largely in promoting E85 as an alternative biofuel and believes that cheaper biofuel benefits both the climate and consumers. This approval goes against several other EU countries' wish to treat ethanol from third countries as an agricultural commodity levying high tariffs. Sweden continues to work in the EU and the WTO to bring about more general tariff reduction on climate-friendly goods and services.

SECTION IV. TRADE

A. Ethanol Trade

Sweden's high ethanol consumption is based on imports, of which the largest share is sourced in Brazil. In 2008, statistics show substantial increase in imports from the Netherlands and decrease in imports from Brazil. The reason for this is that main imports from Brazil in 2008 reached Sweden through Rotterdam. Sweden also imports wine

alcohol from Europe. Swedish ethanol exports go mainly to the Nordic countries, but also to Belgium and the Netherlands. Import figures for biofuels are difficult to obtain since there are no strictly defined HS codes on either bioethanol or biodiesel.

Although sales of ethanol for the whole year 2008 were high, ethanol sales dropped by 80% from September to December. This was mainly due to the higher price for ethanol compared to gasoline. So long as consumers can opt to fill their flexi-fuel cars with cheaper lower blends they will do so, regardless of their environmental concerns. In the spring of 2009, the sales of ethanol has slowly started to increase concurrently with the rising gasoline price. Another positive signal for the ethanol market is the Swedish Government's ambition to quickly implement the new EU biofuel directive that enables a blending of 10% ethanol, hopefully by July 1, 2010.

B. Bio-Diesel Trade

Swedish imports of bio-diesel in 2008 are estimated at 40,000 MT. Please note that import figures are post's estimates based on production and consumption, imports may come in under another code. Sweden exports virtually no bio-diesel.

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 2006

Raw Material	Area, in hectares
Grains, ethanol (wheat)	25,000
Grains, heating (oats)	5,000
Straw, heating	(30,000)*
Rapeseed, RME	25,000
Willow (Salix), heating	14,000
Reed Canary Grass, heating	600
Grassland (for biogas)	300

*Bi-product from grains.

Since Sweden is more than self-sufficient in wheat, the planned increase in ethanol production would probably only affect Swedish exports of wheat. In 2007/2008, Swedish production of wheat amounted to about 2.3 million MT, of which 672,000 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, the planned expansion in ethanol production would reduce Swedish wheat exports by about 200,000-300,000 MT per year.

Sweden's rapeseed harvested area in 2008 totaled about 90,000 hectares. Should Lantmännen and Perstorp biodiesel

plants run at full capacity of 200,000 MT of RME with domestic rapeseed, the area harvested would need to increase by 90,000 hectares. However, an increased demand for rapeseed oil from the RME production would most likely be met through imports of rapeseed oil and thus not have any substantial effect on domestic production.

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 in three areas: production of willow, production of biogas and development of second-generation bio-fuels. 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

		2006	2007	2008	2009	2010
Ethanol						
	Wheat	260,000	270,000	330,000	475,000	550,000
	Barley	30,000	33,000	50,000	90,000	90,000
	Rye	30,000	33,000	33,000	33,000	33,000

Quantity of Feedstock Use in Biofuel Production in MT

		2006	2007	2008	2009	2010
Biodiesel						
	Rapeseed Oil	36,000	64,000	110,000	132,000	132,000

Biofuel Production/Consumption/Trade (Metric tons)

Ethanol	2006	2007	2008	2009	2010
Beginning Stocks	-	-	-	-	-
Production	60	70	70	100	120
Imports	256	264	430	360	400
Total Supply	316	334	500	460	520
Exports	56	34	160	160	160
Consumption	260	300	340	300	360
Ending Stocks	-	-	-	-	-

Biofuel Production/Consumption/Trade (Metric tons)

Biodiesel	2006	2007	2008	2009	2010
Beginning Stocks	-	-	-	-	-
Production	20	70	80	100	100
Imports	40	50	40	40	60
Total Supply	60	120	120	140	160
Exports	0	0	10	20	20
Consumption	60	120	110	120	140
Ending Stocks	-	-	-	-	-