THE ELECTRICITY YEAR & Operations

2010

SWEDENERGY

The Electricity Year

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&

Operations

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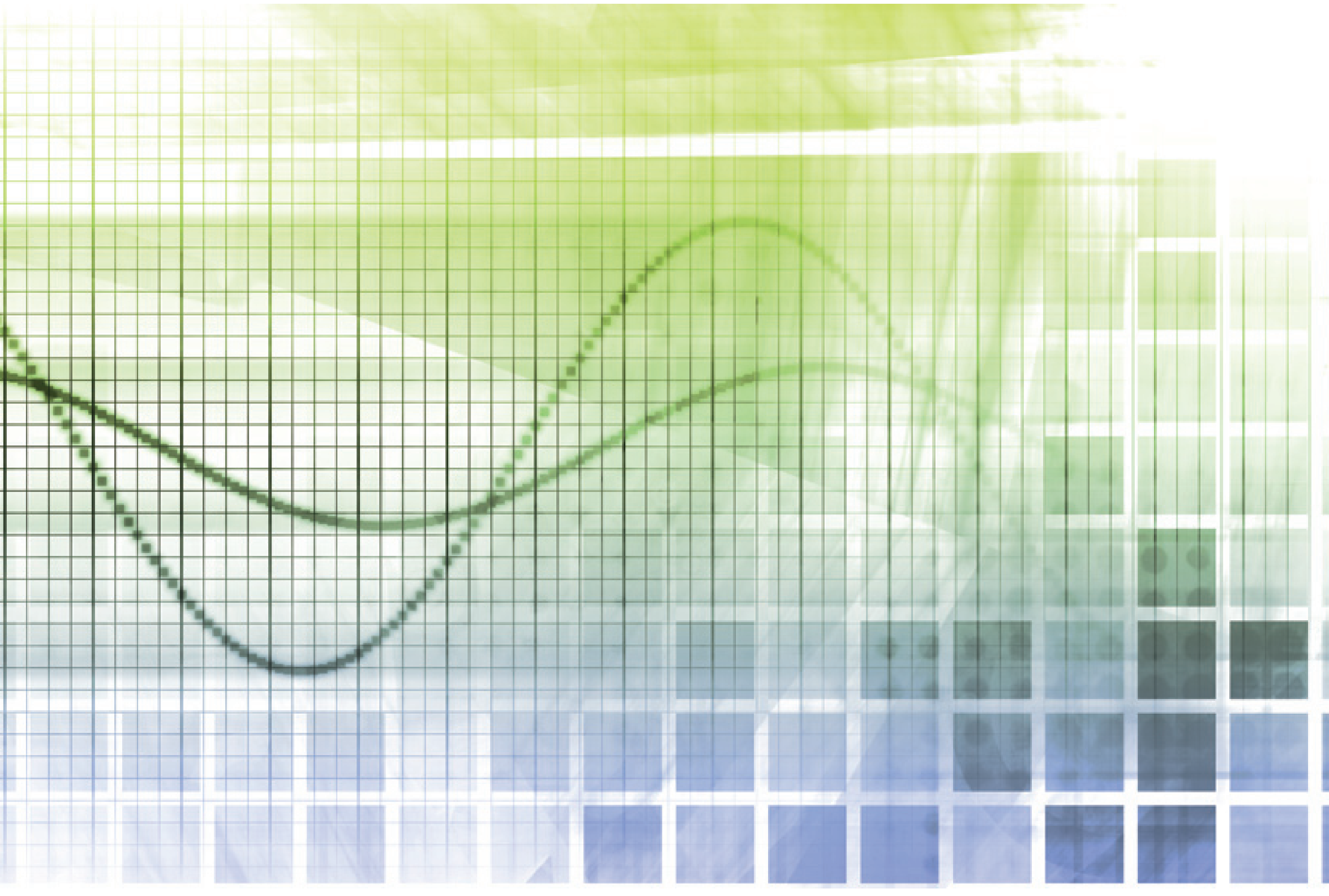
THE ELECTRICITY YEAR 2010



CONTENTS

THE ELECTRICITY YEAR 2010

Historic decisions – many key issues

The electricity year 2010 was a dramatic one. Sweden's electricity consumption increased by 6.3% and both the Nordic region and Sweden were net importers – in Sweden's case with a net inflow of 2.1 TWh. Annual nuclear power production reached nearly 56 TWh, compared to 75 TWh in the record year 2004. A combination of stronger demand and lower production pushed up spot prices on Nord Pool Spot to an all-time high in the winter, and for one hour the cost of electricity spiked at SEK 14 per KWh. The electricity year 2010 was marked by several important and urgent issues. In June the Swedish parliament passed a historic decision on the future of nuclear power that will make it possible to replace Sweden's ten existing reactors with new nuclear capacity.

Nuclear power had yet another year of low production (in a good year production can exceed 70 TWh). The year's total of 55.6 TWh was nonetheless an increase of over 11% compared to 2009 when only 50.0 TWh was produced. The aftermath of extensive modernization projects in the nuclear power plants during 2009 had continued repercussions in 2010.

The entire Nordic region experienced a year of decreased runoff, which was more than 10% lower than average. At the end of 2010 the reservoir storage level in both Sweden and the Nordic region as a whole was 45%, which is approximately 20% lower than average but 10% higher than at the previous year-end. The year's production in the Swedish hydropower plants was 66.2 TWh (65.3 in 2009) – an increase of just over 1%.

CHP – combined production of heat and power – rose dramatically during 2010 with the commissioning of several new biomass-fired plants. The gas-fired Öresund plant and other CHP plants operated at higher than normal capacity in the cold weather. Other thermal power accounted for 19.7 TWh (15.9 in 2009).

Wind power production amounted to nearly 3.5 TWh (2.5 TWh in 2009), up by more than 40%.

Sweden's aggregate electrical production was thus 145.0 TWh, representing an increase of over 8%. The country's total electricity consumption was 147.1 TWh (138.4 in 2009) – an increase that arose mainly as the recession loosened its grip on Sweden. The country's net import of 4.7 TWh in 2009 dropped to 2.1 TWh in 2010. The Nordic region as a whole was also a net importer of electricity with a volume of close to 19 TWh in 2010, compared to a net import of approximately 9 TWh in 2009.

POWERFUL DEMAND LEADS TO HIGHER ELECTRICITY PRICES

The year's price formation on Nord Pool was influenced by the cold weather. The year began with a cold and protracted winter and ended with a cold and early winter. Coupled with strong recovery in the electricity-intensive industries, weekly electricity consumption in the Nordic region rose to a new record level. In the first week of the year the Nordic region consumed over 10 TWh of electricity and consumption in the second week of December was 9.9 TWh, which is an increase of approximately 0.7 to 0.9 TWh compared to normal conditions.

This, in combination with meagre runoff, led to high spot prices on Nord Pool Spot during the year. The average system price was just over SEK 0.50 per kWh, compared to SEK 0.37 per kWh

TABLE 1

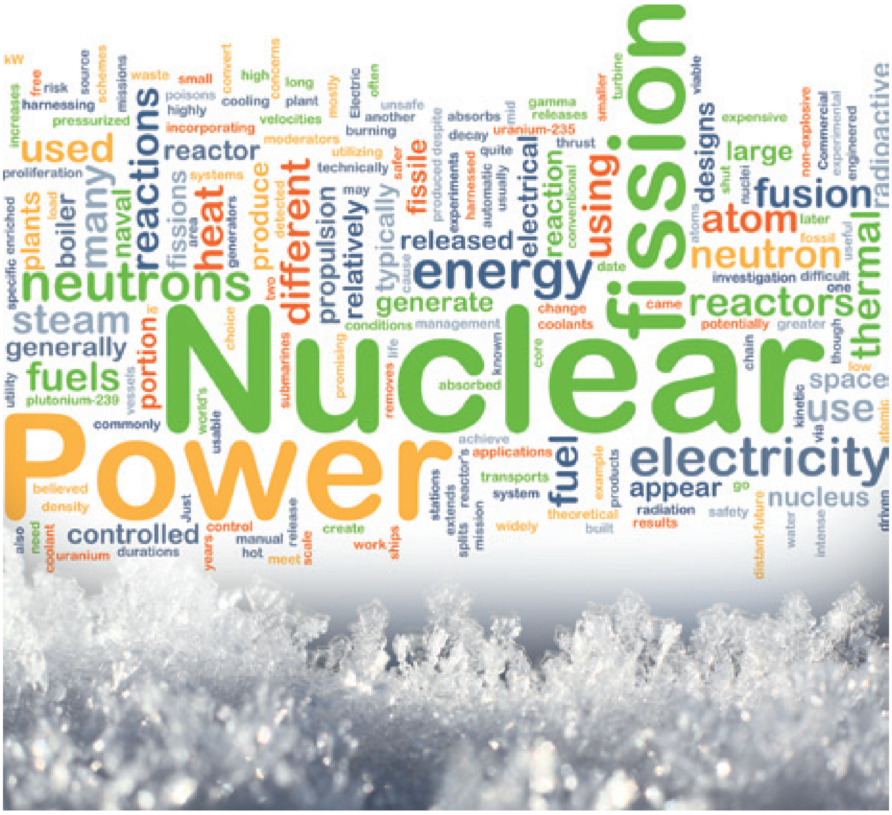
PRELIMINARY ELECTRICITY STATISTICS FOR 2010, TWh

Supply	2009 TWh	2010* TWh	Change from 2009
Hydropower	65.3	66.2	1.4%
Wind power	2.5	3.5	40.0%
Nuclear power	50.0	55.6	11.2%
Other thermal power	15.9	19.7	23.9%
Total electrical power production	**133.7**	**145.0**	**8.5%**
Net import/export**	4.7	2.1	
Total domestic electricity usage	**138.4**	**147.1**	**6.3%**
Temperature-adjusted electricity usage	139.6	143.6	2.9%

** Preliminary data from Swedenergy*
*** A negative value is equal to export*

Sources: Swedenergy and Statistics Sweden

in 2009. The Nordic prices are generally lower than in Germany, mainly due to the Nordic region's abundant supply of hydropower. However, lower access to hydropower meant that the average price in Germany during 2010 was approximately 10% lower than the Nordic price. 2010 was thus an exception from the typical situation, with lower electricity prices in the Nordic market than on the continent.



TWO TOUGH WINTERS IN A ROW – NUCLEAR POWER QUESTIONED

The cold snap that hit Sweden at the end of 2009 and beginning of 2010 caused prices on the Nordic power exchange to rise sharply during a few hours. On 8 January, for example, the electricity price shot up to SEK 10 per kWh and on 22 February to SEK 14.

One contributing factor was that several nuclear power reactors were either offline or operating at less than full power. At times, a full five reactors were shut down simultaneously as a result of modernization projects that ran over schedule. Together with higher demand for electricity resulting from the cold weather and bottlenecks in transmission from Norway, this resulted in higher prices.

The electricity market came under debate and was accused of not working. The nuclear power owners were suspected of deliberately shutting down nuclear reactors as a means for boosting electricity prices in Sweden. The owners openly admitted that their planning of measures in the nuclear power plants had been unfortunate in light of the delays that plagued these projects but denied that there was any conscious strategy behind these events. In fact the owners lose millions every day that the nuclear power plants are offline.

Co-ownership in nuclear power was once again questioned and was the main theme of the Energy Markets Inspectorate's (EI) report "Supervision and transparency in the electricity market" (EI R2010:21) from November 2010. Industry-wide ethical rules for co-owned nuclear power plants, independent observers on the boards of the nuclear power companies and a forum for greater transparency in the power exchange were a few of the measures proposed by the EI to increase transparency and supervision in the electricity market. In February 2011 the former Director-General of the Swedish Civil Aviation Authority, Lars Rekke, was appointed as an independent observer to the boards of OKG and Ringhals. At the same time, SGU's Director-General Jan Magnusson was given a corresponding role at Forsmark.

As a result of the strained power situation in the winter of 2009/2010, hydropower was utilized to a greater extent than normal. The spring flood and autumn rains were not sufficient to fill the Nordic hydropower reservoirs to normal levels. During the weeks when they normally reach their highest levels (September/October), the reservoirs showed a deficit of approximately 15 TWh. In particular, water levels were low in the Norwegian reservoirs where the most significant storage capacity in the Nordic system is found.

The outlook for the winter of 2010/2011 was therefore less than ideal. Although some nuclear generating capacity was offline at the beginning of the winter, the prospects for nuclear power looked brighter than in the winter of 2009/2010. The nuclear power owners prioritized security of supply over major upgrades.

The winter of 2010/2011 started with frigid temperatures and heavy snowfall. On the morning of 22 December, electricity consumption was as high as 26,300 MW per hour. (Sweden's all-time high of 27,000 MWh per hour was recorded in February 2001). On the same date, all Swedish reactors were in operation simultaneously for the first time during the winter. In response to this high electricity consumption, the peak load reserve was activated and the oil-fired Karlshamn plant was started up to secure the supply of electricity in southern Sweden. At the same time, 3,148 MWh were imported between 8 and 9 a.m.

Both the winter of 2009/2010 and the following winter were characterized by high electricity prices. From Swedenergy's standpoint, these high prices are proof that trading on the power exchange is effective. The same opinion has been expressed by leading market economists and public authorities. The power industry also welcomes additional scrutiny of the electricity market's function even though many earlier studies have not uncovered any irregularities.

TOWARDS A COMMON NORDIC END-USER MARKET

In May the New Electricity and Gas Market Commission (NELGA), headed by Håkan Nyberg, presented proposed amendments to Swedish legislation in order to implement the EU's Third Electricity and Gas Market Directive. Major changes were proposed in both the Electricity Act (1997:857) and the Natural Gas Act (2005:4039, such as the consumer's right to a contract with their electricity or gas supplier and what such contracts should contain. The rules for supplier switching in the electricity and natural gas acts will be altered so that it is possible to change supplier every day, with implementation of the change within three weeks. The Electricity Act stipulates that final settlement must take place within six weeks. In addition, electricity consumers should be provided with monthly information about their electricity consumption and the power companies should have efficient routines for handling consumer complaints.

The EI's report, "Supervision and transparency in the electricity market," (EI R2010:21) from November was a response to a government commission on these issues. The report was written with a special focus on nuclear power (see previous section) that is co-owned by Sweden's three largest electricity producers, E.ON, Fortum and Vattenfall, and also suggests measures to improve consumer understanding of the electricity market and increase the spread of information to market participants. Swedenergy declared its support for the measures proposed in the report.

In mid-February 2011 the EI proposed a series of measures for a better electricity market. Aside from independent observers on the boards of the nuclear power companies, the proposal included greater transparency in the Nordic power exchange, hourly metering for all customers with annual consumption in excess of 8,000 kWh and investment in so-called smart grids to increase the supply of renewable electricity.

In the past year the organization for Nordic energy regulators, NordREG, took steps to improve transparency in the Nordic power exchange. NordREG agreed to propose that a regulatory council be set up within Nord Pool, thereby strengthening contacts between Nord Pool Spot and regulators in the countries which it covers.

Progress is being made towards a common Nordic end-user market for electricity. The Nordic energy ministers are unanimous on this point and the same ambition is also found in Europe. The model chosen for the Nordic region should therefore be in line with the upcoming European solution. This work is being headed by NordREG and the favoured model so far has been one in which the customer has a single point of contact with the electricity market. The majority of DSOs/suppliers in Sweden agree that this would be an advantage for the customers, although there is no consensus on whether the single point of contact should be the DSO or the electricity supplier.

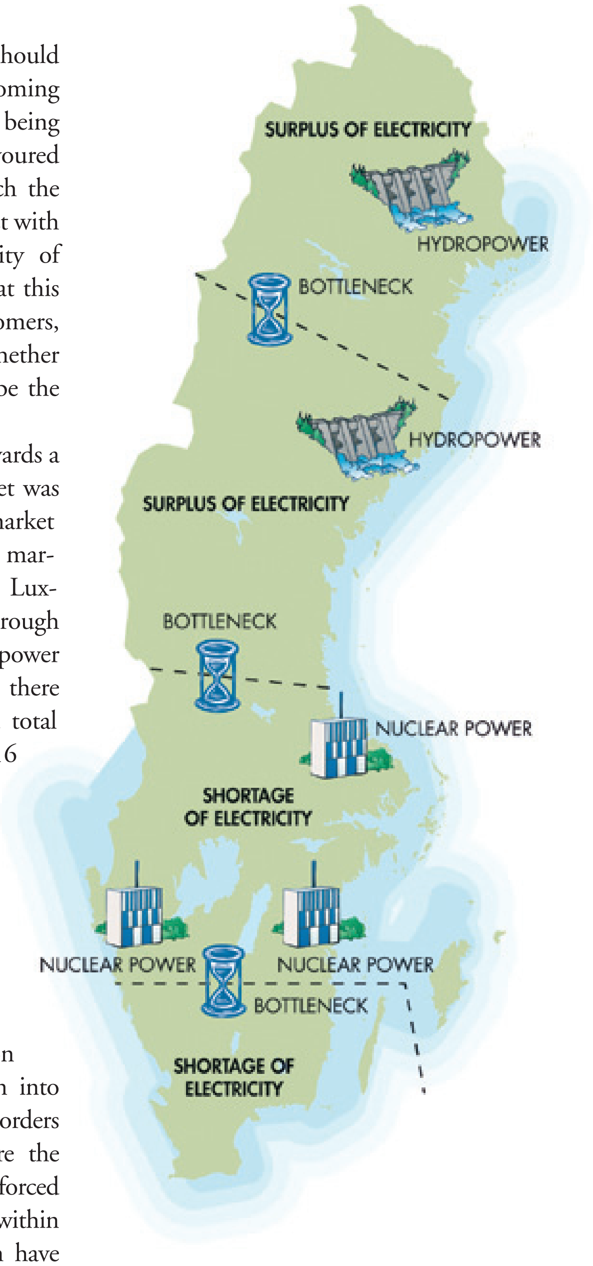
On 9 November a giant step towards a common European electricity market was taken when the Nordic electricity market was integrated with the electricity markets in Belgium, France, Germany, Luxembourg and the Netherlands. Through cooperation between 17 different power exchanges and system operators, there is now a day-ahead market with a total annual production volume of 1,816 TWh, equal to approximately 60% of total European electricity consumption.

BIDDING ZONES MEAN DIFFERENT ELECTRICITY PRICES IN SWEDEN

On 1 November 2011 Svenska Kraftnät (the Swedish transmission system operator) will divide Sweden into four so-called bidding zones. The borders between these will be drawn where the transmission system needs to be reinforced in order to transport more electricity within the country. The bidding zones can have different market prices – area prices – on different occasions. In other words, electricity prices can vary between zones at different points in time.

This chain of events started on 1 July 2006 when Svenska Kraftnät was reported to the European Commission (EC) by Dansk Energi for having curtailed its export trading capacity for electricity in certain situations. To reduce the need to restrict transmission and trading capacity across Sweden's borders, Svenska Kraftnät was commissioned by the Swedish Government in 2009 to study the options for splitting the Swedish electricity market into multiple bidding zones.

In April 2010 the EC adopted a binding decision whereby Svenska Kraftnät must change Sweden's method for congestion management in the Swedish grid. As a result, in May 2010 Svenska Kraftnät decided to introduce four bidding zones that correspond to the so-called cross-sections in Sweden, where transmission constraints (bottlenecks) exist. The new division will apply as of 1 November 2011.



The decision to introduce bidding zones is a solution that is consistent with the EU's striving for a common European electricity market. The bidding zones will create incentives to build new power plants where there is a shortage of electricity and to reinforce the grid to transport more electricity within Sweden. Electricity will be generally cheaper to use in the north, where there is a surplus of generation, and more expensive in the south, where there is a surplus of consumption. The frequency at which different electricity prices arise in different areas depends on factors like the season and amount of precipitation, which determine the amount of available hydropower.

During the year Swedenergy took measures to prepare the industry for the upcoming division. Aside from the above-mentioned cross-sections, bidding zones are also known as bidding areas, electricity areas and electricity spot areas. If two bidding zones have the same electricity price at a given time they are part of the same price area, which is yet another term.

One of the most pressing questions for the power companies and customers is how to handle electricity supply contracts. Together with the Swedish Consumer Agency, Swedenergy entered into an industry agreement for the provision and marketing of contracts with a price adjustment clause. The main points of the agreement are that the clause must be worded so that consumers understand the implications and that it must be placed clearly and visibly in the terms of the contract. In marketing of such contracts, it should also be obvious from the name what the contract entails.

In November NASDAQ OMX – which is responsible for financial trading on the Nordic power exchange – launched new so-called CFDs (Contract for Differences) for the Nordic electricity market. CFDs create scope for electricity suppliers to offer fixed price contracts to customers throughout Sweden, even when the four bidding zones apply. With the new CFD contracts, market participants can hedge against the price differences that arise relative to the system price, a result of transmission constraints between different bidding zones.

In summary, Swedenergy sees the introduction of bidding zones as a short-term solution. In a longer perspective Swedenergy feels that it is necessary for Svenska Kraftnät to reinforce the Swedish transmission system. Furthermore, the permitting process must be simplified so that more power plants can be built, above all in southern Sweden where there is a shortage of generation.

PARLIAMENTARY DECISION OPENS THE DOOR FOR MORE NUCLEAR POWER

On 17 June the Swedish parliament adopted a decision on the future of nuclear power. The decision was passed by a narrow margin of two votes in favour of the Government's proposal allowing for the replacement of Sweden's ten existing reactors with new generating capacity when these have been decommissioned.

The business sector reacted positively to the results. Swedenergy welcomed the decision and pointed out the advantage that the future of the energy area can now be discussed without deadlocks.

OVER 3 TWH OF WIND POWER – PERMITTING DIFFICULT

Sweden's aggregate wind power production in 2010 amounted to 3.5 TWh, an increase of 40% compared to 2009. In the past year the permitting rules were criticised by both the wind power industry and the affected authorities. The municipalities have far-reaching influence over granting of permits. Instead of reviewing permits according to the Planning and Building Act (PBA), active approval is now requir-ed from the municipality when a permit for wind power is reviewed under the Swedish Environmental Code. These rules were introduced in mid-2009 in order to simplify and shorten the handling times, but a study conducted by the Swedish Energy Agency at the end of 2010 shows that the results have been the opposite. The permitting process has become more complicated and handling times have grown longer.

The Swedish Armed Forces' halting of wind power came under scrutiny during the year. In August the Armed Forces issued a decision in principle to stop all wind power installations within a radius of 40 km of military airfields. According to Swedish Wind Energy, this could lead to the shutdown of 1,000 new wind turbines. Minister for Enterprise and Energy Maud Olofsson criticized the proposal and at the end of the year asked the FOI (the Swedish Defence Research Agency) to study the position of countries like Denmark and Spain on wind turbines in the vicinity of military airfields.

COMMON NORWEGIAN/ SWEDISH REC MARKET

A common renewable energy certificate (REC) system in Sweden and Norway is set to start on 1 January 2012. In order to create a common support system, Norway, like Sweden, must first ratify the EU Renewable Energy Directive and set a national target for new renewable energy production by 2020.

In December the Norwegian Government presented a proposed bill in which the country has adopted the same expansion target as Sweden starting from 1 January

2012. An agreement was signed by Swedish Minister of Enterprise and Energy Maud Olofsson and her Norwegian counterpart Terje Riis-Johansen and a legally binding agreement will be negotiated for approval by the parliaments in both countries. In total, the new REC system will bring an additional 26.4 TWh of renewable energy production into the market during the period from 2012 to 2020, of which 13.2 TWh will be subsidized by each country. This is equal two nuclear power reactors or around 2,500 wind turbines.

Swedenergy sees the Norwegian-Swedish REC market as a first step in achieving an effective support system. In order to maximize the benefits the system needs to include more countries, preferably Nordic. However, before more countries can join the system, transmission capacity must be expanded to a sufficient extent.

One prerequisite for the common REC market is the existence of non-discriminatory conditions for the establishment of new generating capacity in each country. Norway's national rules for ownership of natural resources partly exclude Swedish players from investing in Norwegian hydropower. Swedenergy does not find it reasonable that Swedish subsidies be given to electricity generation that is reserved exclusively for Norwegian government and municipal stakeholders.

ELECTRICITY LABELLING

At the end of the year the EI was commissioned by the Swedish Government to propose a voluntary industry solution or regulation for green electricity labelling. Because there is currently no regulated calculation method there is a risk that customers will receive inconsistent information from their electricity suppliers, which can lead to double counting. Part of the EI's task is to study the potential for closer coordination between the systems for green electricity labelling and guarantees of origin pursuant to the EU Renewable Energy Directive. The findings of the commission will be reported by 1 October 2011 at the latest.

The power industry has a long time been seeking more clearly defined rules to create a more stable and reliable system for green electricity labelling. In Swedenergy's opin-ion, it should be mandatory to base electricity labelling on guarantees of origin. At the EU level, the power industry, consumer representatives and authorities are in the process of developing a European standard for guarantees of origin to facilitate trading of electricity.

MICROGENERATION – A QUESTION OF BILLING

To satisfy the growing interest among electricity customers in investing in their own electricity generation (primarily solar systems and small wind turbines), the Government has commissioned the EI to investigate the potential to implement rules for net billing. Net billing means that customers with self-generated electricity are billed for consumption based on the net volume of electricity outflows and inflows during a given billing period. The customer may thus bank their own accumulated generation and use it to offset their consumption.

During the year the EI proposed that it be made mandatory for DSOs to net the amount of electricity withdrawn against electricity fed into the grid per month in their billing of network charges. This would apply to customers who are net consumers of electricity per calendar year and have a maximum fuse rating of 63 A.

However, the tax laws would not permit a corresponding netting by the electricity suppliers, since they charge tax on the delivered volume of electricity. The EI pointed out that it is not permissible to net tax and VAT under the current tax legislation. Instead of proposing tax law amendments to make this possible, the EI proposed that the Government request that the Swedish Tax Agency study the feasibility of changing the tax rules so that net billing can also include energy tax and VAT.

In Swedenergy's view, it is unfortunate that the commission did not draft a complete proposal that would allow full net billing. The goal should be a solution that is as simple as possible for all parties involved – not least the customers. Because the tax aspect has been referred to the Swedish Tax Agency, it will take at least another year before electricity customers are given a definitive answer on what conditions will apply.

In a consultation response to the EI's commission in February 2011, the Swedish Tax Agency wrote that it did not wish to study the opportunities to change the tax rules, claiming that this would be in violation of the EU directives on VAT and energy taxation.

99.99% DELIVERY RELIABILITY – A NEW LAW AS OF 2011

The DSOs' efforts in recent years to weatherproof the distribution system has led to shorter power outages for the country's electricity customers. Swedenergy's summary from October showed that delivery reliability during the year was 99.99%.

Since the end of the 1990s the Swedish DSOs have invested approximately SEK 40 billion in weatherproofing of the Swedish grid – mainly by replacing uninsulated overhead lines with underground cable. The pace of this work was accelerated after storm Gudrun in 2005 and storm Per two years later. A total of around 57,000 km of power lines were to be converted according to the original plan, of which some 5,000 km remained at year-end 2010.

The industry is working according to a "zero vision" for power outages. The basic objective is to ensure that the customers receive their electricity. The DSOs are consequently well equipped to meet the stricter legal requirements that went into force on

1 January 2011 and states that no power outage may last for longer than 24 hours.

HIGHER NETWORK CHARGES – FUTURE INVESTMENTS IN THE NATIONAL GRID

In its report on regulation of tariffs for 2009, the EI found that network charges had risen at a higher rate than costs. Charges increased by an average of 7.7% in 2009. Of a total of 173 audited DSOs, 30 companies exceeded their revenue cap and were subject to further review. For 14 of the companies, the EI found acceptable explanations for the higher charges, while 16 companies were required to submit supplementary information. The increased charges are attributable to rising costs for overlying networks, sizeable investments in delivery reliability and new metering equipment and adaptation of charges to the permitted level.

The year's "Nils Holgersson report" from October also stated that household network charges have continued to rise. Swedenergy, like the EI, found that these increases are due to the substantial investments that have been made. SEK 40 billion has been invested in improved delivery reliability and SEK 15 billion in new electricity meters for Sweden's household customers. The ambition to realize a common Nordic and, in a longer perspective, European electricity market places new demands on monopolistic operations and according to Swedenergy will require additional investments by the DSOs.

Future investments also apply to the national grid. A first joint grid development plan from the Swedish transmission system operator Svenska Kraftnät and its Norwegian counterpart Statnett was presented in November. It indicated a need for additional reinforcement of the national grids in Sweden and Norway for a combined EUR 3.5 billion.

EX ANTE REGULATION INTRODUCED IN 2012 – DEBATE ON NETWORK TARIFFS

On 16 June 2009 the Swedish parliament approved changes in the Electricity Act (1997:857) whereby the fairness of distribution tariffs will be determined ex ante. This means that starting in 2012, a DSO's revenue level must be approved in advance by the Energy Markets Inspectorate (EI). The EI will decide on a so-called revenue cap for a four-year regulatory period.

The power industry considers the changeover imperative for many reasons. The customers will have more stable charges and will know in advance that they are paying reasonable prices, while the DSOs will benefit from clearer financial playing rules, since the revenue caps for coming years will be predefined. In 2010 Swedenergy took steps to prepare the industry for the new regulation, among other things by informing and educating the DSOs about development of the new assessment model.

A debate over DSO tariffs arose in Sweden at the beginning of 2011. Swedenergy explained the price differences. The DSOs that are located far out in grid where the terrain is rugged have higher costs for the network, since it has been more expensive to build and is costlier to maintain.

Additional cost increases are awaited in pace with new demands on the transmission and distribution networks of the future. The customers must be given opportunities to steer their electricity consumption more simply and effectively, and thereby save money. European ambitions to increase the share of renewable energy are influencing the grid design, which is visible not least in a growing volume of wind power. Furthermore, Europe as a whole will optimize its transmission and distribution capacity within and between countries. All of this costs money, money that will benefit the customers through well functioning networks.

In this context, Swedenergy underlined the risk that the EI is limiting the DSOs' ability to invest in the distribution system. This risk is very real, in view of the cost-fixated debate. It is expensive to operate and develop the Swedish grid and Swedenergy feels that the EI's new assessment model must give the DSOs the necessary scope for investment.

PROPOSAL FOR HOURLY METERING

At the end of November the EI presented a report to the Government on hourly metering in which it proposed that all customers with annual consumption of over 8,000 kWh be metered by the hour starting in 2015. Swedenergy sees that the trend is moving towards hourly metering and is in favour of giving consumers greater knowledge about their electricity consumption. At the same time, it is important to have realistic expectations about what can be achieved with this technology and what costs are involved. Hourly metering itself will not make customers active and interested in their energy consumption. This calls for development of new information services, contract types, etc. In order for this to happen, the various stakeholders must also feel that the benefits outweigh the costs.

The report has taken into account neither the costs nor the ongoing efforts to create a Nordic end-user market. In view of this, Swedenergy feels that the overly hasty implementation of hourly metering for large customer volumes and a settlement method that is not harmonized within the Nordic region should be avoided.

Swedenergy instead advocates a successive changeover based on customer needs, where those who want hourly metering can obtain it at a low cost. The conditions to start are already in place, although it will require minor changes in the Electricity Act regarding the allocation of costs for consumers.

A CLIMATE-NEUTRAL SWEDEN BY 2050

The world is facing challenging demands on reduction of greenhouse gas emissions, particularly in the industrialized nations. The Swedish Government has proposed a vision for Sweden to reach zero net emissions of greenhouse gases by 2050. Based on this vision, Swedenergy commissioned a number of scenario estimates in June with the help of Profu in Gothenburg to describe the power industry's contributions towards a carbon-neutral economy.

Swedenergy's main conclusions from the study:

- The climate ambitions in Sweden and Europe must go hand in hand with developments in the rest of the world.
- The Nordic electricity generation system will be well on its way to carbon-neutrality already by 2020, and will have reached this goal by 2030.
- Nordic electricity exports make it less expensive for the EU to move towards carbon-neutrality.
- Greater domestic use of electricity is an important prerequisite for a carbon-neutral and energy-efficient Sweden and Europe.

The study presented a few conditions for a climate-neutral society:

PHOTO ABOVE: ISTOCKPHOTO

- A global climate policy and a global price for carbon dioxide.
- All technology options must be kept open in order to produce both electricity and other goods in the best possible manner.
- Expansion of grids/transmission infrastructure throughout Europe.
- Simpler and faster permitting procedures.
- Continued investment in research and development.

In one scenario, carbon dioxide emissions in Sweden will decrease from the current level of over 50 Mtonnes per year to around 10 Mtonnes per year in 2050, a reduction of 80%. Emissions from electricity and heat generation will decline to nearly zero. To a large extent, it is therefore only industrial process emissions and certain emissions from the transport sector that will remain at the end of the period.

UNIQUE COOPERATION WITH THE EDUCATIONAL SECTOR

A unique cooperation agreement was signed in mid-November 2010 and in the autumn term of 2011 a university distance education program in electric power engineering will be started at three universities in northern Sweden in association with Swedenergy. No comparable collaboration between the business and educational sectors has existed earlier.

On one side stands Swedenergy together with 13 power companies – while the other cooperation partners include Luleå University of Technology, Mid Sweden University and Umeå University. The 13 cooperating power companies are Bodens Energi, Fortum, Härjeåns Nät, Härnösand Elnät, Jämtkraft, Luleå Energi Elnät, PiteEnergi, Skellefteå Kraft, Statkraft Sverige, Sundsvall Elnät, Umeå Energi, Vattenfall and Åsele Kraft.

Earlier in the year Swedenergy, together with representatives from other companies and industry organizations, pledged its backing for the Royal Institute of Technology's (KTH) new future-oriented initiative to educate tomorrow's electrical engineers. This venture has been eagerly awaited by the business sector and will help to alleviate the critical shortage of electrical engineers. To meet this urgent need, KTH launched a university program in electrical engineering (180 credits) in the autumn of 2010 in Haninge outside Stockholm.

HIGHER CUSTOMER SATISFACTION IN THE INDUSTRY

Young people see the power industry as an exciting sector for a future career, according to the year's Synovate survey that was ordered by Swedenergy and published in November 2010. Nearly two of three respondents in the age group 16 to 29 years supported this statement, as did half of the total number of respondents. In addition, more of the respondents were positive toward industry than negative. This is the first time that Synovate has seen this result since the surveys were started in the 1990s.

The annual survey by Swedish Quality Index that was published in mid-December showed that Luleå Energi, God El and Varberg Energi have Sweden's most satisfied electricity customers. This is the seventh consecutive year that the power industry has strengthened its confidence rating among the customers, as measured by Swedish Quality Index among 5,000 participating electricity customers. The results show that the electricity suppliers had more than 3.3 million satisfied customers at the time of the survey.

ENERGY TAXES RAISED MARGINALLY

On 25 November 2010 the Swedish Government made a formal decision on the level of electrical energy tax for 2011. The Swedish Code of Statutes (SFS 2010:1521) was published on 10 December.

The new energy tax on electricity as of 1 January 2011 was set at:

- SEK 0.005 per kWh for electricity used in industrial manufacturing operations or in professional greenhouse cultivation.
- SEK 0.187 per kWh in certain municipalities in northern Sweden.
- SEK 0.283 per kWh in other cases.

The energy tax on electricity will thus be SEK 0.283 per kWh for the majority of Swedes, an increase of 0.003 compared to the taxes applicable in 2010.

The electricity market

Access to a neutral marketplace is essential for achieving a well functioning electricity market. Physical power trading in the Nordic electricity market takes place on Nord Pool Spot, while financial products are offered via NASDAQ OMX Commodities. Trading in the spot market enables players to plan their physical balance for the coming 24-hour period, while trading in the financial market is used for price hedging of future power volumes. Price formation in these marketplaces provides a basis for all power trading in the Nordic electricity market. In addition to trading via these two marketplaces, buyers and sellers can also enter into bilateral contracts.

RECORD VOLUMES ON NORD POOL SPOT

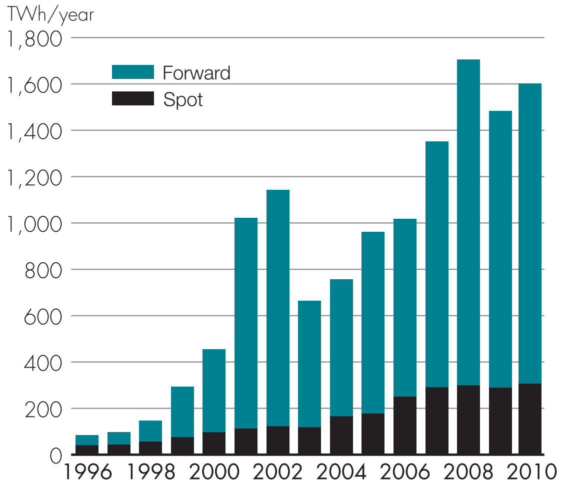
The Nordic power exchange Nord Pool Spot conducts day-ahead and intra-day trading for physical delivery of electricity, enabling market participants to maintain a supply-demand balance in their obligations as electricity suppliers or producers. Elspot conducts daily auction trading of hourly power contracts for physical delivery in the next 24-hour period, while Elbas is a continuous cross-border intra-day market that allows market participants to adjust their balances up to one hour before delivery. The sale of the financial market Nord Pool AS to NASDAQ OMX was completed in March 2010. Financial trading, also known as the forward market, provides opportunities to trade with a horizon of up to five years and gives an indication of long-term spot price development. In addition, financial trading functions as an instrument for risk management. Furthermore, NASDAQ OMX Commodities is also able to clear bilateral contracts.

The volume of spot market trading in 2010 rose to a record high of 307 TWh, see *Diagram 1*, which can be compared to 288 TWh in 2009. This corresponds to nearly 75% of the Nordic region's total electricity consumption. The trading volume in the forward market fell by 8% to 1,287 TWh, down from 1,197 TWh the year before. The total volume of cleared contracts fell from 2,136 TWh to 2,090 TWh.

2010 was marked by low reservoir levels and cold weather at both the beginning and end of the year. Record prices were seen on the spot market on 22 February, with an average daily system price of SEK 1.32 per kWh. For three hours an hourly price of SEK 13.75 per kWh was noted in Sweden, Finland, northern Norway and eastern Denmark. During these and an additional four hours during the winter, the peak load reserves were offered to the spot market in order to

DIAGRAM 1

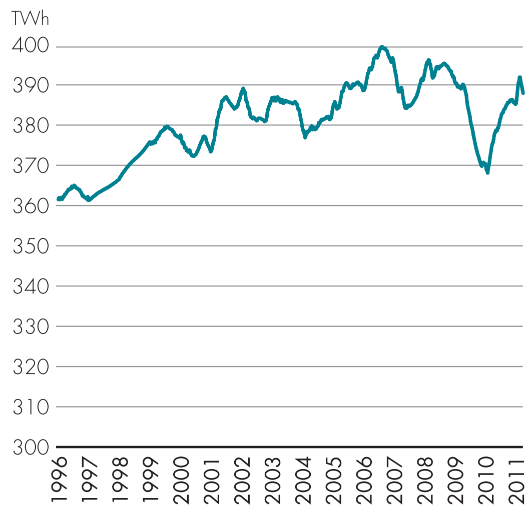
TRADING ON THE SPOT AND FORWARD MARKETS



Source: Nord Pool Spot

DIAGRAM 2

ELECTRICITY CONSUMPTION IN THE NORDIC REGION SINCE 1996, TWh



Source: Nord Pool Spot

avoid curtailment, consisting of a mandatory reduction in all demand bids to achieve a supply-demand equilibrium at the same time that the market clearing price is set at the technical maximum price of around SEK 18 per kWh.

Prices did not fall back to more normal levels until April. However, the winter came early and daily prices once again surged to over SEK 0.70 per kWh already in December, culminating at SEK 0.94 per kWh on St. Lucia Day (13 December).

Cold weather and recovery in the industrial market contributed to increased demand for electricity in the Nordic region. Nordic demand for electricity in December 2009 amounted to 370 TWh, as a 52-week total. Electricity consumption was more than 20 TWh higher in mid-December 2010 and at year-end reached nearly 392 TWh, see *Diagram 2*. Electricity consumption in Sweden during the corresponding period rose from 137 TWh to 145 TWh, or from 139 to 142 TWh on a temperature-adjusted basis.

The average system price on Nord Pool Spot was SEK 0.506 per kWh, up by 36% compared to 2009 when the average price was SEK 0.372 per kWh. The price on the German power exchange (EEX) was around SEK 0.42 per kWh, i.e. nearly 16% lower calculated as an annual average, which can be attributed primarily to higher demand and lower access to hydropower in the Nordic region.

ELECTRICITY PRICE INFLUENCED BY MANY FACTORS

From a historical standpoint, prices in the Nordic electricity market have been primarily determined by the amount of precipitation. Access to cheap hydropower in the Nordic power system has been decisive for the extent to which other and costlier production capacity has been used. The Nordic region's rising demand for electricity has necessitated increased operation of coal-fired condensing power plants, above all in Denmark and Finland. Low precipitation or temperatures mean greater utilization of coal-fired power, while the opposite is true in years with ample runoff and high temperatures. This, in turn, affects the average price over the year.

In pace with a growing volume of cross-border electricity trade outside the region, the Nordic market is increasingly exposed to electricity prices on the continent. This means that Nordic prices are now also shaped by factors such as shrinking margins in the European power balance, cold weather on the continent and runoff in countries like Spain. *Diagram 3* shows the spot price trend in the Nordic and German markets.

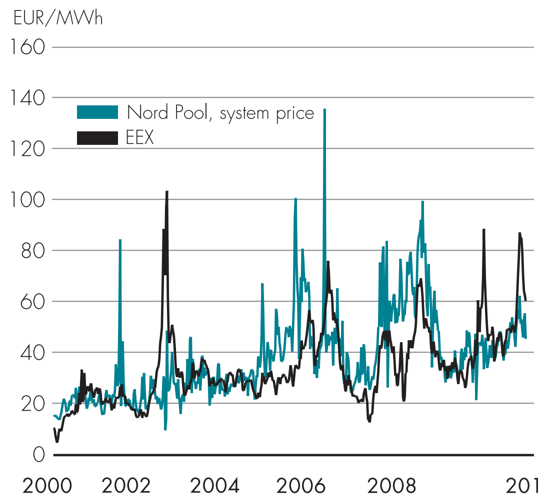
Continental, and therefore also Nordic, electricity prices are closely tied to production costs in coal-fired condensing power plants. Following implementation of the EU Emissions Trading Scheme (EU ETS) on 1 January 2005, the price of emission allowances must be added to the production cost for fossil-based electricity generation. Because of this, the price of emission allowances has a direct impact on both the spot and forward price of electricity.

Diagram 4 shows that the price of emission allowances has a clearly formative effect on Nord Pool's forward price, while the link to the spot price varies mainly with respect to runoff and water supplies. In periods with high runoff, for example, it is not possible to store water and the producers are forced to either generate electricity or spill excess water, with direct implications for the spot price.

Emission trading is one of the so-called flexible mechanisms defined in the Kyoto Protocol. The goal of this trading is to enable countries and companies to choose between carrying out their own emission-reducing measures or buying emission allowances which then generate emission reductions somewhere

DIAGRAM 3

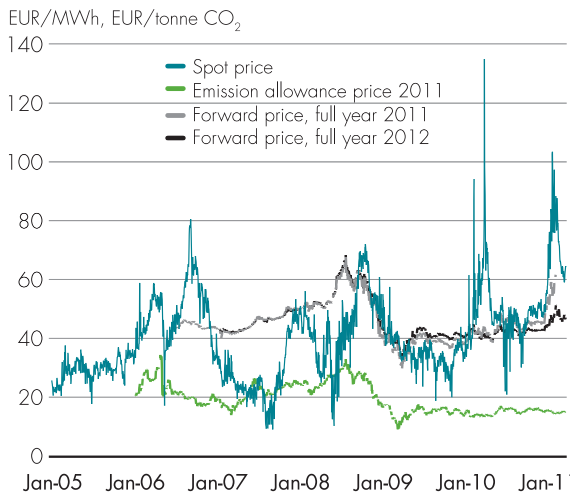
ELECTRICITY SPOT PRICES ON NORD POOL SPOT AND EEX (GERMAN ELECTRICITY PRICE)



Sources: Nord Pool Spot, EEX

DIAGRAM 4

ELECTRICITY SPOT PRICE, FORWARD PRICE AND PRICE OF EMISSION ALLOWANCES



Source: Nord Pool Spot

else. The idea is for the least expensive measures to be taken first, thus keeping the total cost of meeting Kyoto targets as low as possible. Allocation of emission allowances is determined nationally, but must be approved by the European Commission.

The current trading scheme (EU ETS) covers two so-called budget periods. The first ran from 2005 to the end of 2007 and was a trial period, while the other runs from 2008 to the end of 2012, concurrent with the Kyoto Protocol's commitment period. Over 700 installations in Sweden are covered by the scheme. In the energy industry, EU ETS includes all individual installations with a capacity of more than 20 MW or district heating systems with a combined capacity exceeding 20 MW.

With regard to actual trading of emission allowances, it is not possible to transfer (bank) these allowances between periods. Furthermore, the players covered by the scheme must report the previous year's emissions data by March at the latest. As a result, differences in the allowance price arise depending on the time period. In general, a price of EUR 10 per tonne can be said to add nearly SEK 0.07 per kWh to the raw power price. The allowance price varied only marginally in 2010, see *Diagram 5*, partly owing to a weak industrial market in Europe.

Due to the high proportion of fossil-fired power in Germany, there is a significantly stronger link between the German spot price and the emission allowance price. *Diagram 6* shows the difference between Nordic and German spot and forward prices, as well as the price of emission allowances. As the allowance price rises, the gap between the spot price on Nord Pool and EEX has also widened in favour of the Nordic spot price.

The Nordic region's abundant supply of hydropower results in a lower price relative to Germany. The difference can be equated with the price gap between forward contracts on the respective exchanges, which in February 2011 was SEK 0.05 per kWh for low load and SEK 0.17 per kWh for high load factor usage for the full year 2012.

PRICE AREAS ON NORD POOL SPOT

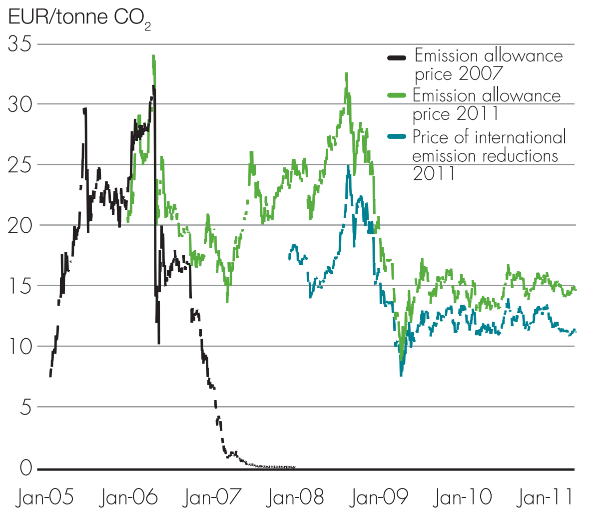
The system price on Nord Pool Spot serves as a price reference for the financial electricity market and is a price that is calculated for the entire Nordic power exchange area, assuming that no transmission constraints exist. However, because all transmission grids are subject to physical limitations, situations can arise when transmission capacity is not adequate to meet market demand for inter-area trading.

To manage these transmission bottlenecks, Nord Pool's power exchange area has been divided into so-called electricity spot areas. Sweden and Finland each form separate areas, while Denmark is divided into two. In December 2010 Norway was divided into five electricity spot areas. When transmission capacity is insufficient to ensure equal prices throughout the power exchange area, separate area prices are calculated. A price area can consist of one or several electricity spot areas. Sweden very rarely constitutes a separate price area. In 2010 Sweden was a separate price area for only one of the year's total of 8,760 hours. In 2009 the figure was five hours, in 2008 nine hours and in 2007 Sweden was also isolated for only one hour.

Table 2 shows area prices since deregulation in 1996. The differences between the various price areas are primarily dependent on the generation capacity available in each area. Price differences are caused mainly by large variations in the supply of hydropower, which is also reflected in the system price. Unusually low or high runoff also increases the fre-

DIAGRAM 5

PRICE OF EMISSION ALLOWANCES ON NASDAQ OMX COMMODITIES



Source: Nord Pool Spot

TABLE 2

AVERAGE AREA PRICES ON NORD POOL. SEK 0.01/kWh

	Oslo	Stockholm	Finland	Jutland	Zealand	System
2010	51.74	54.25	54.07	44.26	54.36	50.59
2009	35.90	39.28	39.24	38.28	42.26	37.22
2008	37.85	49.15	49.05	54.14	54.50	43.12
2007	23.82	28.01	27.78	29.98	30.55	25.85
2006	45.56	44.53	44.95	40.89	44.93	44.97
2005	27.05	27.64	28.36	34.63	31.43	27.24
2004	26.83	25.62	25.25	26.28	25.87	26.39
2003	33.87	33.29	32.22	30.74	33.58	33.48
2002	24.27	25.23	24.92	23.28	26.12	24.59
2001	21.30	21.09	21.07	21.92	21.73	21.36
2000	10.21	12.04	12.58	13.86		10.79
1999	11.52	11.94	12.00			11.84
1998	12.21	12.04	12.26			12.26
1997	14.86	14.37				14.59
1996	26.61	26.00				26.30

Source: Nord Pool

quency of fragmentation into separate price areas. In a wet year, the price will be lowest in Norway and then Sweden, while the opposite is true in dry conditions.

On 9 November a giant step forward towards a common European electricity market was taken when the Nordic electricity market was integrated with the electricity markets in Belgium, France, Germany, Luxembourg and the Netherlands through "tight volume coupling". Thanks to this cooperation between 17 different power exchanges and system operators, there is now a day-ahead market with a total annual production volume of 1,816 TWh, equal to approximately 60% of total European electricity consumption.

Volume coupling is the use of implicit day-ahead auctioning involving two or more power exchanges, where the flow of power between markets is determined based on bid information from each exchange area and the available transmission capacity. These flows are then used for price formation in the respective power exchange. The next step in the process is price coupling, in which the flows and prices are determined simultaneously

STRUCTURAL TRANSACTIONS

Hafslund of Norway positioned itself for the development of a common Nordic end-user market by acquiring Energi-bolaget i Sverige and Göta Energi. Hafslund is Norway's largest electricity supplier, with 655,000 customers. The company has no electricity sales outside Norway but has gained 200,000 customers in Sweden and 50,000 in Finland through these two transactions. The majority shareholders in Hafslund are the Municipality of Oslo, with 54%, and Fortum, with 34%. Its electricity sales operations include the subsidiaries Norges-Energi, Fredrikstad Energisalg, Hallingkraft, Røyken Kraft and Total Energi. In 2009 Hafslund sold 8.9 TWh to private customers and 4.3 TWh to corporate customers.

Öresundskraft and Lunds Energi formed a joint company, Modity Energy Trading, that will handle energy portfolio management through price risk hedging for electricity, gas and other fossil fuels, as well as renewable electricity certificates (RECs) and emission allowances.

Fortum sold its 49% holding in Karlskoga Energi & Miljö to its principal shareholder, the Municipality of Karlskoga, for SEK 435 million. Fortum has been a part owner in Karlskoga Energi & Miljö since 1998.

Yello wound up its operations in the Swedish market and transferred its customers to GodEl.

According to a letter of intent, electricity supply operations in the municipally-owned Sandviken Energi, with more than 15,000 electricity customers, will become part of Bixia as of 2011. Sandviken Energi will receive payment in the form of shares in Bixia and will thereby become the ninth largest shareholder in Bixia.

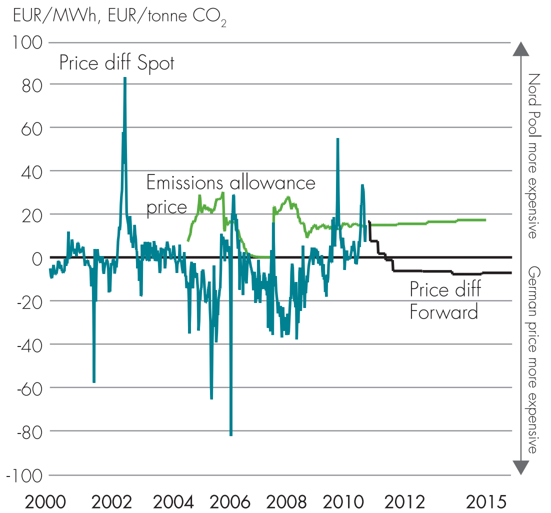
Telge AB took over all shares in the electricity supplier Telge Kraft. The former part owners Scania, AstraZeneca and Ericsson, which together controlled 40% of the company, have sold their holdings but will remain as customers to Telge Kraft.

Lunds Energikoncernen acquired the electricity sales operations of Herrljunga Elektriska, thereby strengthening its presence in Västra Götaland. In June, Lunds Energikoncernen purchased the remaining 40% of the electricity supplier 7H Kraft, which is active in the Sjuhärad region directly adjacent to Herrljunga's area. Lunds Energi was already previously the majority shareholder in Billinge Energi.

As a result of acquisitions and mergers, the number of member companies in Swedenergy decreased during the year. At

DIAGRAM 6

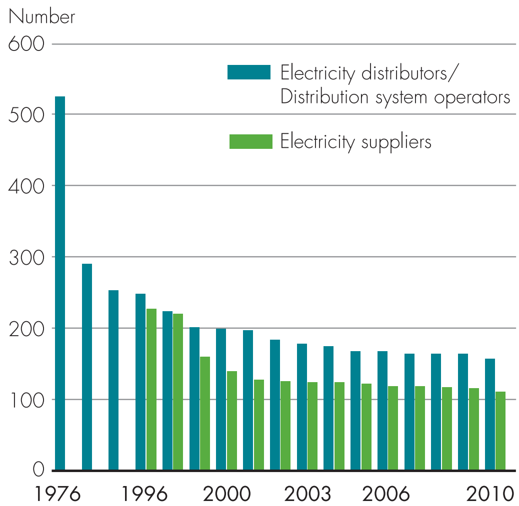
PRICE OF EMISSION ALLOWANCES AND PRICE DIFFERENCES BETWEEN THE NORDIC REGION AND GERMANY



Sources: Nord Pool Spot, EEX

DIAGRAM 7

NUMBER OF DSOS AND ELECTRICITY SUPPLIERS THAT ARE MEMBERS OF SWEDENERGY



Source: Swedenergy

year-end 2010, 157 distribution system operators and 111 electricity suppliers were members of Swedenergy, see *Diagram 7.*

GREATER CUSTOMER MOBILITY IN THE MARKET

Since April 2004 Statistics Sweden compiles monthly statistics on the number of supplier switches (changes of electricity seller) and the spread of customers between different contract types, see *Diagrams 8 and 9.*

The ability to change supplier depends on contracts in force, which means that not all customers have the opportunity to switch during the year. It is therefore difficult to draw any real conclusions due to the relatively short time span for data on supplier switches.

After a record number of supplier switches in 2009, the rate of changes has fallen somewhat. The average number of switches in 2010 was just over 40,900 per month, of which household customers accounted for more than 35,600. This can be compared to an average of 37,500, including 32,200 household customers, since the start. The average total volume in 2010 was more than 1,100 GWh, of which around 370 GWh was attributable to household customers. The corresponding averages for the entire period are 986 GWh and 302 GWh.

In 2010 the share of customers with standard rate contracts, i.e. those who have not made an active choice, continued to decrease. At the same time, it must be considered likely that these customers have deliberately not made a choice. The range of contracts has grown over time and the newer types do not fit into the traditional model, such as contracts that contain a mix of fixed and variable rates. Since January 2008, Statistics Sweden includes these in the category "Other".

CONSUMER PRICES FOR ELECTRICITY

Consumer prices for electricity vary between customer categories, between rural and urban areas and between the Nordic countries. They are influenced by varying distribution costs, differences in taxation, subsidies, government regulations and the structure of the electricity market.

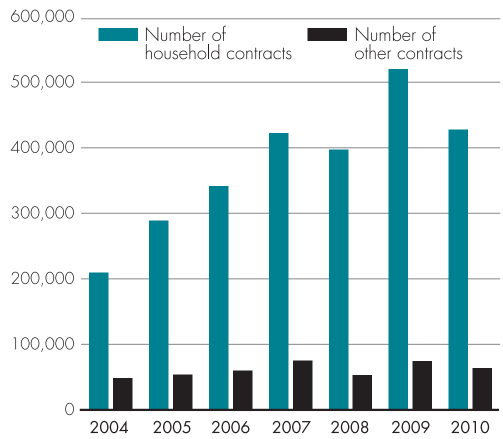
Consumer electricity prices basically consist of three main components:

- A supply charge for consumption of electrical energy, the portion of the electricity bill that is subject to competition.
- A distribution charge to cover the cost of network services, i.e. power distribution.
- Taxes and charges such as energy tax, VAT and fees to government agencies.

The example in *Diagram 10* shows the development of electricity prices (single-family home with electrical heating) for a "variable rate" contract, one of many contract types. It is worth pointing out that in 1970 only 7% of the electricity price went to the government as tax. In January 2007 this had risen to 45% and consisted of energy tax, VAT and REC charges. Large fluctuations in the electricity price cause these percentages to vary proportionately. It should also be noted that producer surcharges now account for part of the electricity price, such as the cost of emission allowances.

DIAGRAM 8

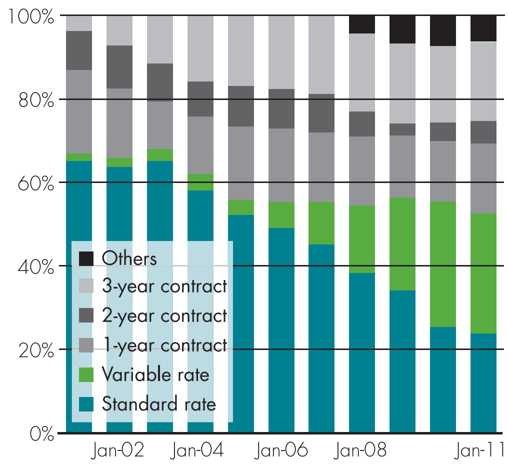
NUMBER OF SUPPLIER SWITCHES PER YEAR



Source: Statistics Sweden

DIAGRAM 9

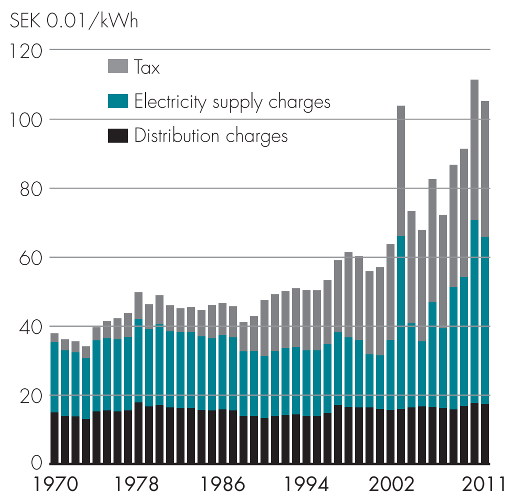
CUSTOMER MOBILITY, JANUARY 2001–2011



Source: Statistics Sweden

DIAGRAM 10

BREAKDOWN OF TOTAL ELECTRICITY PRICE FOR A SINGLE-FAMILY HOME WITH ELECTRICAL HEATING AND A VARIABLE RATE CONTRACT, 1990 PRICES, IN JANUARY OF EACH YEAR



Sources: Swedish Energy Agency and Statistics Sweden

Sweden's total energy supply

ENERGY SUPPLY

Sweden's energy requirements are covered partly by imported energy sources – mainly oil, coal, natural gas and nuclear fuel – and partly by domestic energy in the form of hydropower, wood, peat and wood waste from the forest products industry (bark and lignin). Development of the energy supply since 1973 is shown in *Diagram 11*. The most significant changes between 1973 and 2010 are that the share of oil in the energy mix has fallen from 71% to just over 25% and that nuclear power has increased from 1% to more than 30%. With normal availability, the share of nuclear power is over 35%. Sweden's total energy supply in 2010 amounted to a preliminary 583 TWh, compared to 532 TWh the year before.[1] The increase in energy supply is mainly due to economic recovery following the financial crisis, but also to greater losses in nuclear power as a result of higher production.

ENERGY USAGE

Steady growth in society's demand for goods and services has historically generated stronger demand for energy. *Diagram 12* shows energy consumption in relation to gross national product (kWh/GNP SEK). Although the Swedish statistics previously disregarded conversion losses in the nuclear power plants, Sweden now applies the standard international method based on the energy content of the fuel.

[1] Excluding net electricity imports, bunkering for international shipping and usage for non-energy purposes.

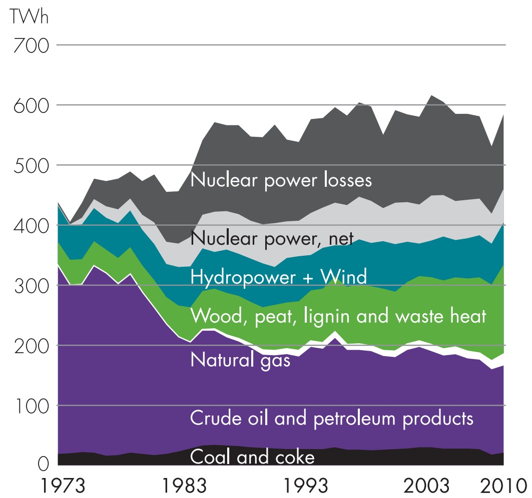
It can be noted that energy consumption calculated according to the older Swedish method has fallen since 1973, but did not start to decrease according to the international method until the mid-1990s. The increase in 2010 according to the international method is partly attributable to higher nuclear power production and a resulting rise in conversion losses, but also to growth in the electricity-intensive industries.

In absolute terms, energy consumption among end-users has been relatively constant since 1973. At the same time, consumption in relation to GNP has fallen by almost 40%. This is partly due to greater usage of processed energy in the form of electricity and district heating, and partly to better energy-efficiency in general. The oil share of energy usage has fallen sharply in the industrial, residential and service sectors, etc., while oil-dependency is still considerable in the transport sector.

According to preliminary figures from Statistics Sweden, final energy consumption in 2010 was up by 9.2% to 422 TWh. Electricity consumption rose by 6% and usage of district heating by 16%. While the use of oil and gas products increased by 3%, use of biomass and peat, etc., climbed by 14.0% and the use of coal and coke by 65%, partly owing to higher activity in the pulp and paper and iron and steel industries.

DIAGRAM 11

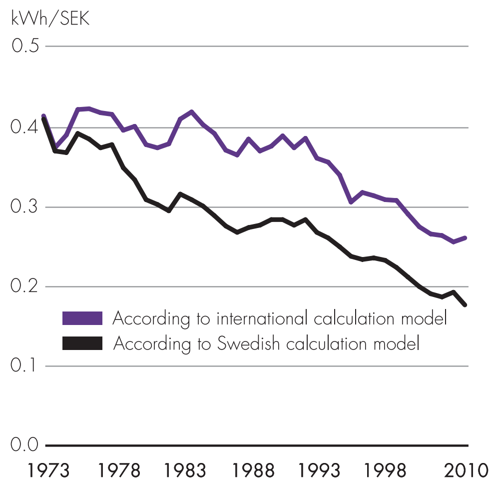
TOTAL ENERGY SUPPLY IN SWEDEN 1973–2010



Source: Statistics Sweden

DIAGRAM 12

TOTAL SUPPLIED ENERGY IN RELATION TO GNP 1973–2010 (1995 PRICES)



Source: Statistics Sweden

Electricity consumption

Total electricity consumption including transmission losses and large electric boilers in industries and heating plants during 2010 amounted to 147.1 TWh, compared to 138.4 in 2009.

Sweden has a relatively high proportion of electrical heating, more than 30 TWh in total, of which two-thirds are dependent on the outdoor temperature. Temperature variations must therefore be taken into account when making year-on-year comparisons. Temperature-adjusted consumption in 2010 amounted to a preliminary 143.6 TWh, compared to 139.6 in 2009.

Electricity consumption trends are closely linked to economic growth. *Diagram 13* shows development from 1970 onwards. Until 1986, the rise in electricity usage outpaced growth in GNP. During the years 1974-1986 this was largely attributable to increased use of electrical heating. Since 1993, however, electricity consumption has increased at a slower rate than GNP.

INDUSTRIAL ELECTRICITY USAGE

Diagram 14 shows that electricity usage in the industrial sector rose dramatically between 1982 and 1989 in conjunction with an extended economic boom. Devaluation of the Swedish krona in 1982 gave the electricity-intensive base industries, particularly pulp and paper, favourable conditions for growth. Consumption then declined during the economic recession and structural transformation of the early 1990s. At mid-year 1993 electricity utilization began rising again and continued upwards through the end of 2000. For the next three years industrial usage of electricity then decreased somewhat – an effect of economic slowing and higher electricity prices. Since then, industrial electricity consumption grew at a moderate rate until the second half of 2008.

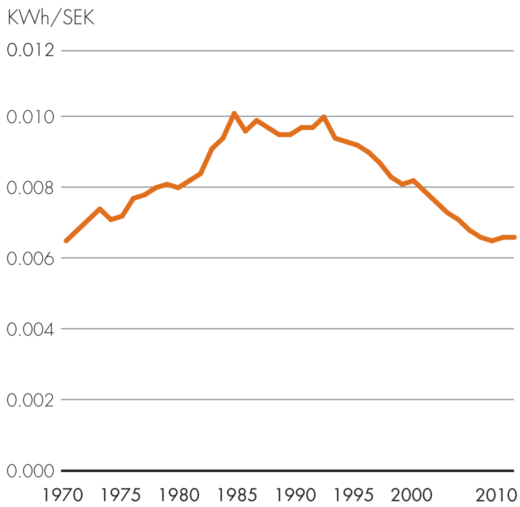
Diagram 15 illustrates how the industrial sector's specific electricity usage, expressed in kWh per SEK of value added, has developed since 1970. Since 1993, industrial usage in relation to value added has fallen sharply. This is due to the heterogeneous industrial structure in Sweden, where a handful of sectors accounts for a large share of electricity consumption, *Table 3*. From 1993 onwards, the strongest growth has been seen in the engineering industry, where the production value has more than doubled during the period while electricity usage has increased by less than 10%. In the energy-intensive industries, production value has grown by close to 50% at the same time that electricity usage has climbed nearly 20%.

ELECTRICITY CONSUMPTION IN THE SERVICE SECTOR

Electricity consumption in the service sector (offices, schools, retail, hospitals, etc.) climbed rapidly during the 1980s, particularly with regard to lighting, ventilation, office equipment and electrical space heating. This increase was generated by a considerable rise in standards for renovation, rebuilding and new construction of service industry premises, as well as a massive surge in the volume of computers and other equipment. The late 1980s saw a huge increase in the number of new buildings. However, few new construction projects were undertaken

DIAGRAM 13

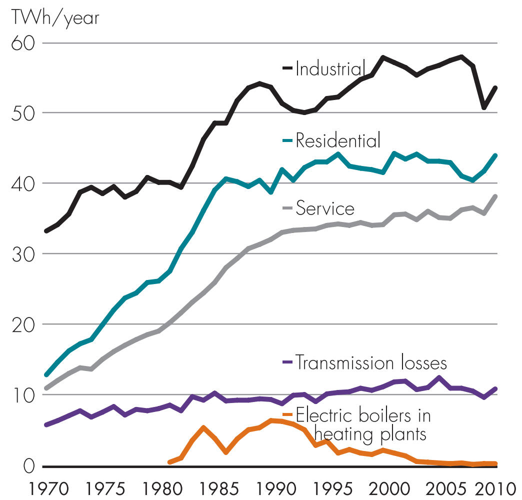
ELECTRICITY USAGE PER GNP SEK 1970–2010 (1995 PRICES)



Source: Statistics Sweden

DIAGRAM 14

BREAKDOWN OF ELECTRICITY USAGE BY SECTOR 1970–2010



Source: Statistics Sweden

during the economic slump of the early 1990s, which together with more efficient appliances and equipment has caused electricity usage excluding large electric boilers to stabilize at 33-34 TWh per annum. The high electricity prices of recent years have contributed to a slight drop in consumption.

Most buildings in the non-residential sector's use district heating. Electrical heating as the principal heat source is used in around 9% of the total building area, but accounts for around 20% of the total heating energy due to widespread use of electrical heating as a complement.

The service sector also includes technical services such as district heating plants, water utilities, street and road lighting and railways. These areas also underwent powerful growth during the 1980s, when the district heating plants introduced large heat pumps that consumed over 2 TWh of electricity in 2000. Usage in this sector has levelled out at around 0.5 TWh since 2003, with high electricity prices as one of the contributing factors.

RESIDENTIAL ELECTRICITY USAGE

The residential sector includes single-family homes, farms, multi-dwelling units and holiday/summer homes. Electricity for agricultural activities is attributed to the service sector. Electricity usage, excluding electrical heating, has increased at an even pace since the 1960s, with the exception of the oil crisis in 1973-74 and a temporary conservation campaign in 1980-81 when the upward trend was temporarily curbed.

Consumption of household and operating electricity for multi-dwelling units has risen steadily, partly due to the growing number of homes and partly to a higher standard of electrical appliances and equipment. However, the rate of increase has slowed in recent years and is today essentially linked to the renovation of old apartment buildings and the fact that households are acquiring more appliances such as dishwashers, freezers, and home computers. In all housing types, the replacement of old equipment, like refrigerators and washing machines, with modern and more energy-efficient models is offsetting the increase. *Diagram 16* provides a breakdown of household electricity usage.

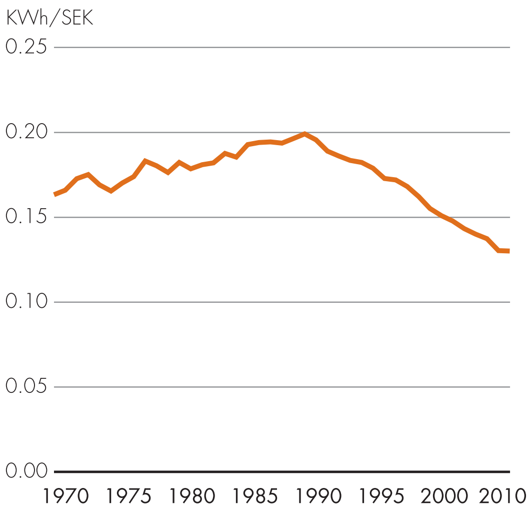
Electrical heating accounts for 30% of all heating energy used in the residential sector, primarily in single-family homes. A large number of single-family homes with electrical heating were built during 1965-1980. After 1980 the majority of newly built single-family homes have been equipped with electric boilers for hot water systems. In order to reduce oil-dependency after the second oil crisis in the early 1980s, a very large number of single-family homes converted from oil-fired to electric boilers during 1982-1986. In recent years, the number of heat pumps has risen dramatically, thereby reducing the need to purchase energy for residential heating and hot water.

The preferred choice in new construction and conversion of apartment buildings has been district heating, where available. Outside the district heating networks, however, electrical heating has been installed, primarily in new construction. Electrical heating as a complement to other forms of heating is also widespread, and around 4% of the surface area in apartment buildings relies mainly on electrical heating.

Table 4 shows the number of subscribers and average consumption for various categories in the residential sector. The table excludes homes in the agriculture, forestry and similar sectors since it is not possible to distinguish residential usage from that for commercial activities

DIAGRAM 15

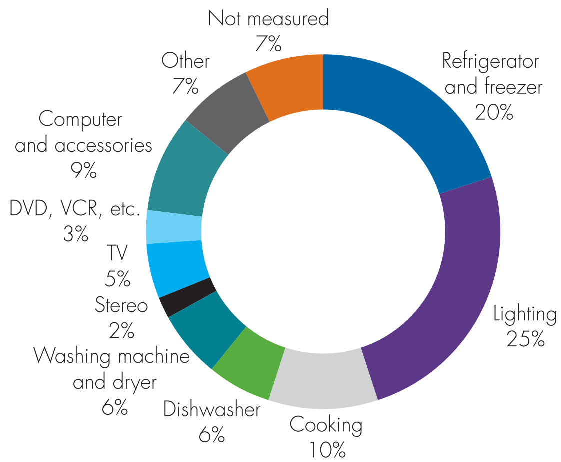
IINDUSTRIAL ELECTRICITY CONSUMPTION 1970–2010 (1991 PRICES)



Source: Statistics Sweden

DIAGRAM 16

HOUSEHOLD ELECTRICITY CONSUMPTION BY APPLICATION (RESULTS FOR 2007)



Source: Swedish Energy Agency

TABLE 3

INDUSTRIAL ELECTRICITY USAGE BY SECTOR 2000–2010, TWh

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 prel.
Mining	2.6	2.5	2.6	2.6	2.5	2.6	2.5	2.7	2.8	2.4	3.4
Food and beverages	3.0	2.8	2.7	2.5	2.4	2.4	2.4	2.6	2.5	2.4	2.5
Textiles and clothing	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Wood products	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1
Pulp and paper, graphics industry	24.1	23.2	23.4	23.2	23.6	24.2	24.5	24.6	24.2	22.6	22.2
Chemicals	7.6	7.7	7.7	8.0	7.9	7.6	7.4	7.3	7.1	6.6	7.4
Soil and stone products	1.2	1.4	1.2	1.1	1.0	1.1	1.1	1.1	1.1	1.0	1.0
Iron, steel and metalworking	8.2	7.9	7.8	7.5	8.6	8.5	8.4	8.4	8.0	6.0	7.1
Engineering industry	7.5	7.6	7.4	6.9	7.0	6.9	7.4	7.0	6.7	5.4	6.2
Small industries, craftsmen, etc.	1.0	1.2	1.0	0.9	0.7	1.0	1.5	1.8	1.7	2.1	1.5
TOTAL, incl. disconnectable electric boilers	**57.8**	**57.1**	**56.4**	**55.3**	**56.2**	**56.7**	**57.7**	**57.9**	**56.5**	**50.7**	**53.5**

Source: Statistics Sweden

TABLE 4

NUMBER OF SUBSCRIBERS AND AVERAGE HOUSEHOLD ELECTRICITY CONSUMPTION IN 2009

	No. of subscribers	GWh*	MWh/s
Single-family homes with consumption of > 10 MWh	1,147,956	20,663	18.0
Single-family homes with max. consumption of 10 MWh	714,832	4,289	6.0
Multi-dwelling units, direct delivery, with consumption of > 5 MWh	152,375	1,371	9.0
Multi-dwelling units, direct delivery, with max. consumption of 5 MWh	1,940,264	3,881	2.0
Multi-dwelling units, aggregate deliveries	5,683	473	83.2
Holiday/summer homes	512,099	3,073	6.0
Total residential according to the above	**4,473,209**	**33,750**	**7.5**
Share of total number of subscribers	86.2%	25.3%	29.3%
Total number of subscribers	**5,190,213**	**133,588**	**25.7**

* 1 GWh = 1/1000 TWh

Source: Statistics Sweden

Electricity production

Electricity production in Sweden is dominated by CO_2-free hydro and nuclear power. The rate of wind energy expansion has accelerated in recent years and wind-generated power currently makes up 2.5% of Sweden's total electrical production. The rate of expansion for thermal power may not be as high as for wind power percentage-wise, but in terms of generated electricity the change is greater. Thermal power, produced with biomass fuels, accounted for 9% of total electrical production and fossil-fired production for around 5% of production in 2010.

Sweden's aggregate domestic electrical production in 2010 amounted to 145.0 TWh (133.7 in 2009), an increase of just over 8% compared to the prior year.

The country's electricity generation by power type during the period from 1951 to 2010 is shown in *Diagram 17*.

The Nordic electricity market and the exchange of electricity between neighbouring countries are of crucial importance for Sweden's electricity supply. Sweden's production mix differs from that in the neighbouring countries, whose conditions for power generation also vary from one another, see *Diagram 18*. For many years the Nordic countries have cooperated by utilizing their different production potentials. In good hydropower years, the import of hydroelectric power to Finland and Denmark enables these countries to reduce their production of condensing power, and the reverse is true in dry years when they can export condensing power to compensate for the decrease in hydropower production. In recent years Germany has also participated equally in these flows in both directions.

In the 1960s Sweden decided to develop nuclear technology and was thus able to phase out fossil-based (coal, oil) condensing power from the system. Nuclear and thermal power, together with much of the country's hydropower capacity, today supply baseload power in the Swedish system. In addition to its baseload function, hydropower also plays an important role as regulating power.

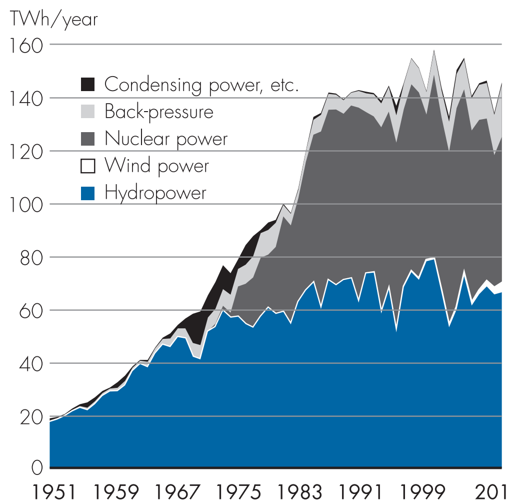
The term "regulating power" means that water can be stored in reservoirs to be drawn down at a later time when the need for power is greater. The regulatability of hydropower fluctuates over the year, for example at times of high runoff in the system there is little opportunity to regulate hydropower. The greatest regulatability normally arises during the winter when runoff is lower, which provides greater opportunity to decide on the draw-down level. Regulatability is also limited by the speed at which production levels must be adjusted from one day to the next, since the flow rates of water in the long Swedish watercourses must be taken into account.

If Sweden has 20 TWh of wind power in 2025, this will tangibly affect the power system and will require capacity for effective handling. This poses no problem from an energy standpoint, since the annual production profile closely matches that for electricity consumption, see *Diagram 24*, page 25. The challenge instead lies in the short-term perspective, from hours up to a few days. 20 TWh of wind power corresponds to an installed capacity of around 8,000 MW, see *Table 5*, that is assumed to be spread throughout Sweden. Despite aggregation effects, it can be assumed that output will fluctuate between 5% and 80%, i.e. 400–6,400 MW in steps of 400–1,000 MW per hour.

One of the distinctive characteristics of wind power is that it is intermittent and will nearly always require some kind of regulation (to stop, start, increase or decrease production) in another power type. This in itself is nothing new, since the power load also varies from hour to hour and with larger vol-

DIAGRAM 17

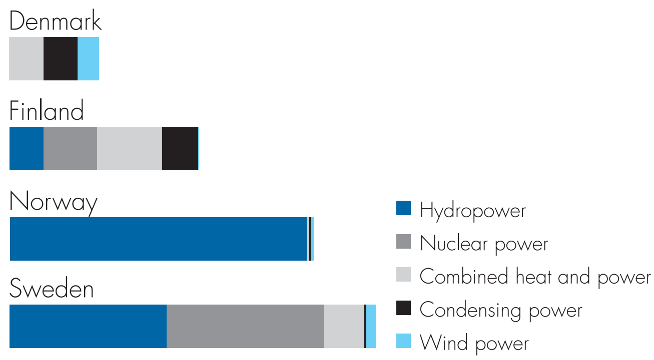
TOTAL ENERGY SUPPLY IN SWEDEN 1951–2010



Source: Swedenergy

DIAGRAM 18

NORMALIZED ELECTRICITY PRODUCTION MIX IN THE NORDIC REGION



Source: Swedenergy

tage steps, albeit with the difference that it is easier to forecast in the short and long term.

What scope does Sweden have to manage this regulation of wind power? The first step is taken through the spot market (day-ahead), since supply and demand set prices that result in measures to increase or decrease generation other than wind power. The next step is the regulating power market (intra-day), which handles forecast errors for production, consumption and other imbalances. At the domestic level, Sweden has capacity for regulation with hydropower during much of the year.

ELECTRICITY PRODUCTION CONTROLLED BY WEATHER

Weather conditions have a major influence on Sweden's power supply. Outdoor temperatures affect electricity consumption, particularly for heating of homes and other premises.

The amount of precipitation, and subsequently also runoff to the reservoirs and hydropower stations, is decisive for hydropower production. With an increased share of wind power, variations in wind speed will also be of greater importance. There is a certain correlation between precipitation and wind speed.

2010 was the eighth consecutive year of above-normal temperatures.

In the southern half of the country, January was the coldest month since 1987 and many parts of the region experienced an unusually long period without a thaw. In the north, however, warm westerly winds led to above-freezing temperatures on several occasions. The winter cold persisted nearly through the end of February and temperatures in several parts of southern were measured at the lowest since 1987.

After a long and frigid winter, the arrival of spring in southern Sweden was unexpectedly mild. On the whole, April was warmer and somewhat sunnier than normal all over the country. A balmy first half of the month in northern Sweden brought spring to all of region, aside from the mountains, as early as 8 April. A chilly start to May was followed by real warmth above all in northeastern Sweden, of which the Norrbotten region had a virtual heat wave. The heat, combined with occasional heavy precipitation, led to a powerful spring flood in large parts of northern Sweden. High flows in the watercourses continued even when the temperature dropped throughout the country at the end of the month. In May the snow cover disappeared from all of northern Sweden except the mountain areas.

Much of June was dominated by cool and unstable weather. Local showers in the Jämtland region brought more than 100 mm of rain in 48 hours on 18 and 19 June, causing flooding and landslides in the Åre area.

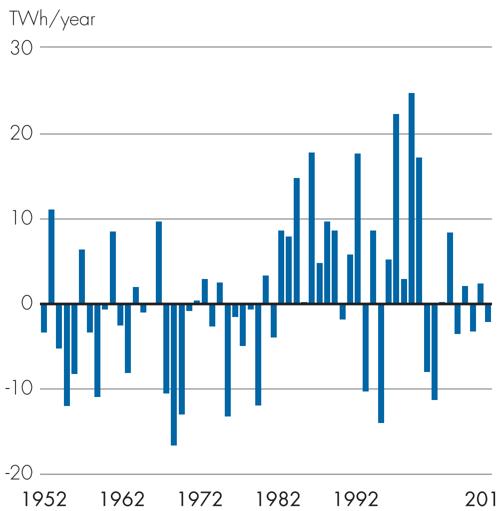
September was cool and sunny at both the beginning and end. The Härjedalen area even had a few days of snow cover. The first half of October saw a high pressure front and sunny weather while the second half was unsteady and grey. In the first half of the month the meteorological winter arrived according to the normal timetable in the far north. In several parts of Götaland and southern Svealand, the season's first snow fell. At the same time, there were local thunder showers in western Götaland and gusty winds in the Göteborg area.

November was cold throughout the country. Precipitation was lower than normal in northern Sweden but heavy in the south of the country, particularly along the Småland coast and the island of Öland. A new snowfall record for November was noted in the Götaland region when the town of Kråkemåla in eastern Småland received 85 cm on 30 November. Parts of Götaland recorded the coldest December for more than 100 years. Throughout the country, the weather was characterized by extended periods of below-freezing temperatures and several decimeters of snow.

For the country as a whole, the average annual temperature was around one degree lower than normal and precipitation was higher than normal.

DIAGRAM 19

RUNOFF VARIATIONS IN RELATION TO NORMAL YEAR RUNOFF 1952–2010



Source: Swedenergy

TABLE 5

INSTALLED CAPACITY IN SWEDISH POWER PLANTS TODAY AND SCENARIO IN 15 YEARS, MW

	31 Dec. 2010	31 Dec. 2024*
Hydropower	16,200	17,000
Wind power	2,163	8,000
Nuclear power	9,151	9,000
Other thermal power	8,187	9,000
– CHP, industrial	1,216	1,800
– CHP, district heating	3,563	5,200
– condensing power	1,801	500
– gas turbines, etc.	1,607	1,500
Total	**35,701**	**43,000**

**Estimated scenario at 3 April 2010*

Source: Swedenergy

RUNOFF AND RESERVOIR LEVELS

Total runoff in 2010 was 63.7 TWh (not adjusted for spill), and was thus above the average for the past 58 years.

Annual runoff variations in relation to normal values for the period 1952–2010 are shown in *Diagram 19*.

Runoff variations in 2010 are shown in *Diagram 20*. The grey field shows runoff with a probability rate of between 10% and 90%. There is a 10% probability that runoff will exceed the upper limit, and 90% probability that it will exceed the lower limit in the grey field. The thinner black curve represents normal runoff (50% probability) and the green curve shows actual weekly runoff during 2010.

As seen in *Diagram 20*, runoff during the winter and up to the spring flood was below the median value. The spring flood started at the normal time and was explosive, with a very high volume in the third week of May, while the total volume was lower than average. In northern Sweden, precipitation was higher than normal and led to above average runoff. Starting in the end of August, the amount of precipitation decreased and runoff dropped to below-normal levels, falling further when the cold and snow spread throughout the country in the second half of November and through the end of the year.

The country's aggregate reservoir storage is shown in *Diagram 21*. At the beginning of the year the storage level was just under 51%, which is far below the average for the comparison period 1950-2009. Due to a low level already before the spring flood and a sharp falloff in nuclear power production during the autumn and early winter, the reservoirs were drawn down further than normal. At their lowest, storage levels dropped to around 12%, which is approximately 10% lower than average. This should also be compared to 2003, when the level fell to an exceptionally low 8%.

Because the spring flood does not start simultaneously throughout the country, it is not possible for all reservoirs to be drawn down during the spring flood since there are always some reservoirs in the process of being either filled or emptied at any given time. At year-end 2010 the storage level was 44%, which is roughly 22% lower than the average for 1950-2008.

In conclusion, the water year 2010 can be characterized as fairly normal, with a warm winter and above normal runoff, followed by a short but intense spring flood and low precipitation during the summer and autumn in drainage areas in the north of the country.

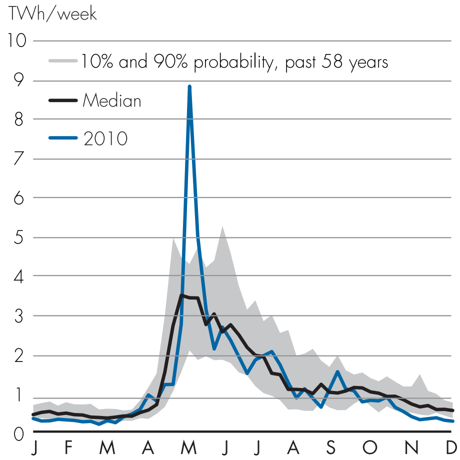
INVESTMENTS IN ELECTRICITY PRODUCTION

Investments in electricity production and other parts of the energy industry's infrastructure are almost always of a very long-term nature, up to 50 years, and typically demand substantial capital. *Diagram 22 (page 25)* shows the energy industry's gross investment in current prices starting in 1985. The data comes from SCB (Statistics Sweden) and presents total investment spending by the energy industry but with no breakdown among the individual players, which are classified for example as real estate companies, or between investments in wind power, etc. Furthermore, the forestry industry's investments, which affect electricity production, are not included in the investment amounts.

The tendency has been for the energy industry to increase its

DIAGRAM 20

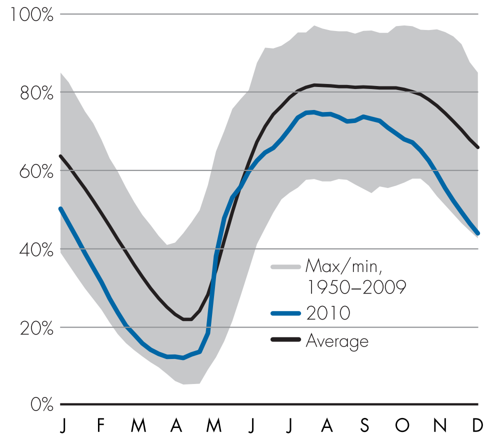
RUNOFF VARIATIONS IN THE POWER-GENERATING RIVERS



Source: Swedenergy

DIAGRAM 21

STORAGE LEVELS IN THE REGULATING RESERVOIRS



Source: Swedenergy

TABLE 6

HYDROPOWER PRODUCTION

Breakdown by river in 2010, TWh

River	Net production	
Lule älv	12.7	(12.8)
Skellefte älv	4.3	(4.1)
Ume älv	7.6	(7.4)
Ångermanälven	7.8	(7.4)
Faxälven	3.6	(3.7)
Indalsälven	9.8	(10.2)
Ljungan	2.1	(2.1)
Ljusnan	4.2	(4.1)
Dalälven	5.5	(5.4)
Klarälven	1.8	(1.9)
Göta älv	1.9	(1.7)
Other rivers	4.9	(4.7)
Total production	**66.2**	**(65.3)**

(Data for 2009 in brackets)

Source: Swedenergy

investments in recent years. An independent survey conducted by Swedenergy in 2008 indicated a total investment volume of SEK 300 billion during the period to 2018, conditional on the continued expansion of wind power to a level of around 17 TWh by 2020. Wind power accounts for around one third of the total volume.

The investments are made up of different parts:

- Modernization of existing power stations.
- Whole new power stations.
- Modernization of transmission and distribution networks.
- Heat generation and heat distribution.

The transmission and distribution system is of critical importance in bringing the generated electricity to electricity customers. In today's more international electricity market there is a greater need for multiple connections, but also new potential to handle different power balance situations such as dry years, wet years, etc. A higher share of wind power, solar power and other varying electricity production is also increasing the need for capacity to move electric power in many directions in the transmission and distribution system.

MODERNIZATION OF POWER STATIONS

Sweden's hydropower production in 2010 amounted to 66.2 TWh (65.3 in 2009), which is 1.5% more than in the previous year and close to normal year production. Hydropower accounted for 46% of Sweden's total electrical production in 2010.

The spread of hydropower production among the country's main rivers is shown in *Table 6*. The four largest rivers – Luleälven, Umeälven, Ångermanälven including Faxälven, and Indalsälven – together represented 63% of total hydropower production.

At the end of 2010, the maximum quantity of water that could be stored if the regulation reservoirs were used at full capacity corresponded to an energy volume of 33.7 TWh, which was largely on par with 2009. The electricity production capacity of the country's hydropower stations in a normal year is 65 TWh, according to calculations based on runoff data for the years 1950–2000.

Although no major hydropower stations were built during the year, extensive reinvestment programs are being carried out in existing facilities. Below are a few examples of facilities where work is underway.

Vattenfall AB is in the midst of a large-scale investment program with plans to refurbish some 30 of its hydropower stations by 2013. Furthermore, the company is working to improve environmental safety in its hydropower plants and reinforce its dams. Concrete measures include construction of the Abelvattnet power plant on the upper Umeälven River. The plant went into operation in 2010 with an installed capacity of 4.6 MW. Vattenfall has also started a rebuild of the Akkat power plant on the Luleälven River, a project that is expected to take five years. Among other things, the rebuild will involve replacement of the old 150 MW turbine with two 75 MW turbines. The old intake tunnel will remain in place and a new headrace tunnel will be built. The machine hall is being expanded to make room for the additional turbine.

E.ON is investing around SEK 1.5 billion in safety enhancement measures at the Storfinnforsen and Ramsele dams on the Faxälven River between 2009 and 2015.

TABLE 7

HYDROPOWER, INSTALLED CAPACITY ON 31 DECEMBER

	Output, MW		
Watercourse	2008	2009	2010
Upper Norrland	**7,143**	**7,143**	**7,138**
Lule älv	4,196	4,196	4,196
Pite älv	50	50	50
Skellefte älv	1,026	1,026	1,016
Rickleån	10	10	10
Ume älv excl. Vindelälven	1,758	1,758	1,765
Öreälven	6	6	6
Gideälv	70	70	70
Moälven	6	6	6
Nätraån	12	12	12
Small rivers	9	9	8
Central and lower Norrland	**6,124**	**6,122**	**6,126**
Ångermanälven incl. Faxälven	2,590	2,586	2,578
Indalsälven	2,100	2,099	2,107
Ljungan	600	600	601
Delångersån	16	16	19
Ljusnan	814	817	817
Small rivers	4	4	4
Gästrikland, Dalarna and Mälardalen region	**1,291**	**1,292**	**1,294**
Gavleån	25	24	24
Dalälven	1,148	1,148	1,149
Eskiltunaån	9	9	9
Arbogaån	33	33	35
Hedströmmen	8	8	7
Kolbäcksån	55	57	57
Nyköpingsån	5	5	6
Small rivers	8	8	8
Southeastern Sweden	**416**	**420**	**416**
Vättern-Motala ström	163	163	163
Emån	19	23	23
Alsterån	8	8	7
Ronnebyån	14	14	14
Mörrumsån	21	21	21
Helgeån	35	35	33
Lagan	133	133	134
Small rivers	23	23	22
Western Sweden	**1,221**	**1,226**	**1,226**
Nissan	55	55	55
Ätran	68	68	68
Viskan	27	28	28
Upperudsälven	25	25	25
Byälven	72	73	72
Norsälven	126	126	126
Klarälven	388	388	388
Gullspångsälven	128	128	128
Tidan	8	8	8
Göta älv	300	301	303
Small rivers	24	26	27
Entire country	**16,195**	**16,203**	**16,200**

Source: Swedenergy

OPERATIONS

2010

SWEDE energy

Electricity creates opportunities, benefits and experiences

After two tough winters in a row when the function of the electricity market was seriously questioned, I feel compelled to point out that the customers naturally want their electricity and that long-term electricity consumption has continued to rise. Furthermore, delivery reliability has now reached 99.99%.

AS A PRODUCT, electricity is taken for granted. At the same time, the opportunities, benefits and experiences associated with our fine product have been overshadowed by a heated debate that in the winter of 2009/2010 was mainly focused on high electricity prices, the insufficient availability of nuclear power and questioning of the electricity market's function. In the past winter the range of criticism and debate also included media attacks on the upcoming ex ante regulation and rising network tariffs. And on top of all this came the earthquake and tsunami in Japan, which served to reawaken the nuclear power controversy.

It has certainly been a time of trials for the industry.

Before we let go of 2010, I would like to touch on some important aspects of Swedenergy's work in the past year:

- Preparations for the new ex ante regulation, effective 1 January 2012, have involved many individuals among our 157 distribution system operators (DSOs). Dedicated efforts have been made by numerous experts – in close dialogue with the Energy Markets Inspectorate – to accurately set the requested revenue cap for the first four year period from 2012 to 2015. We won't know the final results until all DSOs have been assigned their official decisions this autumn.
- The introduction of electricity bidding zones on 1 November 2011 is another major change that is unlikely to facilitate communication with the customers but where extensive steps have been taken by Swedenergy. User-friendly information materials have been produced and some 400 employees in the member companies have taken part in training courses within the organization. We have also met with key customer groups in preparation for this.
- Corresponding efforts have been made when it comes to explaining the coming years' increases in network tariffs. There are now effective information materials available for this purpose that the members can use and adapt to their own needs.
- Last autumn's survey by Synovate shows that despite the recent turbulence, the power industry is enjoying an upswing among the younger age groups when it comes to interest in a future career. A full 65% of 16- to 29-year-olds are positive toward the industry as an employer (up by +20 percentage points in just two years). This is encouraging in view of the industry's focused activities in the education and recruitment area in the past couple of years. A particular source of satisfaction is the agreement with Sweden's three northernmost universities to start a new program in electric power engineering.
- A wide-ranging pilot study conducted by the consulting firm United Minds answers the question of "How can we improve attitudes towards electricity?". Through quantitative measurements, group interviews, home visits and media analysis, the pilot study has drafted a proposal for how the power industry can tackle the problems it faces and gradually improve electricity's image as a product in order to restore confidence in the industry. In March 2011 the board of Swedenergy made a decision in principle to pursue a wide-front and long-term communication strategy – naturally in close cooperation with the member companies – in the first stage known as the "fact offensive" or "charm offensive". This is an initiative you will be seeing more of in the next few years.

We all love electricity and everything it can offer. For a year we should perhaps call ourselves the experience industry and underline all of the fantastic things that the customers can do and experience thanks to electricity. In any case, it would be wonderful to have the chance to talk about electricity without being constantly bogged down in discussions about high electricity prices.

As we look ahead, we should keep in mind that we represent an exciting and important industry. It is especially inspiring to work with a product that affects every person and is in many respects a given "winner" for the future. Energy efficiency and electric vehicles are just two examples of areas that indicate an increased reliance on electricity. And the fact Sweden's electricity production system is 96% carbon-neutral makes us an international role model, which should contribute to our sense of pride in being part of an industry that is vital – and always in focus.

KJELL JANSSON
MANAGING DIRECTOR, SWEDENERGY

Swedenergy's 2050 study: "Electricity – a future winner!"

In 2010 Swedenergy conducted an independent study on the roadmap to a climate-neutral Sweden and the role of electricity in this context. Cecilia Kellberg, coordinator of the project, is satisfied with the outcome.

OUR 2050 STUDY showed that electricity will play a central role in the transition to a climate-neutral society. The Nordic production system will achieve climate-neutrality a full 20 years before its European counterpart, which creates unique opportunities for electricity and our industry!

Through increased electricity exports to Europe, the EU can become climate-neutral faster and more cheaply than would otherwise be the case if the Nordic electricity resources are recognized and utilized.

Cecilia says, "In the Nordic region we have a fantastic resource that should be used as widely as possible. Furthermore, we have a shared responsibility for finding the best possible ways to overcome challenges in the climate area. One condition for success is that the entire Europe grid is expanded offensively."

The 2050 Study was carried out by Profu at the request of Swedenergy. Based on this document, Swedenergy has hammered out the final version that is presented in the report.

Cecilia Kellberg adds, "After the disappointing results of the climate summit in Copenhagen in December 2009 it seemed that climate issues took a temporary back seat, at least in terms of the public debate. But for us as an industry it was urgent to explore a number of possible future scenarios – what obstacles and opportunities could arise along the way.

"The policy must be based on a long-term strategy. We feel that policy-makers need to take active responsibility and realize a cross-bloc energy policy agreement. This would ensure a more far-sighted approach and greater stability, and would also benefit the climate."

Through Eurelectric, the European power industry has shown that production of electricity in Europe can become climate-neutral by 2050. Swedenergy's study shows that the Nordic production system can reach that target 20 years earlier – by 2030. Sweden's electricity production is already 96% climate-neutral today.

Cecilia Kellberg continues, "Some of the challenges ahead lie in the development of new technology – we are counting on carbon capture and storage (CCS) technology to become a reality. Other issues are related to speeding up the permitting process and preparing for increased use of electricity in the transport sector. In the latter case this is largely a matter of bringing about expansion of the infrastructure needed for electric vehicles. And, of course, the vehicles themselves must become available – but that is not the power industry's responsibility.

"Working on the 2050 study has been exciting and uplifting. It is clearly obvious that the industry can make a positive contribution to overcoming a threat as daunting as climate change. We definitely have a winning concept!"

Energy efficiency "a key to lifting the industry's image"

"Energy efficiency is a critical image-affecting issue for the power industry. The motives for improving efficiency are simple; it is a cost-effective way to reduce carbon dioxide emissions and leads to lower energy waste. It also has other advantages, such as easier attainment of the renewability targets."

THESE ARE THE WORDS OF Henrik Wingfors, who is responsible for energy efficiency at Swedenergy. The greatest efficiency gains by far can be achieved through road transports with electric vehicles, an area where Henrik works primarily in cooperation with Elforsk (the Swedish Electrical Utilities R&D Company).

"Electric vehicles offer sensational energy efficiency. Electric engines are three to four times as efficient as those powered by petrol or diesel. In addition, electric vehicles contribute to better air quality, particularly in urban areas, through lower emissions of particulates and nitrogen oxides," says Henrik Wingfors. He continues, "The industry's task is to ensure the deployment of infrastructure for recharging the vehicles. Introduction of the vehicles can be promoted by introducing greater differences in taxation related to CO_2 emissions or other measures, such as free parking."

Henrik Wingfors is otherwise delighted that Swedenergy and Svensk Fjärrvärme (the Swedish District Heating Association) have succeeded in agreeing on an energy efficiency policy during 2010. We now have a clear picture of how to approach improved efficiency in heating of buildings.

Henrik Wingfors gives us a quick rundown on the heating aspect. "There has been some give and take between Svensk Fjärrvärme and us. In new buildings we have agreed to take into account primary energy (PE), i.e. that electricity consumption is increased by a factor of 2.5 compared to the energy that is finally used. In renovation of older homes, we agree that improvements in the climate shield should be prioritized."

Another imperative undertaking during the year has been to influence the European Commission's action plan from 2006, which will be presented in a revised version in March 2011. Swedenergy's main line of argument has been that efficiency improvements must be made across all sectors of society, including transports, construction and industrial production.

"This is where a crucial consideration comes into the picture. Several of Swedenergy's member companies are active in the market for energy services and sell different types of services that help customers to save energy and therefore also money. But herein lies a problem," says Henrik Wingfors, and adds, "The rules in the Swedish Competition Act on public sector sales activities have created uncertainty about whether municipally-owned players have the right to do business in the energy services area. From our standpoint, it is only natural that these companies be permitted to operate in this market. They have in-depth expertise in energy and climate issues and can offer specially tailored services for the customers."

One development that is supported by neither Swedenergy nor Henrik Wingfors is the introduction of a white certificate scheme that has been promoted by the European Commission. These certificates can be traded between companies and entail an obligation for the energy companies to achieve an energy savings quota among their customers. Swedenergy fears that this could lead to expensive efficiency improvements if the measures are carried out according to a predetermined list instead of where they are most urgently needed, demanded and do the most good.

In the wake of the meter reform: "A great deal is happening"

In the wake of the meter reform, which went into effect on 1 July 2009, the pace of work on different types of metering issues has by no means slowed. On the contrary, according to Peter Takacs, who works with electricity metering technology at Swedenergy.

THE INDUSTRY COMPLETED THE REPLACEMENT of Sweden's 5.2 million electricity meters in time to meet the monthly metering requirement by 1 July 2009. The discussion now concerns the growing demand for hourly metering.

About this step, which is fast approaching, Peter Takacs says, "Hourly metering is an advantage for electricity customers since it gives them greater knowledge about their usage. But hourly metering alone will not make the customers more active and interested in their electricity consumption. For that to happen, we need to see the development of new information services, contract types, etc. The key to bringing about this change is that the individual customer also feel that the benefits outweigh the costs.

"Hourly metering is on the way, but the transition has to take place at reasonable pace and should not be rushed. It needs to be harmonized with other ongoing changes in the electricity market and it would be preferable if we could wait for an official decision on the upcoming Nordic end-user market and certain initiatives at the EU level regarding smart meters. Otherwise, there is a major risk that some of massive investments that have been made will be essentially wasted."

In the Energy Markets Inspectorate's work on hourly metering, Swedenergy has advocated a successive rollout with a focus on customer needs. The gist of Swedenergy's proposal is that the customers who want hourly metering should be able to obtain it at a low cost following a minor amendment to the Electricity Act. In this way, the market will also be given both time and opportunity to develop services and systems to handle hourly metering on a large scale.

SWEDAC, the new regulatory authority for electricity meters, has issued a number of stricter requirements of which that for accreditation for inspection of electricity meters represents the biggest change and has prompted an in-depth and well needed review of the industry's routines for inspection of electricity meters.

In order to meet these new and stricter requirements, the DSOs must quality assure more of their internal routines.

Peter Takacs comments, "In the past year Swedenergy has worked actively together with SP Technical Research Institute of Sweden to improve the industry's national random sampling and testing of electricity meters. In addition to the formulation of clearly defined instructions, the ELSA database – to which the DSOs report performance data from their electricity meters – has been improved and revamped. Effective routines for inspection of electricity meters are a fundamental source of confidence in the industry – the customers must be able to rely on their metering equipment."

One consequence of SWEDAC's accreditation requirement, effective 1 July 2010, has been an indirect need for double staffing in nearly all work on electricity metering systems. This in itself has proven highly resource-intensive and expensive, and has not resulted in any appreciable increase in customer benefit. On this point Swedenergy has repeatedly petitioned SWEDAC, which finally changed its position. As a result, the same individual in an inspection body can now perform both service and inspection, which will generate cost savings in the multi-millions.

"For me this was probably the single most satisfying event of the year. It allows the industry to avoid unnecessary requirements, creates to greater simplicity in work and inspections on category 2 to 5 metering systems and leads to substantial savings."

Peter Takacs notes that much more will be happening on the metering side in the future:

"The most significant trend, the one that the whole world is talking about, is related to smart metering and its role in realizing smart grids. As we prepare for this, we need to confront many new aspects that are not directly related to metering technology. I am thinking primarily of integrity aspects, data security, monitoring systems and much more."

After two tough winters in the electricity market: "We could really use a wet year"

Magnus Thorstensson is a market analyst at Swedenergy and Folke Sjöbohm works in the power system area. The conversation shifts immediately to the two past winters, which have sparked severe criticism of the power industry and the function of the electricity market.

MAGNUS THORSTENSSON speaks first:
"We can start by saying that we had a extremely long winter in 2010. Last winter began as early as November and extended far into April. Winter always leads to a direct increase in demand, and the ten weeks with the highest demand for electricity were recorded in the past two winters. In addition, the all-time weekly records were broken in the first week of 2010 with an electricity consumption of over 10 TWh in the Nordic region."

"Things have not functioned well on the supply side", says Folke Sjöbohm, "which has further fueled the debate. We had two cold periods with major problems in the nuclear power plants. And although the situation was better this winter, it wasn't good. It's fortunate that we have been able to import electricity, which is a clear signal that the market works. The Nordic region had a net import of close to 20 TWh in 2010."

Folke continues, "The criticism aimed at the power companies for selling water in the summer is also interesting. But much of the precipitation that fell during the summer could not be stored in any reservoir and had to be used directly in the power plants. A large share of this hydropower was sold to Norway, which was thus able to conserve its already low reservoir levels. In other words it was a measure that in fact saved water in the Nordic region, where the alternative would have been to discharge the water past the power plants."

A unique event took place last winter when the Swedish peak load reserve had to be activated on three occasions for a total of 8 hours when the market was unable to reach an equilibrium point, meaning that no balance could be reached in the supply and demand curves for electricity. This did not happen until Svenska Kraftnät offered electricity from the peak load reserve.

"It saved the day at that time. Immediately afterwards, the Swedish industries reacted by reducing their electricity consumption. What we learned from this is that the industrial sector can be involved from the start and cut back its usage. Things have gone more smoothly this winter," says Magnus Thorstensson.

In addition, price peaks during the winter affected household customers' choice of contract type. The trend towards variable rate contracts was broken and more households opted for fixed rate contracts. The market has also functioned from this perspective, in that consumers have acted according to the existing conditions.

What other new developments took place during the year? In November a giant step towards a common European electricity market was taken when the Nordic electricity market was integrated with the electricity markets in Belgium, France, Germany, Luxembourg and the Netherlands. Thanks to this cooperation between 17 different power exchanges and system operators, there is now a day-ahead market with a total annual production volume of 1,816 TWh, equal to approximately 60% of total European electricity consumption.

Many other issues have arisen in the electricity market. Among these Folke Sjöbohm mentions renewable electricity certificates, where Sweden and Norway are moving towards a common system, as well as greater transparency, electricity labelling and net billing of electricity microgenerators.

"And don't forget our efforts to communicate that Sweden will be split into four bidding zones in November 2011," adds Magnus Thorstensson. "This may be the biggest upcoming change in the electricity market."

As lastly, what can we otherwise wish for in the electricity market?

"It would be nice to have a real wet year, which would hopefully give the public and the media a better understanding of price formation," concludes Magnus Thorstensson.

Hydropower study "a way to highlight the importance of hydropower"

The hydropower study will be presented in the spring of 2011. After working for around one year, sole commissioner Thomas Korsfeldt will hand over his findings to the board of Swedenergy. The role of hydropower in a renewable energy system has been explored in the study, which will also provide proposals for preserving and developing hydropower's existing production and regulation capacity.

"THE STUDY is not focused exclusively on the current status but also on the ways in which hydropower can be developed in the future," says Gun Åhrling-Rundström, who is responsible for hydropower at Swedenergy. She is also part of Swedenergy's hydropower working group, which has among other things reviewed the preliminary proposals through the study's reference group.

According to Gun Åhrling-Rundström, this is a way to highlight the role of hydropower. Its importance as a source of regulating power, for example as more other forms of renewable power generation are integrated into the system, is becoming increasingly evident. The study will also be broad-based in that many different stakeholder groups with connections to hydropower have had the opportunity to express their views during its writing.

Gun further explains her reasoning on its breadth. "It is an ambitiously written directive. The results will illustrate the true breadth of hydropower. Hydropower is relevant from many perspectives, not least when discussing concepts like sustainability, climate change, renewability and biodiversity."

Although hydropower has been studied previously from several angles, the power industry has sought a connection specifically to the sustainable energy system. In response to this, Swedenergy took the initiative to launch a study according to the pattern used in government commissions. Former Center Party politician Thomas Korsfeldt, with a background as Director-General of the Swedish Energy Agency, was chosen for the task.

The study is important not least in view of the reassessment of terms in water court rulings initiated by the authorities and in connection with water rights cases where facility owners want to make changes. There is a risk that these reassessments will adversely affect both hydropower production and its regulating capacity.

Another featured aspect is the possible need for changes in the tax system and renewable energy certificates, i.e. the steering instruments that can affect the development of hydropower. The study also includes a look at the scope for incentives to increase acceptance for construction of new hydropower.

What will happen when the study is completed?

"We will then gather input from the member companies, after which the board of Swedenergy will take a position on our ongoing handling of the findings," says Gun Åhrling-Rundström and concludes by summing up why a study on hydropower is so vital.

"It sheds new light on hydropower regardless of how different stakeholders respond to the proposals in the study, and it can provide an opening for ongoing discussions. There is a keen interest in this issue and a need to understand the diverse roles of hydropower. It is definitely a plus to raise the level of knowledge."

A Nordic end-user market for electricity – an ambition for the Nordic energy ministers

A year of intensive study has been devoted to finding the optimal design for a common Nordic end-user market. The goal for NordREG, consisting of the Energy Markets Inspectorate and its Nordic counterparts, is to give the electricity suppliers a more prominent role. One key in determining how far we can go is what kind of billing regime should be applied. The outcome of this decision will form a basis for the final structure of the market model. The meeting of the Nordic energy ministers this autumn will be a valuable opportunity to compare notes.

GUNILLA STAWSTRÖM, who is responsible for these activities at Swedenergy, says, "NordREG is expected to recommend a common Nordic billing regime in the autumn of 2011. The industry will have the opportunity to express its view in a public consultation response at the beginning of the summer.

Gunilla Stawström describes the four alternative billing regimes:

- No harmonization, meaning that the billing regime is left out of the scope of the harmonization work.
- Mandatory separate billing, requiring one bill from the DSO and one from the electricity supplier.
- Mandatory combined billing, which would most likely mean a future market model where the electricity supplier is the customer's main point of contact.
- Some type of voluntary combined billing where the electricity supplier chooses whether to provide the customer with combined or separate billing.

One key priority for NordREG is that the DSOs maintain total neutrality towards electricity suppliers, meaning that a DSO may not favour electricity suppliers in its own corporate group. This is NordREG's short-term goal, while the more long-term goal is a model with combined billing for both the cost of network services and electricity.

Is it possible to realize a Nordic end-user market already by 2015, Gunilla?

"That depends on which solution is finally chosen. It is conceivable to have a future model in which only critical functions and processes are harmonized, which should be possible to achieve more quickly than a more far-reaching reform. But by any means, 2015 seems overly optimistic."

Swedenergy is actively participating in NordREG's work, not only through experts in all five working groups via representatives from the member companies but also in the project's steering group. Swedenergy's Nordic counterparts are similarly involved in this process. The same applies – aside from the regulators – to Svenska Kraftnät and the other Nordic transmission system operators.

Gunilla Stawström sums up her impressions from the process so far as follows:

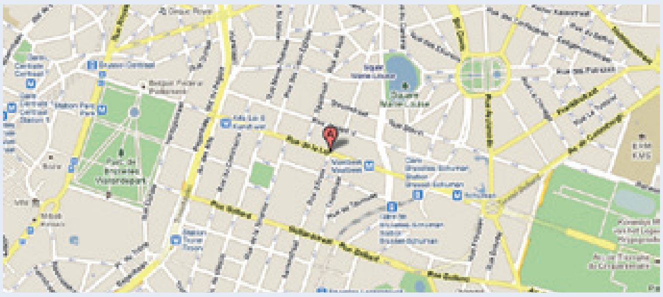
"The level of commitment from the member companies is gratifyingly high. The response has been enthusiastic when it comes to staffing the project groups and the reference group is growing steadily in size. In many ways, the Nordic end-user market is an important point of discussion for the members.

"We work in close dialogue with our member companies, but it has proven difficult to reach consensus. As a result, we are now aiming for a basic solution in which only the most critical aspects are harmonized. In this way, we hope to achieve a Nordic end-user market without having to change the market model."

Gunilla Stawström concludes by pointing out that although the emergence of a Nordic end-user market is a momentous change in many ways, it is a natural continuation of the path from deregulation, the EU's basic principles of free movement of goods and services and the fact that the raw power market is already Nordic. "I think that all of us who work in this area feel that we are building for the future."

From the energy industry's stronghold in Brussels: "Let us develop this work together"

The energy industry's stronghold at Rue de la Loi 227 in Brussels will be developed in close dialogue with the member companies. This is Sylvia Michel's ambition after close to a year on site as Swedenergy's representative. Sylvia wants to find working methods that raise the level of commitment and understanding among the member companies – not least the small and mid-sized players – since Brussels is the birthplace of the thoughts and ideas that later result in EU directives and Swedish laws.



WITH HER BACKGROUND AS MANAGING DIRECTOR of a small and local energy company, she is well aware that events in Brussels can seem far removed from the daily problems that must be addressed.

She says, "That is precisely what I want to try and change. From my lookout, I want to spread the new thoughts and ideas that are being discussed in the European Parliament and the European Commission at an early stage, before they have crystallized into fixed form. By then, it's too late to do anything and we in Sweden can only bring about marginal changes. My blog on Swedenergy's intranet provides impulses for those who are interested in following this work. There I would like to see an active flow of input back to me from the member companies in the spirit of dialogue.

"How to structure the details of our day-to-day work is something we need to try and influence before definitive proposals arrive. Otherwise, someone else will set the terms for our business and everyday activities. It's as simple as that!"

Sylvia Michel emphasizes that there is no need for the smaller member companies to plow through fat EU tomes. Instead, a more active involvement in Sylvia's work should provide sufficient insight. She is testing different ideas for how these activities should be organized and developed.

Sylvia Michel feels that there is a definite sense of direction among political decision-makers in both the Nordic region and Europe. The march toward a European energy market has just begun, but the goal is clear. The development of a common Nordic end-user market is just a step on the way.

Determined efforts are being made to incorporate the EU's third electricity and gas market package into Swedish legislation and there are already signals that a fourth electricity and gas market package is in the works.

Three weighty EU documents from November 2010 that will dominate discussions in the coming year are:

- "Energy 2020", a strategy that defines the framework for the coming years' ambitious goals and describes how the EU will progress from words to action. Energy conservation, an integrated internal market, security of supply, the necessity of a technology shift and stronger international cooperation are top priorities in the document.
- "The Energy Infrastructure Package", which describes the huge investments needed to enable a free flow of both electricity and gas in the future without remaining constraints in the transmission system. Special priority is given to four defined "electricity corridors". Two of these affect our region – a grid for offshore wind power in the North Sea with connections to Northern and Central Europe, and integration of the Baltic and European markets.
- At the beginning of 2011 the EU presented the updated action plan for energy efficiency.

Without a doubt, these three documents will strongly shape the industry's joint activities in Brussels. It is crucial to make our voice heard – in time.

Fast-growing support among young people for a career in the energy industry

The energy industry is increasingly attractive for a future career, as shown by Synovate's annual survey on behalf of Swedenergy. In the autumn of 2010, 65% of respondents in the age group 16–29 years agreed that young people are eager to work in the industry – an increase of 20 percentage points in the span of two years. The other age groups also showed higher confidence in the industry as a future employer.

THIS IS GOOD NEWS at a time when more and more industries are concerned about their ability to replace large numbers of retiring employees over the next few years.

For the past two years Swedenergy has been mobilizing its forces in the education and recruitment area in order to regain lost ground, an effort driven and coordinated by the Industry and Recruitment Council. Following the establishment phase in 2009, the council is now working on different ways to reach out to teachers, study/vocational guidance counselors and students with an accurate picture of the energy industry as an exciting career choice. The industry offers stimulating challenges for young people with skill and ambition.

"The industry's vision 'With electricity, anything is possible!' is underpinned by action and opportunities," says Gunilla Harrysson-Nellevad, who is responsible for educational and recruitment activities:

"It is a multifaceted industry with a wide range of important vocations. I also I think that the climate aspect and the ability to make a real contribution to a better environment and climate through a job in the industry are positive factors. In the year ahead it is vital to raise the tempo of activities in the regional networks. By doing so we can increase our leverage through the breadth and force of this work.

"With the available resources we have been able to build up an extensive fact bank with up-to-date teaching aids and printed materials, including some ten different films. We can provide the member companies' employees with effective fact-based materials so that they can visit local schools in the region and talk about energy. It's just a matter of daring!"

Much effort has spent in getting the Swedish Government to meet the industry's needs in the content of the new high school system. Swedenergy, the member companies and the EIO (the Swedish Association of Electrical Contractors) have won support for a vocational program (the Electricity and Energy Program) that will result in well trained power distribution electricians. One advantage is that it will have a combined focus on electricity and energy in which both electricity and heating are integrated in a high school program.

Through its position on the national program council for the Electricity and Energy Program, Swedenergy has gained a hearing for nationwide admission to the schools the industry regards as offering a good education in the power distribution area. A number of industries have alerted the Swedish National Agency for Education that university preparatory programs such as the Technology Program must provide qualification for engineering studies at the university level. The industry has also emphasized that the future manpower must have an adequate level of expertise. It is not sufficient to add a fourth year to a high school program and achieve the title of technical college graduate – this can't be compared to the former high school engineering programs that were discontinued 20 years ago.

Thanks to its seat on the board of Teknikum, which operates under the auspices of Stockholm University, Swedenergy has good potential to influence the technology curriculum – in terms of both structure and content – at the compulsory and high school levels. Through Teknikum, many close contacts with teachers have been established and will be made through a number of planned teacher meetings during 2011.

Several educational programs at the higher vocational level have been started thanks to the industry's efforts. Based on the labour market analysis carried out for the years from 2008 to 2014, Swedenergy has been able to confirm to the Swedish National Agency for Higher Vocational Education which vocational programs the industry can benefit from. It is important to unite the industry behind educational sites that it supports and is committed to. The Education and Recruitment Council has agreed on an analysis of which programs are needed and where in Sweden these programs should be located so that they don't "cancel each other out".

One particular highpoint of the past year was Swedenergy's agreement with the country's three northernmost universities – Luleå University of Technology, Umeå University and Mid Sweden University – to start a program in electric power engineering. The funders are 13 member companies with production interests in northern Sweden. In the autumn term of 2010 the Royal Institute of Technology's (KTH) started a university program in electrical engineering where the students can focus on electric power during years two and three. This came about after one year of negotiations. A range of other activities are also underway in the education and recruitment area:

- The Future Train" which rolled across the country last autumn to a total of 170 cities and reached 300 schools at the compulsory level. Here, Swedenergy has participated at every stop and the member companies were offered the chance to take part as local "inspirers". Through this initiative the industry has reached an estimated total of at least 30,000 pupils in grade nine.
- "The Future Choice", an interactive website where young people can find information about study options and industries, offers information events for study/vocational guidance counselors and teachers during the spring. We expect to reach at least 5,000 teachers through this forum.
- "The Society Builders", a collaborative platform for student job fairs together with six other industries: The Swedish Construction Federation, the EIO (the Swedish Association of Electrical Contractors), Lantmäteriet (the Swedish mapping, cadastral and land registration authority), the Swedish Federation of Consulting Engineers and Architects, the Swedish Transport Administration and the Swedish Association of Plumbing and HVAC Contractors. For the third consecutive year, job fairs were carried out in Stockholm, Gothenburg, Malmö, Umeå, Piteå, Östersund and Sundsvall. This successful collaboration attracts around 50,000 students every year.
- The National Museum of Science and Technology and "The Energy Game" – in which Swedenergy has been active throughout the entire three-year period. Here, Swedenergy showcases the power industry in a series of films. The exhibit has a central position in the museum, which attracts 200,000 visitors annually.

Over 7 ,000 educated by Swedenergy

In 2010 Swedenergy held 283 courses with over 7,000 participants. This translates into roughly 10,700 training days divided among the industry's approximately 20,000 employees.

EBR METHOD AND MACHINE DAYS NOW ON EXPORT

The event that attracted the most attention was EBR Method and Machine Days, which took place in the first week of June 2010 and gathered some 1,800 participants. Mats Andersson, Project Manager for the event in Västerås between 3 and 6 June, explains its success as follows:

"Aside from the sun that shone down on the outdoor exhibition area at Rocklundafältet in Västerås, it was thanks to all of the dedicated people who gave their time and energy. The host company Mälarenergi, the station managers from the member companies who created the content at the eight stations and the 80 or so exhibitors all contributed their products and expertise.

"The participants appreciated the arrangement with stations where different methods currently used by the DSOs were illustrated through practical demonstrations and where materials, tools and technology were displayed."

Mats adds, "As additional proof that this is a fantastic way to spread knowledge and experience, the Norwegians have now imported our concept and will carry out their own version of the event in June in cooperation with Swedenergy. Here at home we are preparing for 2014 when EBR Method and Machine Days will be held in Gävle in collaboration with Gävle Energi."

MAJORITY OF COURSES HELD REGIONALLY

A full 78% of the courses have been held locally and regionally and 22% in Stockholm. 49% were offered as open events for participants from different companies and 51% were company-specific.

The new ex ante regulation for DSOs led to 22 course days with nearly 600 participants. The BAS course for building environment coordinators was held on 40 occasions and attracted 770 participants.

Some ten professional arenas have been held for key occupational groups in the industry – such as Power Distribution Days, Electricity Market Days, Hydropower Days, Linemen's Meet and Customer Service Days.

NEW INFORMATION SERVICES FROM THE PUBLISHING HOUSE

Marie Wiklund, responsible for publishing activities at Swedenergy, looks back on a year of exhaustive development work. "An 'electrification' and modernization of our services is underway," she says.

"The biggest project has been to create a new online solution for EBR. It has been a demanding task, not least the migration of all EBR reports, of which there are close to 300. We have based our changes on user preferences and have for example improved the search function and simplified the navigation. Another new feature is that the users can select their own favorites and gather documents in the project."

Energi i Media – a condensed daily update of the news flow in the press and other media – has reached readers in 127 of the member companies/groups.

"Energi i Media will also be given a modern new platform. The users themselves will be able to decide how they want their news update – as a morning email, in an RSS flow or on the web. They can also choose which news topics and in what order the news is presented."

INDUSTRY MAGAZINES CONFIRM THEIR POSITION

ERA's circulation has happily increased (verified circulation of 12,600 copies) and the advertising inflow has recovered after a falling trend during the financial crisis," explains Marie Wiklund.

Tidningen El was published in three issues during 2010 and had a circulation of 400,000 copies per issue.

"It is rewarding that many power companies are seeing the potential to communicate with their customers through Tidningen El. For an unbelievably low contact cost of SEK 2.48, they engage their readers for an average of 20 minutes. This has been shown by a reader survey that we conducted," says Marie Wiklund.

Board of Directors

(at 31 December 2010)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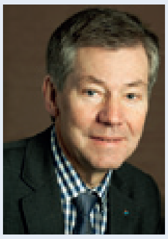
Chairman,
Göteborg Energi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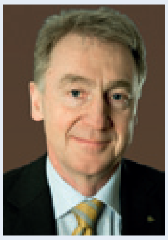
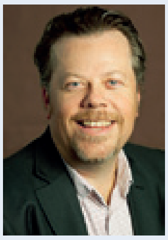
First Vice Chairman,
Mälarenergi


Anders Olsson,
Second Vice Chairman,
E.ON


Anders Ericsson,
Jämtkraft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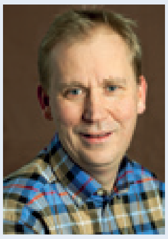
Mjölby-Svartådalen
Energi


Roger Johansson,
Uddevalla Energi


Anna Karlsson,
Kalmar Energi Elnät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Fortum


Johan Lundqvist,
Götene Elförening


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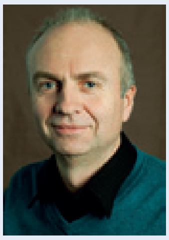
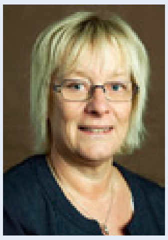
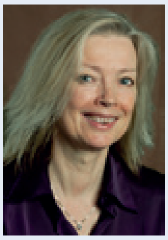

Göran Sörell,
Sundsvall Energi Elnät


Inger Wadström,
Närkes Kils Elektriska
förening


Torbjörn Wahlborg,
Vattenfall

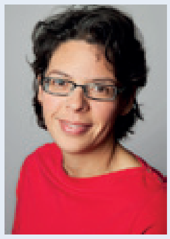

Inger Abrahamson,
SACO (The Swedish Confederation of Professional Associations)/ Sveriges Ingenjörer (The Swedish Association of Graduate Engineers), employee representative, replacement for Folke Sjöbohm.

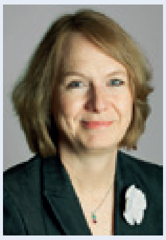

Folke Sjöbohm,
Unionen (Union for White-Collar Workers in the Private Sector), employee representative.

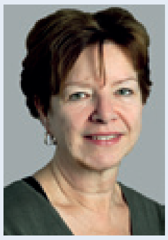
Secretariat Management


Kjell Jansson,
Managing Director


Bosse Andersson,
Production


Karima Björk,
(on leave of absence),
Trading & Sales


Eva Elfgren,
Competence &
Publishing


Catharina Götbrant,
Administration


Kalle Karlsson,
Communication


Christer Larsson,
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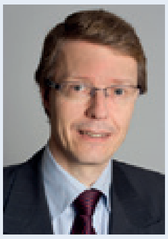
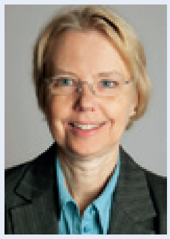

Anders Richert,
Distribution, Trading
& Sales


Maria Wärnberg,
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Regional Managers


Mats Andersson,
Region North


Helena Olssén,
Region Central


Hans-Christian Pedersen,
Region West


Paul Andersson,
Region South

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TABLE 8

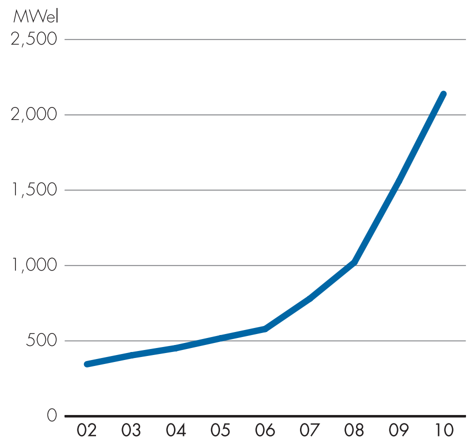
WIND POWER PLANTS IN 2010

Plant	Owner	Installed capacity MWel 2010	Total
Lillgrund	Vattenfall AB		110
Havsnäs	Havsnäs Vindkraft AB	+95	95
Stor Rotliden	Vattenfall AB	+78	78
Bodön 1–14	Bodön Vindkraftpark		35
Bliekevare Vind	Bliekevare Vind AB		32
Gässlingegrund	Flera		30
Storrun	Storrun Vindkraft AB		30
Uljabuouda	Skellefteå Kraft AB	+30	30
Hedbodberget Vind	Flera	+8	26
Hörnefors	Flera		25
Oxhult 1–12	Arise Windpower AB		24
Dragaliden	Dragaliden Vind AB		24
Fröslida	Arise	+22	22
Saxberget	Stena Renewable Energy AB		20
Röbergsfjället A–B	Stena Renewable Energy AB		16
Säliträdberget 1–8	Sälitrådberget Vind AB		16
Östra Herrestad	Vattenfall AB	+16	16
Brattön	Brattön Vind AB	+15	15
Hud 1–6	Rabbalshede Kraft AB		15
Others, not specified		+339	1,504
Decommissioned (mothballed, scrapped or sold)			
Total		**+603**	**2,163**

Sources: Swedish Energy Agency, Swedenergy

DIAGRAM 23

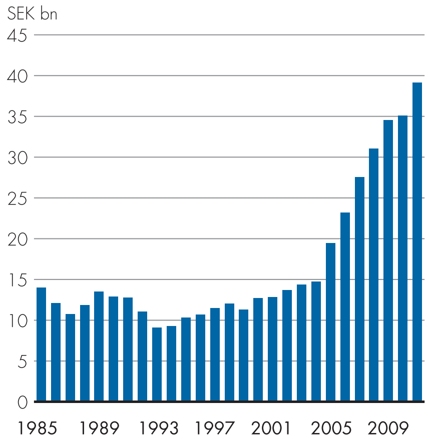
INSTALLED WIND POWER CAPACITY IN MW FOR THE PAST NINE YEARS



Source: Swedenergy

DIAGRAM 22

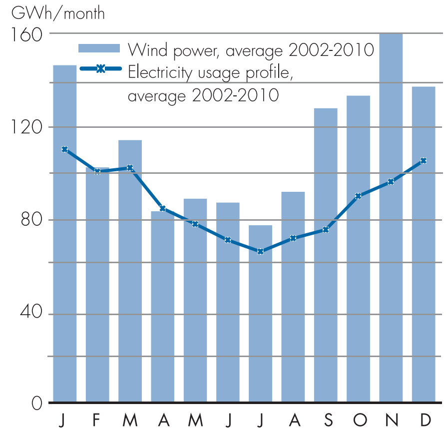
ENERGY INDUSTRY GROSS INVESTMENT IN CURRENT PRICES



Source: Statistics Sweden

DIAGRAM 24

AVERAGE MONTHLY GENERATION OF WIND POWER FOR THE PAST NINE YEARS IN RELATION TO THE ANNUAL ELECTRICITY USAGE PROFILE



Source: Swedenergy

TABLE 9

NUCLEAR POWER PLANT ENERGY AVAILABILITY FACTOR AND PRODUCTION

Reactor	Net capacity MW	Start-up	Energy availability 2006 %	2007 %	2008 %	2009 %	2010 %	Production 2006 TWh	2007 TWh	2008 TWh	2009 TWh	2010 TWh	Total production from start-up to 2010 TWh
Barsebäck 1	(600)	1975											92.7
Barsebäck 2	(600)	1977											111.5
Forsmark 1	978	1980	76.5	81.3	81.4	90.1	93.8	6.7	7.0	7.0	7.6	8.0	212.8
Forsmark 2	990	1981	72.3	85.7	79.7	64.1	38.5	6.0	7.5	6.9	5.5	3.3	201.7
Forsmark 3	1,170	1985	94.3	88.2	69.7	86.1	81.4	9.6	9.0	7.1	8.8	8.3	227.9
Oskarshamn 1	473	1972	51.3	64.1	88.3	70.5	79.0	2.1	2.6	3.5	2.8	3.2	95.2
Oskarshamn 2	638	1974	79.7	77.7	88.7	77.9	92.0	4.1	4.0	4.5	3.9	5.0	148.1
Oskarshamn 3	1,200	1985	96.7	89.5	71.4	15.2	32.0	9.5	8.8	7.1	1.7	3.8	211.2
Ringhals 1	854	1976	89.8	81.4	62.0	17.4	48.7	6.5	6.0	4.5	1.3	3.6	170.3
Ringhals 2	866	1975	91.4	85.0	79.6	39.1	80.3	6.8	6.4	5.7	2.8	5.6	188.3
Ringhals 3	1,048	1981	81.6	66.7	88.5	91.3	83.7	6.6	6.0	7.6	8.1	7.6	187.8
Ringhals 4	934	1983	90.8	90.8	91.0	92.8	89.3	7.1	7.2	7.3	7.5	7.2	183.3
	9,151		**84.6**	**83.3**	**79.0**	**64.0**	**70.1**	**65.0**	**64.3**	**61.3**	**50.0**	**55.6**	**2,030.7**

Sources: OKG, Ringhalsgruppen, Forsmarks Kraftgrupp

Once completed, the dams will be in better condition than when newly built and will be ready for another approximately 100 years of operation.

Skellefteå Kraft is investing in new turbine and control equipment at the Selsfors G1 power station during 2011. Within the next ten years there are plans for a number of turbine and generator upgrades and the replacement of several more control systems. Skellefteå Kraft will also invest an additional sum of around SEK 20 billion in dams over the next five years. Among other things, these investments are aimed at improving the discharge safety and stability of the facilities.

The installed capacity in the country's hydropower stations at year-end 2010 was approximately 16,200 MW. Many smaller power plants were built during the year. *Table 7,* page 24, provides more detailed information about the installed hydropower capacity per river.

INSTALLATION RECORD FOR WIND POWER

The contribution of wind power to Sweden's electricity production in 2010 was 3.5 TWh, up by approximately 40% over the preceding year and equal to 2.5% of the country's annual electrical production. More than 300 new wind power plants went into operation during the year and at the end of 2010 there were some 1,700 wind turbines in the country with an output of more than 50 kW each. Generating capacity of more than 600 MW was added and the total installed wind power capacity at year-end 2010 was approximately 2,163 MW. Wind generating capacity has grown at rate of around 10% annually in recent years, but increased significantly more during 2010. The major wind power farms and data on changes in 2010 are shown in *Table 8. Diagram 23* shows the trend over the past few years.

The average monthly values for wind-generated power during the period 2002-2010 show how closely wind power production matches the electricity user profile during the year, *Diagram 24.* Wind power output is somewhat higher at the end of the year when all of the year's new generation capacity is included in the total.

In a future system with increased wind power output, it will be necessary to have a greater interplay with other power types and an exchange of electricity with neighbouring countries. It is primarily in the short-term perspective (hours, up to a few days) that wind power must be coordinated with other electricity generation, of which hydropower will play a key role.

NUCLEAR POWER – A YEAR OF MAJOR REINVESTMENTS

Sweden's nuclear power production in 2010 reached 55.6 TWh (50 TWh in 2009). *Table 9* shows the nuclear power plants' Energy Availability Factor (EAF) and production for the years 2006-2010 and total production per reactor from the year of start-up.

The average EAF at the ten Swedish reactors in 2010 was a low 70.1%, but was higher than in 2009. This can be compared to a global average of 75% for nuclear power plants of similar types. The country's installed nuclear power capacity was 9,342 MW at the beginning of 2010 and 9,151 MW at the end of the year.

Barsebäck

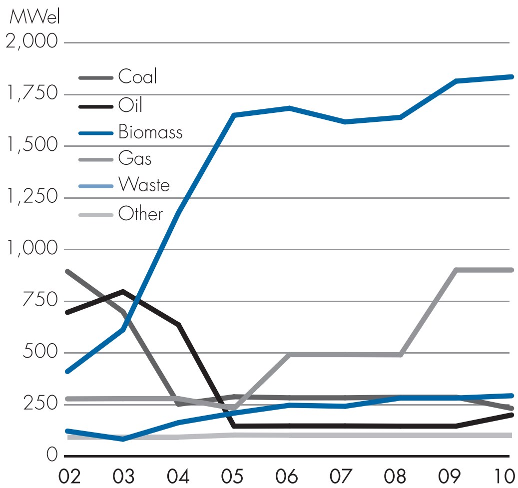
For the new few years Barsebäck will be in service operation, i.e. a situation in which the owners are managing the plant in the safest possible manner until it can be demolished. According to plans, the demolition will begin around 2020 at the earliest.

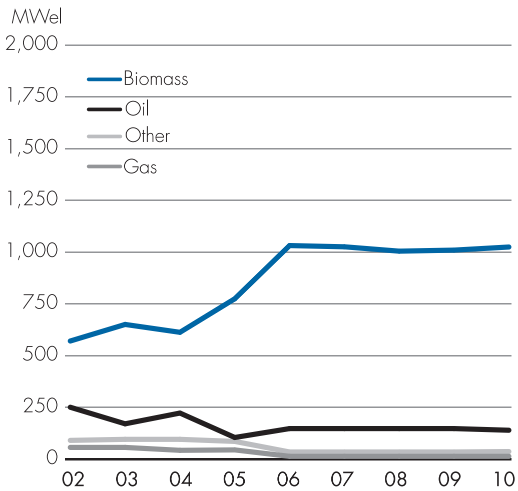
Forsmark

In 2010 Forsmark celebrated 30 years in operation. On 31 January the nuclear power plant's three reactors achieved a combined production of over 600 TWh. This means that since opening in 1980, Forsmark has generated a volume of electricity equal to Sweden's total consumption during a period of

DIAGRAM 25

INSTALLED POWER GENERATION CAPACITY IN COGENERATION DISTRICT HEATING (AT LEFT) AND INDUSTRIAL BACK-PRESSURE PLANTS 2002–2010





Source: Swedenergy

four years. Total production in 2010 was 19.6 TWh, which is equal to household electricity for around four million homes.

Production for 2010 was 4.3 TWh lower than planned, mainly owing to problems with vibrations on high-pressure turbine inlet valves at Forsmark 2 during the year. A valve replacement was completed in November and since then the reactor has operated at full capacity.

Forsmark had an EAF of 71.8% in 2010, compared to 80.5% in 2009. The lower EAF in 2010 is mainly explained by the fact that Forsmark 2 was operated at reduced capacity during much of the year due to problems with the high-pressure turbine inlet values. It is worth noting that Forsmark 1 achieved an EAF of 93.8% during the year, which is good even from an international perspective.

Oskarshamn

Production at OKG did not reach the anticipated levels in 2010, although production was higher than in 2009. OKG's net production volume was a total of 12.1 TWh, an increase of more than 3.5 TWh over 2009. The combined EAF for 2010 was 56%, compared to 43% in 2009.

However, Oskarshamn 2 set a new annual production record of over 5 TWh and achieved an EAF of 92%. Two daily production records were broken in the autumn, with a high of 15.9 GWh on 5 December.

On 30 June 2010 Oskarshamn 3 reached a historically high output level of 1,260 MWel during the ongoing trial operations period and on 23 November Oskarhamn 1 had produced more than 100 billion kWh since the reactor's start-up in 1972.

The year's production at O1 resulted in a net production of 3.2 TWh, which did not fully correspond to the budgeted level. One reason for the unit's production loss was an extended maintenance shutdown that started on 15 August and was completed on 26 September, rather than the planned date of

TABLE 10

COMMISSIONED COGENERATION PLANTS IN DISTRICT HEATING SYSTEMS 2010

Plant	Owner	Installed capacity, MWel
Jordbro	Vattenfall AB	+20
Boländerna, Uppsala	Vattenfall AB	+10
Other unnamed changes		+1
Decommissioned (mothballed, scrapped or sold)		–1
Total		**+30**

Source: Swedenergy

TABLE 11

COMMISSIONED COGENERATION PLANTS IN INDUSTRIAL PROCESSES 2010

Plant	Owner	Installed capacity, MWel
Fiskeby	Fiskeby Board AB	+10
Other unnamed changes		+16
Decommissioned (mothballed, scrapped or sold)		- 6
Total		**+20**

Source: Swedenergy

TABLE 12

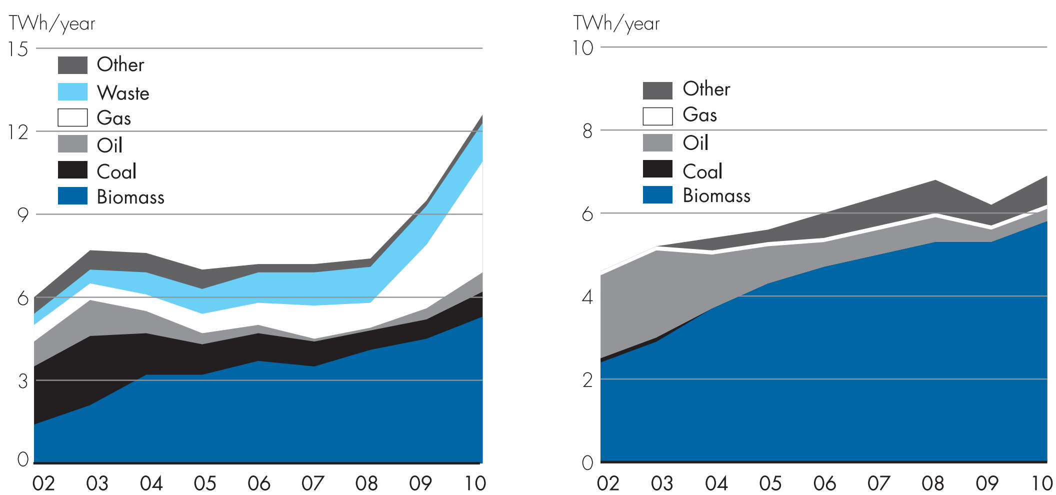
CONDENSING POWER PLANTS IN 2010

Plant	Owner	Installed capacity, MWel	Fuel
Stenungsund	Vattenfall AB	–270	Oil
Marviken	Vattenfall AB	–200	Oil
Total		**–470**	

Source: Swedenergy

DIAGRAM 26

POWER PRODUCTION BY FUEL TYPE IN COGENERATION DISTRICT HEATING AND INDUSTRIAL BACK-PRESSURE PLANTS 2002–2010



Source: Swedenergy

TABLE 13 A

INSTALLED CAPACITY IN SWEDISH POWER PLANTS, MW

	31 Dec. 2009	31 Dec. 2010
Hydropower	16,203	16,200
Wind power	1,560	2,163
Nuclear power	9,342	9,151
Other thermal power	8,608	8,187
- CHP, industrial	1,199	1,216
- CHP, district heating	3,531	3,563
- condensing power	2,271	1,801
- gas turbines, etc.	1,607	1,607
Total	**35,713**	**35,701**
Added	+1,578	+685
Subtracted	-46	-697

Source: Swedenergy

TABLE 13 B

INSTALLED CAPACITY IN SWEDISH POWER PLANTS BY FUEL TYPE, MW

	31 Dec. 2009	31 Dec. 2010
Nuclear power	9,342	9,150
Fossil power	5,502	5,035
Renewable power	20,869	21,516
- hydropower	16,203	16,200
- waste	282	293
- biomass	2,824	2,860
- wind power	1,560	2,163
Total	**35,713**	**35,701**
Added	+1,578	+685
Subtracted	–46	-697

Source: Swedenergy

TABLE 14

MEMBER COMPANY POWER ASSETS IN SWEDEN, MW, 1 JANUARY 2011

Company	Hydropower	Nuclear power	Wind power	Other thermal power	Total
Vattenfall AB	7,941	4,682	261	668	13,552
E.ON Sverige AB	1,788	2,668	18	2,078	6,552
Fortum Power and Heat AB	3,135	1,690	0	994	5,819
Statkraft Sverige AB	1,261	0	0	1	1,262
Skellefteå Kraft AB	667	62	32	77	838
Mälarenergi AB	56	0	0	513	569
Göteborg Energi AB	0	0	4	308	312
Jämtkraft AB	211	0	11	46	268
Tekniska Verken i Linköping AB	93	0	0	170	263
Holmen Energi AB	253	0	0	0	253
Umeå Energi AB	153	0	33	57	243
Öresundskraft AB	3	0	0	125	128
Karlstads Energi AB	24	49	0	34	107
Söderenergi AB	0	0	0	94	94
LuleKraft AB	0	0	0	90	90
Sundsvall Elnät AB	0	0	0	74	74
Växjö Energi AB	0	0	0	50	50
Sollefteåforsens AB	49	0	0	0	49
Borås Elnät AB	12	0	0	34	46
Jönköping Energi Nät AB	20	0	0	23	43
Övik Energi AB	0	0	0	40	40
Gävle Energi AB	15	0	1	23	39
Eskilstuna Energi & Miljö AB	0	0	0	39	39
Kalmar Energi Elnät AB	0	0	1	32	33
Lunds Energikoncernen AB (publ)	0	0	4	26	30
Other member companies	118	0	59	173	351
Total	**15,799**	**9,151**	**424**	**5,769**	**31,144**
NON-MEMBER COMPANIES					
Svenska Kraftnät	0	0	0	640	640
Södra Cell	0	0	0	235	235
Billerud	0	0	0	150	150
Stora Enso	0	0	0	150	150
SCA	0	0	0	97	97
Havsnäs vindkraft AB	0	0	95	0	95
Holmen	0	0	0	90	90
Others	401	0	1,644	1,056	3,285
Total Sweden	**16,200**	**9,151**	**2,163**	**8,187**	**35,701**

Source: Swedenergy

21 September. The somewhat prolonged shutdown was partly caused by additional work on diesel generators for back-up power. The EAF for O1 was 79%.

In 2010 O2 produced a net total of 5.0 TWh and the year's maintenance shutdown went largely according to plan.

O3 had a net production of 3.8 TWh during the year, which can be compared to a planned volume of over 10 TWh. The EAF was only 32%. Most of the loss is attributable to the problem areas that were discovered during the trial operations period following the extensive modernization, such as vibrations in the turbines and steam lines and regulating problems in the feed water tank. The new turbine bearings were found to have a deficient design that resulted in a bearing breakdown. To nonetheless ensure safe operations and the highest possible production during the cold winter season, OKG undertook a prolonged shutdown to carry out a number of measures on the oil systems that provide the bearings with oil and replace the damaged bearing segments with new ones.

Ringhals

In 2010 Ringhals produced a combined 24 TWh and accounted for one sixth of Sweden's total electrical production during the year.

2010 will not go down in history as one of the best for Ringhals, but the year's production can be regarded as fairly satisfactory considering that two of the four reactors were offline for modernization during the first three months of the year.

Ringhals 1 and Ringhals 2 started 2010 by completing the previous year's comprehensive and time-consuming safety enhancement program. After the fact, it is clear that the modernizations, not least the transition to a whole new digital control room at R2, have been successful. However, the extended shutdown coincided partly with the coldest winter in several years.

In 2010 Ringhals 3 achieved its fourth and Ringhals 4 its third best production year of all time. At R3, a new digital control and monitoring system for the turbines was installed during the maintenance shutdown.

Ringhals 1 once again had an extensive maintenance shutdown on both the turbine and reactor side. R1 was restarted in December after being offline for over two months and was also shut down during the summer for the yearly testing required by the supervisory authorities.

FUEL-BASED PRODUCTION UP SLIGHTLY

Fossil fuels include oil, coal and natural gas. Peat is normally also regarded as a fossil fuel but is classified separately in Sweden. Biomass fuels include wood waste, energy forest, one-year crops, agricultural waste and recycled lignin (a by-product extracted from wood chips during cooking of pulp in the cellulose industry).

Combustion of biomass fuels offers environmental advantages in that the amount of carbon dioxide stored in trees and other plants as they grow is equal to the amount they release when burned. Provided that this balance is maintained, biomass fuels make a zero contribution to the greenhouse effect.

In 2010 electricity generated from other thermal power (fossil and biomass fuels) amounted to 19.7 TWh (15.9 in 2009), equal to nearly 14% of Sweden's total electrical production. Of this, 12.5 TWh (9.3) was produced in cogeneration district heating plants and 6.4 TWh (5.9) in industrial CHP (back-pressure) plants.

Diagrams 25 and 26 show the installed capacity and power generation by fuel type used in cogeneration district heating and industrial back-pressure plants. As a rule, the installed capacity *(Diagram 25)* is determined by the primary fuel type used in the plant. The energy statistics can be somewhat misleading, depending on how the fuel is allocated between electrical power and heat generation. Prior to the introduction of renewable energy certificates (RECs), a large share of fossil fuels was allocated to power production. In other words, the trends are reinforced by the fact that certain statistics providers must take other steering instruments into account.

The condensing power plants and gas turbines, which generate only electricity, produced a total of 0.8 TWh (0.7) in 2010.

A few new power plants were commissioned during 2010, two of which by companies with no previous ownership in electricity generation. The decrease in installed capacity, as shown in *Diagram 25*, can be explained either by the fact that existing plants are using fuels other than those they were originally designed for, or that they have been mothballed. *Table 10* shows capacity additions and other changes during the year. A few major plants that are under construction and are expected to be commissioned during 2011, such as the Säversta plant (9 MWel).

The Swedish forestry industry's previously ambitious investment spending on new turbines and generators has decreased. The only plant to be completed in 2010 was Fiskeby Board, see *Table 11*. *Table 12* shows that the two condensing power plants in Marviken and Stenungsund were decommissioned.

INSTALLED CAPACITY

The aggregate installed capacity in the country's power stations at the end of the year was 35,701 MW (excluding diesel backup generators in hospitals, hydropower plants, etc.), divided between the various types listed in *Table 13A*, or by fuel type according to *Table 13B*. The total installed capacity consists of 45% hydropower, 6% wind power, 26% nuclear power and 23% other thermal power.

Table 13B, showing installed capacity by fuel type, is somewhat misleading since the primary fuel is denoted for the entire capacity while in reality many plants use several different fuels simultaneously.

Due to hydrological limitations, etc., it is not possible to utilize the entire installed capacity at the same time. During certain parts of the year, there are also constraints in physical grid transmission from northern to central and southern Sweden. Furthermore, some capacity must be reserved to regulate voltage in the power grid and deal with disturbances.

In order to continuously secure the power supply and avoid power shortages, reserve power at least equivalent to the output of one of the country's largest power plants must always be available. International connections enable neighbouring countries to quickly assist each other in the event of contingencies.

Table 14 also shows how the installed capacity in the country's power stations is divided between the member companies in Swedenergy and other companies.

TABLE 15

LARGEST ELECTRICITY PRODUCERS IN SWEDEN – PRODUCTION IN SWEDEN 1998–2010, TWh

	1998	2000	2002	2004	2006	2007	2008	2009	2010
Vattenfall	75.6	69.3	70.3	70.4	63.8	64.4	66.0	58.7	61.5
Fortum, Sverige	29.1	27.8	24.5	24.0	27.1	26.0	27.9	25.1	26.7
Birka Energi		21.4							
Stockholm Energi	11.1								
Gullspång Kraft	11.3								
Stora Kraft	6.7	6.4							
E.ON	33.3	30.4	30.9	33.9	30.0	31.9	29.8	22.3	27.7
Sydkraft	30.4	27.2	28.5						
Graninge	2.9	3.2	2.4						
Statkraft Sverige					1.2	1.3	1.3	5.3	5.4
Skellefteå Kraft	2.7	2.9	3.4	3.1	3.1	3.4	3.3	3.3	3.2
Total	**140.7**	**130.4**	**129.1**	**131.4**	**125.2**	**127.0**	**128.3**	**114.7**	**124.5**
Share of total	91.2%	91.9%	90.1%	88.3%	89.2%	87.6%	87.9%	85.8%	85.9%
Total production	**154.2**	**141.9**	**143.3**	**148.8**	**140.4**	**145.0**	**146.0**	**133.7**	**145.0**

Generation in wholly owned, partly owned with a deduction for minority shares and addition/subtraction of replacement power.

Source: Swedenergy

TABLE 16

LARGEST ELECTRICITY PRODUCERS IN SWEDEN – PRODUCTION IN NORDIC REGION 1998–2010, TWh

	1998	2000	2002	2004	2006	2007	2008	2009	2010
Vattenfall			70.6	70.9	68.3	72.7	73.5	67.0	70.3
Fortum			46.5	50.7	51.8	49.3	49.9	46.2	48.5
Statkraft			–	26.2	38.6	35.8	41.9	42.0	45.0
E.ON			30.9	34.0	30.1	32.4	30.2	22.6	28.1
Skellefteå Kraft			3.5	3.5	3.5	3.9	3.8	4.1	3.6
Total			**151.5**	**185.3**	**192.3**	**194.1**	**199.3**	**181.9**	**195.5**
Share of total			39.6%	48.9%	50.8%	48.8%	50.1%	49.3%	51.0%
Total production	**364.1**	**383.5**	**382.8**	**379.2**	**383.9**	**397.3**	**397.5**	**368.8**	**383.1**

Generation in wholly owned, partly owned with a deduction for minority shares and addition/subtraction of replacement power.

Source: Swedenergy and Nordel

TABLE 17

ELECTRICAL ENERGY BALANCE 2006–2010, NET TWh, ACCORDING TO STATISTICS SWEDEN

	2006	2007	2008	2009	2010*
Domestic production	140.3	145.0	146.0	133.7	145.0
Hydropower	61.1	65.6	68.6	65.3	66.2
Wind power	1.0	1.4	2.0	2.5	3.5
Nuclear power	65.0	64.3	61.3	50.0	55.6
Other thermal power	13.3	13.7	14.1	15.9	19.7
CHP, industrial	5.5	6.1	6.2	5.9	6.4
CHP, district heating	6.9	7.1	7.2	9.3	12.5
Condensing power	0.9	0.5	0.7	0.7	0.8
Gas turbine, diesel, etc.	0.01	0.03	0.02	0.02	0.03
Pump power	-0.05	-0.03	-0.03	-0.03	-0.02
Domestic usage	146.3	146.3	144.0	138.4	147.1
Transmission losses	11.0	10.7	10.5	10.2	11.0
Electricity from neighbouring countries	20.5	18.5	15.6	16.4	17.6
Electricity to neighbouring countries (-)	-14.4	-17.2	-17.6	-11.7	-15.6
Net exchange with neighbouring countries **	6.1	1.3	-2.0	4.7	2.1

** Preliminary data from Swedenergy, **Negative values are equivalent to export*

Sources: Swedenergy and Statistics Sweden

RENEWABLE ELECTRICITY GENERATION

Diagram 27 shows that the percentage of renewable electricity generation in the form of hydro, wind and biomass-based thermal power in Sweden is over 50%. If nuclear power is included the percentage of CO_2-free electricity generation is 95%, which means that only 5% of Sweden's electricity generation utilizes fossil-based or other fuels. This percentage is difficult to reduce since the fuel is used mainly in gas turbines, condensing power plants and as support fuels for start-up of cogeneration plants, of which the first two belong to the category of disturbance and capacity reserves.

ELECTRICITY PRODUCERS

In total, the Swedish state owns approximately 40% of the country's power generation capacity, non-Swedish owners around 40%, municipalities around 12% and others roughly 8%, *Diagram 28*. *Diagram 29* shows that the earlier rising trend in foreign ownership has been replaced by an increase in municipal and other ownership.

Acquisitions and mergers have progressively reduced the number of major electricity producers over the past 20 years, a structural rationalization that has led to a strong concentration of power generation assets. The Nordic region's five largest electricity producers with operations in Sweden accounted for around 124.5 TWh, or 85.4%, of Sweden's total electrical production.

In the production figures shown in *Table 15*, minority shares have been omitted and leased electricity production is included only for the company utilizing this production. *Table 16* shows the same companies from a Nordic perspective. Their share of total Nordic electricity generation is 51%.

Diagram 30 shows the five largest electricity producers active in Sweden and their total production in the Nordic region during 2010. These account for over 50% of all electricity generation.

THE POWER BALANCE

The weekly power balance for the years 2008-2010 is shown in *Diagrams 31 and 32*. Production is divided between hydropower, wind power, nuclear power and other thermal power. Development since 2006 is shown in *Table 17*.

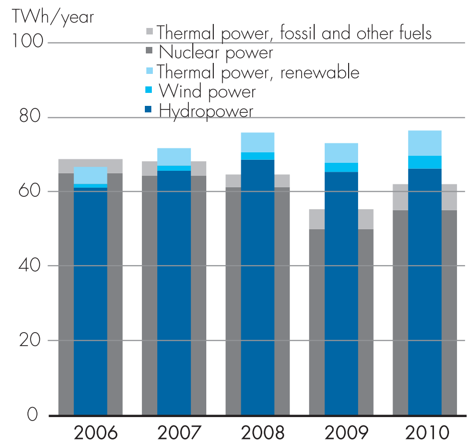
Diagram 31 shows the spread of electricity production over the past three years to cover the domestic power requirement and variations in Sweden's net electricity exchange with neighbouring countries during the year. The difference between electricity consumption and total electricity production represents the net inflow of electricity to Sweden (when electricity consumption exceeds total production) or the net outflow of electricity from Sweden (when total production exceeds consumption).

Hydropower is utilized relatively evenly over the year in that the reservoirs are filled during the spring and summer and the energy stored in the reservoirs is used throughout the winter until the next year's spring flood. Maintenance shutdowns at the nuclear power plants are carried out during the summer, when electricity usage is low. Other thermal power consists almost entirely of CHP plants with the bulk of production during the winter when the district heating requirement is high.

Of total electricity production in 2010, hydropower accounted for 46%, wind power for around 2.5%, nuclear power for 38% and other thermal power for just over 13%.

DIAGRAM 27

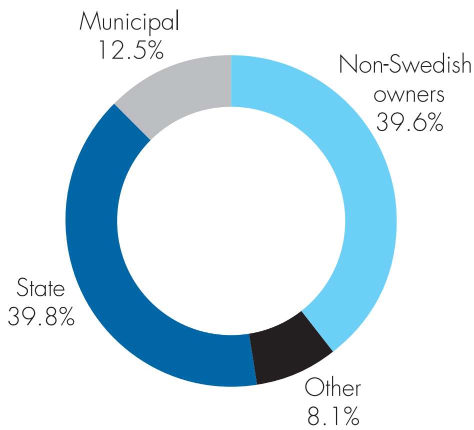
DEVELOPMENT OF RENEWABLE ELECTRICITY GENERATION



Source: Swedenergy

DIAGRAM 28

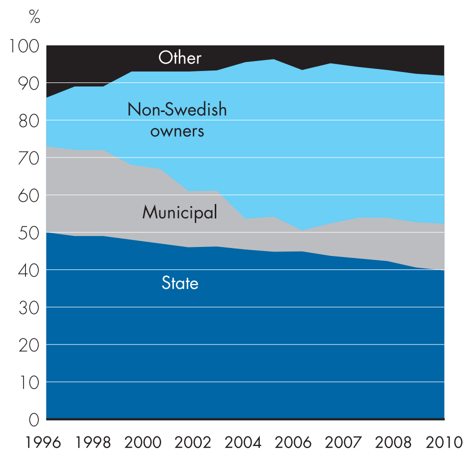
OWNERSHIP OF GENERATION CAPACITY, VALUES FOR 2010



Source: Swedenergy

DIAGRAM 29

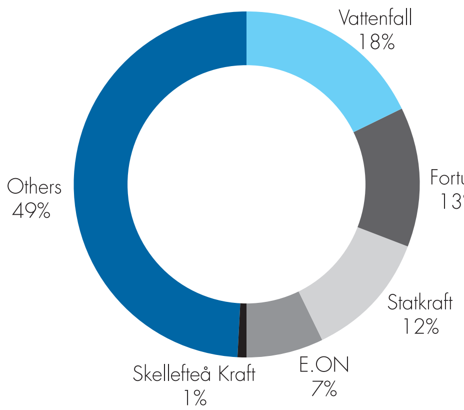
CHANGES IN OWNERSHIP OF ELECTRICITY GENERATION 1996–2010



Source: Swedenergy

DIAGRAM 30

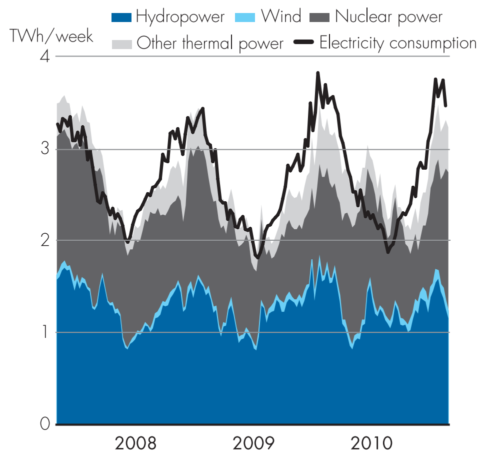
FIVE LARGEST ELECTRICITY PRODUCERS IN SWEDEN – PRODUCTION IN NORDIC REGION IN 2010



Source: Swedenergy

DIAGRAM 31

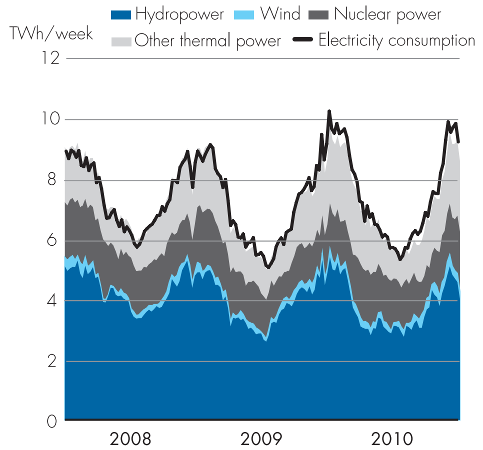
ELECTRICITY GENERATION AND CONSUMPTION IN SWEDEN 2008–2010, TWh/WEEK



Source: Swedenergy

DIAGRAM 32

ELECTRICITY GENERATION AND CONSUMPTION IN NORDIC REGION 2008–2010, TWh/WEEK



Source: Nord Pool

Diagram 32 shows how electricity production is spread over the year in order to cover the power requirement in the Nordic market. The most significant differences in the production mix compared to Sweden are a larger share of other thermal power and a proportionately higher share of wind power in the Nordic region.

The peak hourly load in the electricity system during 2010 was recorded on 22 December between 5 and 6 p.m. and reached approximately 26,700 MWh per hour, which can be compared to the previous year's peak of 24,500 MWh per hour.

The weighted average daily temperature in the country on 22 December was -15.2 °C, which is 12.3 °C colder than normal. The hourly load profile for 22 December is shown in *Diagram 33*, where two typical 24-hour periods, one winter and one summer, are presented for the sake of comparison.

Electricity consumption on weekdays generally has two peaks, one at 8 a.m. and one at 5 p.m. Due to the use of electric heating, the temperature has a strong influence on electricity consumption in Sweden. The amount of electrical energy used on a winter weekday is twice that consumed on a Saturday or Sunday during the summer.

The rise in electricity consumption on a warm summer day due to increased use of fans and air conditioning, irrigation, etc., is still insignificant compared to the effects of a winter month in the form of higher electricity usage for heating.

ELECTRICITY EXCHANGE

Following deregulation of the Swedish electricity market in 1996, the country's exchange of electricity with neighbouring countries is accounted for in terms of physical (measured) values by country, with the sum of net exchanges specified by the hour and point of exchange. Svenska Kraftnät is responsible for this reporting.

Graph 1 shows the Swedish national grid's transmission capacity to the respective neighbouring countries defined in MW. As a result of constraints in the interconnecting grids, the capacity of cross-border connections can differ depending on the direction in which electricity is transmitted. The graph is a schematic representation; in reality Sweden has a number of separate links to each country.

In 2010 Sweden's inflow of electricity from neighbouring countries increased to 17.7 TWh (16.4 in 2009). The outflow of electricity from Sweden increased to 15.6 TWh (11.7 in 2009), resulting in a net inflow of 2.1 TWh (net inflow of 4.7 in 2009), see *Table 18*. The electricity flow data for 2010 shows that Sweden had a varying in- and outflow during the year, see also *Diagram 34*. The exchange between the Nordic region and other countries resulted in a net import of approximately 19.4 TWh, see *Table 19*.

Graph 2 shows the Swedish national grid placed within the Nordic transmission system. This expansion also increases the number of neighbouring countries to include interconnections with Russia, Estonia and in 2009 also the Netherlands. The link with Russia has been, and is currently, a one-way export to the Nordic region. Depending on developments in the Russian electricity market, however, it is conceivable that electric power could be transmitted in both directions in the future.

TABLE 18

ANNUAL VALUES FOR SWEDISH ELECTRICITY EXCHANGE WITH DIFFERENT COUNTRIES IN 2010

TWh	To Sweden		From Sweden	
Denmark	5.0	(3.1)	2.8	(3.8)
Finland	5.7	(4.1)	3.0	(2.9)
Norway	4.2	(7.8)	8.0	(2.6)
Poland	0.5	(0.3)	0.8	(1.4)
Germany	2.3	(1.1)	1.0	(0.9)
Total	**17.7**	**(16.4)**	**15.6**	**(11.7)**

(Data for 2009 in brackets).

Source: Svenska Kraftnät

TABLE 19

ANNUAL VALUES FOR NORDIC ELECTRICITY EXCHANGE WITH DIFFERENT COUNTRIES IN 2010

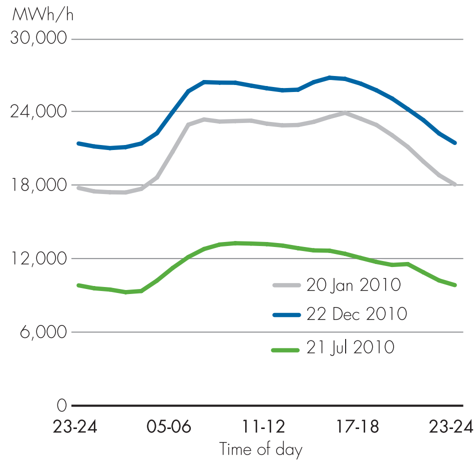
TWh	+ To/ – From Nordic region	
Estonia	1.7	(1.7)
Netherlands	0.6	(–1.5)
Poland	0.3	(–1.1)
Russia	11.8	(11.7)
Germany	5.0	(–2.6)
Total	**19.4**	**(8.2)**

(Data for 2009 in brackets).

Source: Nord Pool

DIAGRAM 33

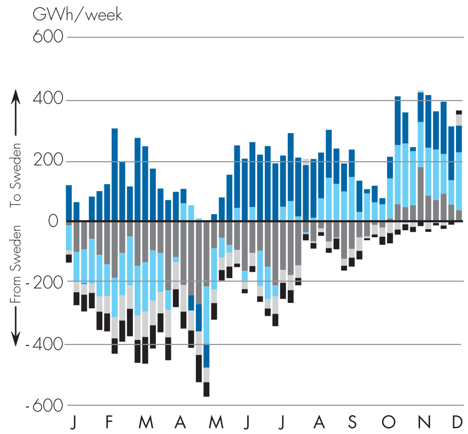
HOURLY LOAD PROFILE FOR ELECTRICITY USAGE WITH PEAK DEMAND IN 2010 AND TYPICAL 24-HOUR PERIOD IN WINTER AND SUMMER



Sources: Svenska Kraftnät and Swedenergy

DIAGRAM 34

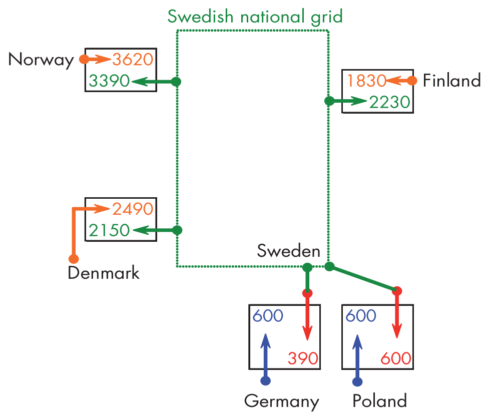
NET FLOW OF ELECTRICITY TO AND FROM SWEDEN PER COUNTRY IN 2010, GWh/WEEK



Source: Svenska Kraftnät

GRAPH 1

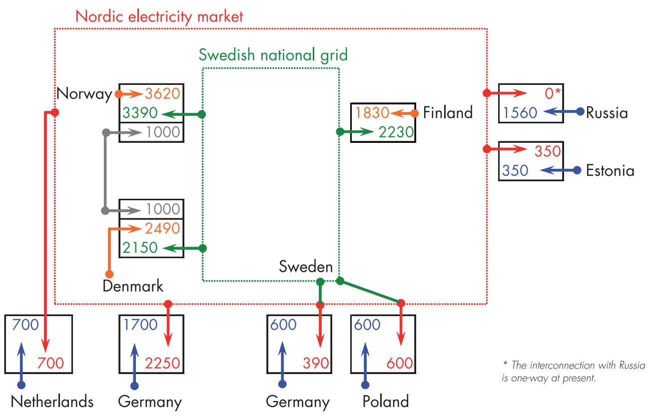
TRANSMISSION CAPACITY BETWEEN SWEDEN AND NEIGHBOURING COUNTRIES, MW



Source: Svenska Kraftnät

GRAPH 2

TRANSMISSION CAPACITY BETWEEN THE NORDIC REGION AND NEIGHBOURING COUNTRIES, MW



Source: Svenska Kraftnät

Environment – not just the climate any more

2010 started on a dismal note and, at least according to the EU, with the added burden of a climate fiasco. The entire UN process was questioned but was eventually redeemed at the climate summit in Cancun at the end of the year when the results surpassed all expectations.

Within the European Union, discussions were started as to whether the EU, given the results of COP 15 in Copenhagen, should raise its emissions reduction target from 20% to 30%. In the spring the European Commission presented a communication on climate policy with an impact analysis highlighting the potential opportunities in a higher target, such as the creation of jobs. The communication also states that the financial crisis has led to a dramatic downward revision of emissions forecasts that has provided scope to raise the target. The EU member states are divided on this issue and discussions are still underway.

After COP 15 climate issues took a back seat in the media while other environmental concerns of at least equally importance, such as the loss of biodiversity, dominated the global environmental arena. The UN declared 2010 as the International Year of Biodiversity, and a wide range of related activities were carried out around the world. In 2010 real advances were also made in the UN's biodiversity process during the conference in Nagoya, Japan, when new targets were set to halve the loss of plant and animal species. By 2020, 17% of land and water areas and 10% of coastal and marine areas worldwide will be protected from exploitation. Overfishing will be stopped, deforestation reduced by at least half, subsidies harmful to biodiversity phased out and 15% of degraded ecosystems restored.

The EU's regulatory framework for the EU Emissions Trading System (EU ETS) underwent continued development with the adoption of a common platform for auctioning of emission allowances and rules for granting of free-of-charge emission allowances. The European Commission put forward a proposal to ban the use of credits from certain types of CDM (Clean Development Mechanism) projects starting in 2013. The proposal was quickly approved by the EU Climate Change Committee.

In the summer of 2010 the EU approved the so-called Industrial Emissions Directive (IED), which regulates emission limit values for SO_2, NO_x, CO, particulates, etc., among other things for the energy industry. These can present tough challenges for many installations throughout Europe. Just as today, an environmental permit will be required to conduct operations in industrial facilities. The permit will specify limit values for airborne emissions, requirements for protection of land and water, monitoring requirements, etc. The values, which are to be based on use of the best available technology, may not be exceeded under normal conditions but only during limited periods provided that they are not surpassed on an annual basis. A Swedish commission has been appointed to incorporate the directive in Swedish legislation.

A ban on creosote, which is used among other things as a preservative in wood utility poles, come under discussion in the EU on several occasions during the year. Sweden has between five and six million creosote-impregnated poles. This matter has not yet been settled and discussions are continuing. The industry is currently studying the potential for alternative pole materials.

In 2010 Sweden appointed an All-Party Committee on Environmental Objectives consisting of representatives from all parliamentary parties and a few experts. The purpose of the committee is to provide the Government with proposals for meeting the environmental quality objectives and the generational goal. The Committee's overall task is to develop strategies with interim targets, steering instruments and measures in the government's prioritized areas.

ENVIRONMENTAL ASPECTS OF ELECTRICITY

All extraction, conversion and consumption of energy have some effect on the environment. Burning of fuels gives rise to emissions of substances such as sulphur dioxide and nitrogen oxides. However, even non combustion-based power generation, such as hydro and wind power, has an impact on the local environment. For example, construction of wind farms along the coast alters the visual landscape and hydropower plants affect biodiversity through changed and irregular water flows, with consequences for the habitats of shoreline flora and the migratory paths of fish.

Environmental consideration has always been a natural part of the power industry's responsibilities but is now pursued in a more structured manner than before. Virtually all companies in the industry are certified according to the ISO 14001 environmental standard, which ensures that environmental issues are addressed systematically in order to continuously reduce negative environmental effects. Electricity production in Sweden has a generally low environmental impact in the form of emissions since it is based primarily on hydro and nuclear power, which generate no combustion-related emissions at all.

Table 20 shows the trend for a few combustion-related emissions from electricity generation. Emissions are calculated based on electricity generation data per fuel type, which is converted to total fuel consumption for each power plant unit with the help of average efficiency rates for the plants. Emission factors are then applied to the fuel consumption data to obtain total emissions.

ACIDIFICATION AND SULPHUR DIOXIDE

Acidification is counted among the more regional environmental problems, and sulphur fallout is the primary cause of acidification in Swedish soil and waterways. Since Scandinavian soils are particularly sensitive to acidification, this problem attracted attention at an early stage in Sweden. Sulphur dioxide (SO_2) is a transboundary airborne pollutant and approximately 90% of fallout in Sweden originates from Central Europe and the UK.

Sulphur dioxide emissions in Sweden have decreased sharply from a high of 925,000 tonnes in 1970 to around 30,000 tonnes in 2009, which is lower than the environmental target of 50,000 tonnes set for the year 2010. Of total SO_2 emissions, around 70% is attributable to combustion of oil and coal. The few power and heat generation facilities that still use coal or oil have installed desulphurization plants or now use low-sulphur oil. Furthermore, these are used primarily for peak loads when the need for capacity is highest. Emissions of SO_2 from Sweden's electricity production in 2009 amounted to 2,328 tonnes, equal to around 8% of Sweden's total SO_2 emissions *(Table 20)*.

EUTROPHICATION AND NITROGEN OXIDES

The primary effect of nitrogen oxide (NO_x) fallout into the soil is to promote the growth of nitrogen-loving plants at the expense of indigenous flora such as blueberries and lingonberries. So far, NO_x fallout in Sweden has caused only minor leaching into the country's waterways. Nitrogen oxides are transboundary airborne pollutants and only around 17% of fallout is of domestic origin.

NO_x emissions also lead to the formation of ground-level

TABLE 20

AIRBORNE EMISSIONS FROM SWEDEN'S ELECTRICITY PRODUCTION IN 2009

Emissions	Total emissions from electricity production (tonnes)	Emissions per kWh of electricity produced	Share of total emissions in Sweden [%]
Nitrogen oxides (NOx)	4,364	0.03 g	2.9
Sulphur dioxide (SO_2)	2,328	0.02 g	7.8
Carbon dioxide (CO_2)*	2,369,215	17.79 g	5.1
Carbon monoxide (CO)	13,899	0.10 g	2.6
Volatile organic compounds (NMVOC)	1,096	0.01 g	0.6
Methane (CH_4)	1,442	0.01 g	0.03
Particulates (PM 10)	2,140	0.02 g	5.5
Nitrous oxide (N_2O)	424	3 mg	0.01
Ammonia (NH_3)	118	0.9 mg	0.2
Lead (Pb)	0.82	6 µg	0.01
Mercury (Hg)	0.03	0.2 µg	0.005

**fossil CO_2 emissions*

Sources: Statistics Sweden, Swedish Environmental Protection Agency ozone. In Sweden, this type of ozone causes both negative health effects and damage to trees and crops costing billions per year. Sweden's ozone levels are largely of foreign origin and are result of NOx fallout from Germany, the UK and Poland. International cooperation is therefore needed to deal with eutrophication problems, an area where the UN Convention on Long-range Transboundary Air Pollution and various EU initiatives, such as the ongoing negotiations surrounding the IPPC Directive and the ongoing revision of the National Emission Ceiling Directive, are playing a central role.

NO_x emissions in Sweden have declined in recent years but have proven more difficult to reduce than SO_2 emissions. In 2009 Sweden's total NO_x emissions amounted to 149,000 tonnes and the target for 2010 was a reduction to 148,000 tonnes. Of total emissions, the bulk is attributable to traffic, primarily passenger cars and trucks, but also machinery, equipment and seagoing vessels. The majority of power and heat generating facilities have installed denitrification scrubbers. Sweden's NOx emissions from electricity production in 2009 amounted to 4,364 tonnes, i.e. 3% of Sweden's total emissions *(Table 20). Diagram 35* shows the trend in emissions of NO_x and SO_x since 2000. The rise in NO_x emissions in recent years is due to increased power generation from CHP plants, as shown in *Diagram 36*.

CLIMATE CHANGE AND GREENHOUSE GASES

Certain gases in the Earth's atmosphere allow the sun's rays to pass through while at the same time absorbing the energy reflected back by the Earth's surface. This so-called "greenhouse effect" is a natural phenomenon that keeps the Earth's mean global temperature at +15 °C instead of the -18 °C which would otherwise be the case.

However, increased anthropogenic CO_2 emissions are altering the chemical composition of the atmosphere and affecting its radiation balance.

There are both natural and unnatural greenhouse gases (GHGs), all of which have varying degrees of climate impact. The greatest attention has been focused on carbon dioxide, since concentrations of CO_2 in the atmosphere have risen dramatically. Prior to industrialization the atmospheric concentration of CO_2 was approximately 280 ppm (parts per million), but has since then risen to around 390 ppm. Combustion of fossil fuels such as oil, gas and coal and deforestation are the main causes of increased CO_2 in the atmosphere.

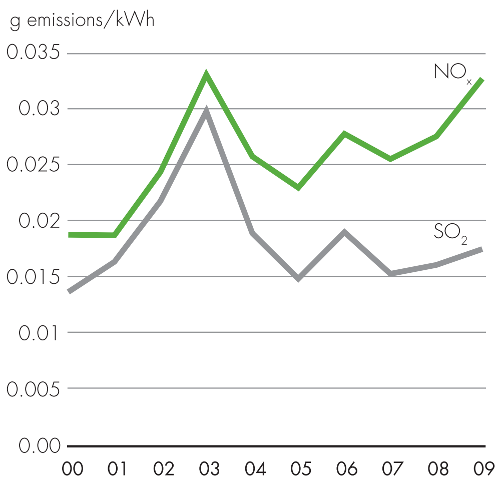
Sweden has relatively low emissions of GHGs, in 2009 amounting to 59.8 Mtonnes (1 megatonne = 1 million tonnes) of CO_2 equivalents (climate-affecting gases converted into CO_2), while CO_2 emissions at the beginning of the 1970s exceeded 100 Mtonnes per year. The difference is mainly due to a drastic decrease in the use of oil in favour of electricity generated from nuclear power. At around 7 tonnes per year, Sweden's per capita emissions of CO_2 equivalents are low in comparison with other industrialized nations. The EU average is around 10 tonnes per capita and year.

Climate change is a global issue that must be addressed at the global level. Swedish emissions of CO_2 equivalents make up only 0.2% of annual global emissions. The United Nations Framework Convention on Climate Change was signed in 1992 and in 1997 led to the Kyoto Protocol, for which the commitment period runs from 2008-2012. Under the Protocol the industrialized nations must reduce their GHG emissions by at least 5% below 1990 levels. Since 1990, Sweden has reduced its emissions by 17%.

At the end of 2008 the EU agreed on new climate targets. Emissions of GHGs will be cut by 20% between 1990 and 2020. In the non-ETS sector, overall emissions in the EU will be reduced by 10% between 2005 and 2020 and the corresponding target for Sweden is 17%. In the ETS sector, emissions will be reduced by 21% between 2005 and 2020. If a new international climate agreement is signed the EU's reduction target for 2020 will be raised to 30%.

DIAGRAM 35

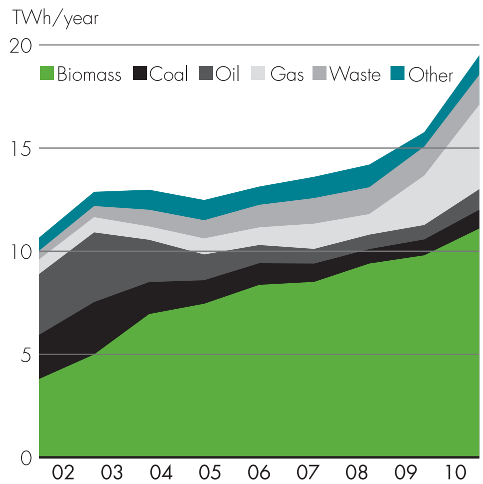
AIRBORNE EMISSIONS OF NO_X AND SO_2 FROM ELECTRICITY PRODUCTION 2000–2009 IN RELATION TO TOTAL ELECTRICITY PRODUCTION



Sources: Statistics Sweden, Swedish Environmental Protection Agency, Swedenergy

DIAGRAM 36

ELECTRICITY PRODUCTION IN CHP PLANTS, TWh



Source: Swedenergy

In 2009 electricity production accounted for approximately 2.4 million tonnes, or around 5%, of total Swedish CO_2 emissions. Emissions vary dramatically in relation to the weather and runoff to the reservoirs. The sharp decrease in emissions of CO_2 during 2009, as shown in *Diagram 37*, is explained by a reduction in electricity production based on blast furnace gas (BFG).

Electricity production also produces emissions of methane and nitrous oxide. In 2009 methane emissions from electricity production accounted for roughly 0.03% and emissions of nitrous oxide for around 0.01% of Sweden's total emissions.

Aside from the GHGs that are released in production of electricity, emissions of the greenhouse gas SF6 arise through leakage from power transmission and distribution facilities. In 2009 there were approximately 101,900 kg of SF6 in Swedish transmission and distribution facilities. Emissions from these in 2009 were estimated at 236 kg, or around 0.23%, of the total usage, see *Diagram 38*.

OTHER AIRBORNE EMISSIONS FROM ELECTRICITY PRODUCTION

Combustion of fossil fuels for electricity production gives rise to emissions of CO_2, volatile organic compounds (VOCs), particulates, ammonia, lead and mercury to varying degrees – depending on the fuel type.

CO_2 and VOCs are produced in incomplete combustion and have negative effects on human health.

Particulate emissions depend on the ash content of the fuel as well as the combustion and cleaning technology in the facility. Particulates have significant health effects when inhaled.

Ammonia arises as a result of the addition of non-reacted ammonia in the use of certain cleaning technologies to eliminate other types of emissions from the process.

Heavy metals are emitted due to the varying heavy metal contents of the fuels, although emissions from electricity production are low. Only 0.01% of Sweden's emissions of the heavy metals in question are attributable to electricity production, see *Table 20*.

ENVIRONMENTAL ASPECTS OF HYDROPOWER

From a historical standpoint, hydropower has been an important driver for development and prosperity in Sweden and today accounts for nearly half of the country's electricity generation in normal year conditions. Aside from its important function as a source of base and regulating power, hydropower is playing an increasingly vital role as an instantaneous peak load reserve and means for frequency control throughout the electrical system.

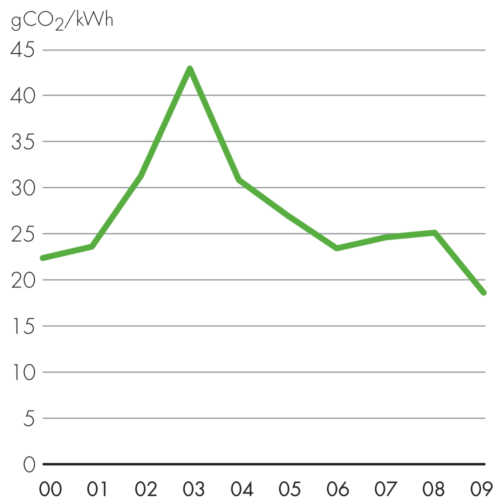
Hydropower spares the environment from harmful emissions such as acidifying substances and their detrimental effects on soil and water. At the same time, the country's early hydroelectric development led to impacts on biotopes and species, both locally and regionally. In this context, public interest has been concentrated mainly on fish and related issues.

In 2000 a research program co-funded by hydropower producers and the Swedish Government was launched to provide a platform for environmental improvements in the currently exploited waterways. In 2010 the final results were presented from stage 3 of this research project, "Hydropower – environmental impacts, remedial measures and costs in regulated waters". Within the program, a generalizable theory and methodology were developed for socioeconomic cost-benefit analysis of changes in regulated waterways. In addition, a dynamic population model was created to enable advance evaluation of whether the construction of fishways will lead to viable populations of migratory fish.

Environmental actions that lead to changed flow regimes can result in serious economic, legal, technical and other environ-

DIAGRAM 37

AIRBORNE EMISSIONS OF CO_2 FROM ELECTRICITY PRODUCTION IN 2000–2009 IN RELATION TO TOTAL ELECTRICITY PRODUCTION



Sources: Statistics Sweden, Swedish Environmental Protection Agency, Swedenergy

DIAGRAM 38

SF6 LEAKAGE (% OF TOTAL USAGE IN PRODUCTION AND TRANSMISSION/DISTRIBUTION OPERATIONS)

Source: Swedenergy

mental problems for both the affected companies and society in general, and therefore involve careful weighing of pros and cons between different aspects. Such measures require in-depth analysis before proceeding and extensive follow-up after completion.

The national environmental objectives, the EU's Water Framework Directive and activities related to biodiversity have highlighted the importance of ongoing attention to environmental issues in existing and new hydropower facilities.

ENVIRONMENTAL ASPECTS OF NUCLEAR POWER

Compared to fossil fuels, nuclear generation of electricity produces virtually no emissions into the air. At the same time, the use of nuclear power entails responsibility for the highly radioactive spent fuel, which must be stored separately from the surrounding environment for a very long time. Nuclear power plants are subject to rigorous security and safety precautions, since malfunctions, transport accidents, etc. can have devastating consequences.

The environmental aspects of nuclear power can be divided into:

- Fuel supply

Most extraction, conversion and enrichment of uranium for Swedish reactor fuel take place in other countries. Fuel elements are manufactured in a fuel factory. In Sweden there is a factory for production of fuel elements in Västerås.

Uranium for the Swedish reactors is purchased from mining companies on the global market, for example in Australia and Canada. Enrichment services for Swedish reactor fuel are also purchased on the global market, primarily from France, the Netherlands and the UK. Sweden consumes approximately 2,000 tonnes of uranium annually. This naturally requires long-distance transports that produce climate-affecting emissions. Like other mining operations, uranium mines give rise to local environmental impact and occupational hazards. A uranium mine must have highly effective ventilation, since the maximum permitted radon level in the mines is equal to that in Swedish homes. All modern mines have invested in extensive protective systems for the natural and working environments in accordance with the norms established by the relevant authorities.

- Operation

The radioactive emissions into the environment produced by reactor operation are very small and carefully monitored. According to the regulatory authorities, these should not exceed a maximum does of 0.1 mSv (millisieverts). From a life cycle perspective, CO_2 emissions from nuclear power are around 3 grams per kWh. The corresponding figure for coal-fired power is 800 grams of CO_2 per kWh. Hydro and wind power produce emissions of between 5 and 10 grams per kWh from a life cycle perspective.

Sweden's nuclear generation facilities are of the condensing power plant type, whose operation produces warm water emissions (waste heat) that affect areas a few square kilometers in size outside the point of emission. It is possible to utilize the waste heat among other things in district heating systems, which has been discussed in Finland.

- Waste

Our Swedish nuclear power plants produce electricity, but also radioactive waste. If the 10 reactors still in operation are used for another 50 to 60 years, Sweden's aggregate nuclear waste will have a volume equal to more than one third of the Globen arena in Stockholm. Spent nuclear fuel must be deposited in a final repository and isolated from the surrounding environment for up to 100,000 years. For the first 30 to 40 years the fuel is placed in interim storage during which time its radioactivity decreases to a few percent of the level directly after operation. The interim storage facility has been located in Oskarshamn since 1985.

The Swedish Nuclear Fuel and Waste Management Company (SKB) has plans to build a deep repository that will isolate the fuel for a very long time – 100,000 years. The repository will be placed at a depth of around 450 meters in the Swedish crystalline basement rock, which is highly stable and has been in place for more than a billion years. The only thing that can transport radioactive substances from the repository is ground water, but this is prevented through the use of multiple protective barriers. The first is an impermeable copper canister in which the radioactive material is stored. The second is a layer of bentonite clay that protects the canister from corrosion and movement, and the third barrier is the Swedish crystalline bedrock that functions as a filter and keeps the spent fuel separate from humans and the environment.

The choice of location for the final repository for storage of spent nuclear fuel from the Swedish nuclear power plants was between Forsmark in the municipality of Östhammar and Laxemar in the municipality of Oskarshamn. For several years the SKB has carried out extensive site surveys, including bore hole sampling, analyses and 600 reports in each of the two locations. All known factors have been analyzed, evaluated and compared.

In June 2009 the board of the SKB made a unanimous decision to propose that a deep repository for spent nuclear fuel be sited in Uppland County, in the municipality of Östhammar, next to the Forsmark nuclear power plant. The SKB will submit an application for a permit to build the facility at the end of 2010 and expects to receive final permission from the Government by 2013 at the earliest. Construction of the repository is expected to begin around 2015 so that the first canisters can be deposited around 2025.

Although the repository is being built in Forsmark, a close collaboration with Oskarshamn will be developed, among other things with the planned encapsulation facility that is being built by the interim storage site. In addition, a collaboration agreement has been signed that includes investments in infrastructure and business development in both municipalities.

ENVIRONMENTAL ASPECTS OF WIND POWER

Wind power is a clean and environmentally friendly energy source that produces virtually no emissions during operation. It creates no environmentally hazardous waste and its operating sites are easily restored. The environmental impacts of wind power mainly consist of anticipated negative effects on the landscape, i.e. aesthetic values that are difficult to assess objectively. Other considerations include noise emissions and visual impact.

Among the potential ecological disadvantages, critics have mainly focused on damage and disruptions in the spawning and nursery areas of fish, the effects of infrasound on aquatic life and electromagnetic fields around cables. Other conceivable effects include the harmful consequences of noise and radiation on seals and collision risks if turbines are placed in the flight path of birds. Research is underway, but preliminary findings indicate that most of these risks are exaggerated.

ENVIRONMENTAL ASPECTS OF POWER DISTRIBUTION

Distribution of electricity also has an impact on the environment. Cables, power lines and switches are made of metals that are extracted from mines and give rise to environmental effects.

Transmission and distribution networks give off electromagnetic radiation, but the levels fall of rapidly with increasing distance from the power line. If needed, shields are set up and the lines are placed so as to limit exposure.

To protect them from rot and insect damage, wood utility poles are impregnated with various chemicals such as creosote and salt compounds containing chromium, copper and arsenic, which are highly toxic. In 2010 the question of prohibiting the use of creosote has come up several times in the EU, although no decision has yet been made. In these discussions, proposals in the EU have shifted from a ban against existing and future usage to a solution in which the member states are given a number of years to phase out creosote and where it is still permissible to use creosote if the member state can show that there are no realistic alternatives. The industry is currently studying the possibilities for alternative utility pole materials and what consequences these would have from a financial, natural environment and work environment perspective.

The greenhouse gas SF6 is used as an insulating gas in switchgears and circuit breakers. Although this greenhouse gas has a very high global warming factor, there is currently no alternative. Swedenergy is monitoring developments in the industry with regard to use of the gas and leakage during handling. Leakage can be said to have gradually decreased over the past ten years and recovery of gas from retired equipment is also taking place. Research is underway to find alternative gases that have the same performance but less environmental impact.

New power lines lead to changes in the natural environment that can have a negative impact on biodiversity. At the same time, existing power lines have proven to be a haven for certain species and steps are being taken to species inventory and manage these, so any replacement must be carried out as carefully as possible.

Taxes, charges and renewable energy certificates (2011)

TOTAL BURDEN OF TAXES AND CHARGES ON ELECTRICITY SUPPLY

In many ways, the supply of electricity is subject to a heavier burden of taxation and charges than other areas of Swedish industry and commerce. For 2011, taxes and charges particular to electricity supply are estimated as follows (excluding VAT), see *Table 21*.

Including VAT, total taxes and charges on the electricity sector in 2011 are estimated at around SEK 40 billion. Added to this is the politically decided emissions trading scheme, which is also part of the electricity price.

PROPERTY TAX

All electricity generation facilities are subject to a general industrial property tax. In 2011 the property tax for hydropower was raised by 0.6% from 2.2% till 2.8% of the taxable value of the property (both land and buildings, Act on National Real Estate Tax [1984:1052]).

The temporary tax increase by 0.5% during the tax assessment years 2007-2011 was thus made permanent. The end result was thus an increase in the property tax by 0.6% rather than a reduction by 0.5%.

On 1 January 2007 the property tax on wind power plants was reduced from 0.5% to 0.2%. For other electricity generation facilities, the property tax is unchanged at 0.5% of taxable property value.

NUCLEAR POWER

Electricity produced in nuclear power plants has been taxed since 1984, initially in the form of a production tax. In 2000 this taxation was restructured as an output tax based on the thermal output of the reactors, and is thus unrelated to the amount of electricity generated. As of 1 January 2008 the output tax amounts to SEK 12,648 per MW and month, equal to an average of around SEK 0.55 per kWh. If a reactor has been out of operation for a contiguous period of more than 90 days, a deduction of SEK 415 per MW is permitted for the number of calendar days in excess of 90.

Electricity produced from nuclear power sources is also levied with a charge of SEK 0.003/kWh according to the so-called Studsvik Act, to cover the costs arising from Studsvik's previous operations.

In order to cover future costs for final storage of spent fuel, each nuclear power plant is charged an individual fee. For Forsmark,

TABLE 21

TAX BURDEN ON THE ELECTRIC POWER SECTOR IN 2010 (FORECAST)

	SEK million
Property tax on power generation facilities	3,000
Nuclear power tax and Studsvik charge	4,500
Certain charges for government financing	300
Tax on fossil fuels	100
Energy tax on electricity	20,000
Total	**28,000**

Source: Swedenergy

TABLE 22

TAX ON FUELS IN 2011*

	Energy tax		**Carbon dioxide tax**	
Fuel oil **	SEK 0.080/kWh	SEK 797/m³	SEK 0.305/kWh	SEK 3,017m³
Crude tall oil ***		SEK 3,814/m³		
Coal	SEK 0.080/kWh	SEK 605/tonne	SEK 0.350/kWh	SEK 2,625/tonne
Natural gas	SEK 0.080/kWh	SEK 880/1000m³	SEK 0.209/kWh	SEK 2,259/1000m³

** Exception for electricity production, see section on tax on electricity production.*

*** Fuel oil to which a dye or chemical marker has been added or which produces less than 85 volume percent distillate at 350 °C.*

**** Crude tall oil (CTO) used for energy purposes in levied with a special energy tax equivalent to the combined energy and carbon dioxide on low-taxed fuel oil, i.e. SEK 797 + SEK 3,017 = SEK 3,814/m³.*

Source: Swedenergy

Oskarshamn and Ringhals, these fees correspond to approximately SEK 0.01 per kWh as a weighted average for Swedish nuclear power as of 1 January 2011. For Barsebäck, the fee amounts to SEK 247 million per year. Furthermore, the reactor owners are required to pledge collateral to the Government – each plant in an individual amount – for a total of SEK 15.87 billion in 2011.

TAX RATES ON USE OF FOSSIL FUELS

Uniform energy tax, etc.

On 1 January 2011 a uniform general energy tax of approximately SEK 0.08 per kWh was introduced on all fossil fuels. This level corresponds to the energy tax on oil of SEK 797 per m^3 for 2011. The change has led to a sharp increase in the energy tax on natural gas. For industrial installations, CHP plants, etc., included in the EU ETS, the level is 30% of the general energy tax.

For crude tall oil, the level for industries participating in the EU ETS is 30% of the general level of the energy tax on oil, i.e. 30% of SEK 797 per m^3.

The carbon dioxide tax on fossil fuels was abolished on 1 January 2011 for industries in the EU ETS.

Tax on electricity production with fossil fuels

According to the Energy Taxation Act, no tax is levied (i.e. a deduction is allowed) on fuels used for the production of taxable electricity. However, for fossil fuel-fired condensing power production, a standard 5% of electricity production is classified as untaxed internal electricity consumption, for which reason 5% of the supplied fuel is taxed. For fossil fuel-fired CHP, 1.5% of the fuel for electricity generation is classified as internal consumption and is taxed.

The rates for energy and carbon dioxide tax have been adjusted for yearly indexation according to the Act on Revision of the Energy Tax Act 2009:1495. The increase is marginal. *Table 22* shows the tax rates applied for use of fossil fuels in 2011.

As of 1 January 2011, the full carbon dioxide tax amounts to approximately SEK 1.10 per kg CO_2. Biofuels and peat are not taxed.

Sulphur tax

Sulphur tax is levied at SEK 30 per kg of sulphur in SO_2 emissions from combustion of solid fossil fuels and peat. For liquid fuels, the tax is SEK 27 per cubic meter for each tenth of one weight percent of sulphur in fuel exceeding 0.05%. If the sulphur content is higher than 0.05% but lower than 0.2%, it is rounded up to 0.2%.

Nitrogen oxide tax

A nitrogen oxide tax is levied at SEK 50 per kg of nitrogen oxides (designated as NO_2) from use of boilers and gas turbines with a utilized energy production of more than 25 GWh per year. The bulk of the fees are repaid to the taxable entities in proportion to their share of utilized energy production.

CHP TAX

With effect from 1 January 2011, the qualifying limit for tax abatement in CHP plants has been set at an electrical efficiency rate of at least 15% according to the bill "*Certain selective tax issues in respect of the budget bill 2010" (prop. 2009/10:41).* In cases where multiple fuels are used, the order of fuels for taxation may no longer be chosen freely but is instead subject to rules for proportioning.

As of 1 January 2011, fuel used for heat generation in CHP plants is exempt from 93% of the carbon dioxide tax. This is a further reduction of 8 percentage points compared to 2010. At the same time, however, the general uniform energy tax has been introduced. For industrial, CHP and other facilities included in the EU ETS, the level is equal to 30% of the general energy tax.

For CHP plants *outside* the EU ETS, the carbon dioxide tax is reduced by 70% of the general level starting on 1 January 2011. In the case of pure heat generation, the carbon dioxide tax is reduced by 6% as of 1 January.

Individual taxation of CHP plants

The tax abatement rules are not the same for CHP plants as for the manufacturing industry, including industrial backpressure. Industrial facilities are fully exempt from the carbon dioxide tax with effect from 1 January.

Under the current tax legislation for installations covered by the EU ETS, CHP plants are taxed individually depending on the owner's industry affiliation. The regulation, in which certain owners of CHP plants are favoured (industrial back pressure) while others are disadvantaged through taxation, is currently being examined by the European Commission to determine whether the differentiated treatment distorts competition. Swedenergy and a few of the affected members have filed a complaint with the European Commission's Directorate General for Competition according to Article 87 of the Treaty.

WASTE INCINERATION TAX

The Swedish parliament passed a decision in accordance with government bill *"Certain selective tax issues in respect of the budget bill 2010" (prop. 2009/10:41)* to abolish this tax as of 1 October 2010. Consequently, no tax is now levied on waste incineration.

WIND POWER

Commercial suppliers of wind-generated electricity produced in Swedish offshore wind farms were previously allowed to deduct part of the energy tax on electricity. The deduction amounted to SEK 0.12 per kWh during 2009, but was abolished as of 1 January 2010.

Electricity is exempt from taxation if it is produced in Sweden in a wind farm by a non-commercial supplier (Energy Tax Act, Chapter 11, § 2).

CONSUMPTION TAXES ON ELECTRICITY

The energy tax on electricity in certain municipalities in northern Sweden was lowered by SEK 0.03 per kWh as of 2008 following approval by the European Commission.

The consumer price index rose by 0.93% between June 2009 and June 2010, which has led to an increase in the tax on electricity.

After indexation, energy tax on consumption of electricity is levied according to the following as of 1 January 2011:

a) SEK 0.005 per kWh for electricity used in industrial operations for professional greenhouse cultivation.
b) SEK 0.187 per kWh for electricity other than that referred to under a) and which is used in certain municipalities in northern Sweden.
c) 0.283 per kWh per kWh for electricity used for other purposes.

The electricity tax trend is illustrated in *Diagram 39*. The previous reduction for electricity used in the supply of electricity, gas, heat or water was raised on 1 January 2006 to a level equal to that for households. At the same time, taxation of the electricity suppliers' own usage of electricity was introduced and the increased energy tax on electricity used in large electric boilers during the winter months was abolished. The reason for these changes is that the EU Energy Tax Directive no longer permits special rules in these cases. Agricultural, forestry and aquacultural operations are allowed an electricity tax refund for the difference between amount of tax paid and an amount computed according to a tax rate of SEK 0.005 per kWh. A refund is permitted for that part of the difference exceeding SEK 500 on an annual basis. If the sum exceeds SEK 500 for a calendar year, a refund is permitted for the full amount.

Under the Energy Efficiency Act (PFE) that went into effect on 1 January 2005, energy-intensive companies that use electricity in the manufacturing process can qualify for tax-exemption by participating in a five-year energy efficiency program. A continuation of the program is currently under consideration by the European Commission.

Electricity customers also pay fees for the financing of certain government administrations. All in all, high voltage customers paid SEK 3,577 and low voltage customers SEK 54 in electrical safety, network monitoring and contingency charges for 2010.

RENEWABLE ENERGY CERTIFICATES

Renewable Energy Certificates (RECs) were introduced in 2003 as a new support system for promoting the use of electricity from renewable sources. The system replaced earlier subsidies on renewable electricity production.

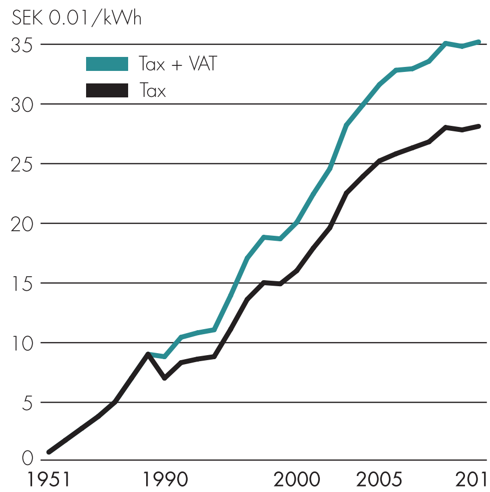
The initial aim of the REC system was to bring about a 17 TWh increase in annual electricity generation from renewable energy sources by 2016 compared to the 2002 level.

The basic principle behind the system is that producers are issued an REC by the Government for every MWh of renewable electricity generated. At the same time, electricity suppliers are obligated to purchase RECs for a certain quota/percentage of their total electricity sales and usage, a so-called quota obligation. The sale of RECs gives electricity producers an extra source of revenue aside from electricity sales, thereby improving the ability of renewable energy to compete with non-renewable sources. The energy sources entitled to allocation of RECs are wind power, certain hydropower, certain types of biofuel, solar energy, geothermal energy, wave energy and peat in CHP plants. When the system was introduced, the quota obligation was assigned to the electricity end-users (customers). In reality, however, the electricity suppliers handled the quota obligation for the majority of their customers and had the right to impose a charge for this.

An evaluation of the REC system in 2006 led to some changes that went into effect on 1 January 2007. The goal was to simplify, expedite and streamline the system. One of these changes is that the quota obligation has been shifted from the customers to the electricity suppliers. As a result of this, suppliers are no longer required to report the REC fee separately on

DIAGRAM 39

DEVELOPMENT OF ELECTRICITY TAX* (ENERGY TAX ON ELECTRICITY) SINCE 1951



**The energy tax is lower for certain municipalities in Northern Sweden*

Sources: Statistics Sweden and the Swedish Energy Agency the invoice. In the future the REC fee will be part of the total electricity price, which will also make it easier for customers to compare prices between different electricity suppliers.

For 2010 the quota obligation was 0.179, or 17.9%. In 2009 the average REC cost for electricity consumers was SEK 0.073 per kWh.

EXCEPTIONS

Free power (agreement between a property owner and an electricity producer in which the former grants the use of its riparian rights in exchange for electric power from the electricity producer) and electricity used as assisting power in electric power generation are exempted from the quota obligation, as are the transmission and distribution losses that are required to maintain network function.

Electricity-intensive industries are exempted from the quota obligation for electricity used in manufacturing processes, but not for their other electricity usage.

With effect from 1 January 2009, a company is defined as *electricity-intensive* if it conducts and has during the past three years conducted industrial manufacturing in a process that uses an average of at least 190 MWh of electricity for every SEK 1 million of the total sales value of the electricity-intensive industry's production, or conducts new operations with industrial manufacturing in a process that uses an average of at least 190 MWh of electricity for every SEK 1 million of the total sales value of the electricity-intensive industry's production, or conducts operations for which a deduction is permitted for tax on electric power in accordance with Chapter 11, 9 § 2, 3 or 5 of the Act on Excise Duties on Energy (1994:1776).

EXTENSION OF REC SYSTEM AND NEW TARGET

On 10 March 2010 the Swedish Government presented a bill calling for further development of the renewable energy certificate system. The REC system has been extended until the end of 2035 and the new target for production of renewable electricity has been raised by 25 TWh by 2020 compared to the level in 2002. The quota obligation will be calculated according to new quotas that apply as of 2013. The amendments are effective as of 1 July 2010. So far the system is estimated to have resulted in the addition of around 9 TWh in renewable electricity production.

REC MARKET WITH NORWAY

On 7 September 2009 Maud Olofsson met with her Norwegian colleague Terje Riis-Johansen and agreed to aim for the establishment of a common REC market as of 1 January 2012, a market that should be technology-neutral. Norway intends to adopt an equally ambitious commitment as Sweden. The transmission connections that have already been agreed on between the Nordic TSOs will be implemented as quickly as is feasible. Norway will adopt a Renewables Directive, including targets, as soon as possible. The same timetable as for the other European countries will also apply to Norway.

On 8 December 2010 the establishment of a common REC market was secured through the signing of a joint protocol by the two ministers. The level of ambition in the common system is to build 26.4 TWh of new renewable electricity production between 1 January 2012 and 2020. At the same time, the Norwegian Ministry of Petroleum and Energy presented its proposal for a Norwegian REC law that is essentially a copy of the Swedish law. The law also includes the Norwegian quota curve.

The Swedish Energy Agency has analyzed the consequences of a common REC market with Norway and has come to the conclusion that the REC price will not be significantly affected in the long term. All in all, a greater proportion of renewable generating capacity will probably be built in Norway and will consist mainly of hydroelectric and wind power. Sweden's expansion of wind power is expected to be somewhat lower in the common system than under a solely Sweden system. New biomass power is expected to be added primarily in Sweden.

HYDROPOWER

In 2010 the Swedish Energy Agency proposed certain changes for REC qualification of hydropower plants. According to the proposal, only additional hydroelectric power production in a location where hydropower operations have been previously conducted are eligible for RECs.

EMISSIONS TRADING

The EU Emissions Trading Scheme (EU ETS) was launched on 1 January 2005. The goal of this trading is to enable countries and companies to choose between carrying out their own emission-reducing measures or buying emission allowances which then generate emission reductions somewhere else. The idea is for the least expensive measures to be taken first, thus keeping the total cost of meeting Kyoto targets as low as possible.

The scheme started with a trial phase, Phase I, between 2005 and 2007. The second trading period, Phase II, runs between 2008 and 2012 and corresponds to the Kyoto Protocol's commitment period.

At present the system covers electricity and heating generation and energy-intensive industries. As of 2011, the aviation industry will also be included in the EU ETS.

In December 2008 the EU Parliament and the Council of Ministers agreed on a revised EU ETS Directive to apply for the 2013-2020 budget period. A total emissions cap equal to a 10% decrease in emissions has been set for the period between set for the period between 2005 and 2020. Furthermore, emission allowances in the power sector will be awarded through auctioning, with certain exceptions, in contrast to the current free-of-charge allocation. In the industrial sector, emission allowances will be initially allocated free of charge but with a successive transition to auctioning.

In 2010 the European Commission approved a draft regulation on auctioning of emission allowances and started a procurement for an EU-wide auctioning platform. The EC has also adopted rules for free-of-charge allocation of emission allowances, which are based on a number of product targets. In addition, the EC has decided to ban the use of offsetting credits from specific CDM (Clean Development Mechanism) projects for the destruction of industrial gases HFC-23 and N_2O (nitrous oxide) in production of adipic acid within the EU ETS.

Electricity networks

The Swedish power system can be divided into three levels – local networks, regional networks and the national (transmission) grid. Most electricity users are connected to a local network, which in turn is connected to a regional network. The regional networks are then connected to the national grid. There are around 170 local distribution system operators (DSOs) in Sweden.

The networks owned by these DSOs vary considerably in size. The smallest has a line length of around 3 km, and the largest over 115,000 km.

The local networks are normally divided into low voltage (400/230V) and high voltage networks (typically 10-20 kV). The total line length of Sweden's low voltage networks is over 302,500 km, of which 76,500 km consist of overhead lines and 226,000 km of underground cable. The local high voltage networks, also frequently referred to as medium voltage networks, are made up of 97,000 km of overhead lines and 93,500 km of underground cable. Some 5.2 million electricity users are connected to the low voltage networks and 6,500 to the high voltage networks.

The regional grids are mainly owned by three DSOs and have a combined line length of around 33,000 km. The Swedish national grid is owned and operated by the public utility Svenska Kraftnät, and is made up primarily of 400 kV and 220 kV lines with a total length of around 15,000 km. In total, the Swedish electricity grid contains 541,000 km of power lines, including 319,500 km of underground cable. If the Swedish grid were stretched out in one long line, it would extend more than thirteen times around the earth.

Delivery reliability in the Swedish grid is 99.99% (see also under the next heading).

OPERATING EVENTS STATISTICS (DARWIN)

The statistics include the 116 DSOs that have provided complete material covering all of 2009 (the figures for 2010 are not yet available). These DSOs represent 96% of Sweden's 5.2 million electricity customers and are relatively evenly spread between urban and rural networks.

2009 was an uneventful year, nearly comparable to 2004, with a total delivery reliability of 99.99% (called "4 nines" when comparing system reliability), which is very good. It is now clearly apparent that the major investments in weatherproofing of the grid have been effective.

Table 23 shows the key statistics for operating interruptions in 2009.

FUNCTIONAL REQUIREMENT AS OF 2011

1 January 2011 marked the effective date of the functional requirement for power distribution that was introduced into the Swedish Electricity Act in 2006 and states that no power outage may last for longer than 24 hours. The Energy Markets Inspectorate (EI) has also published regulations clarifying this requirement.

Without a doubt, Sweden's DSOs are ready to meet these stricter requirements after having launched a large-scale effort at end of the 1990s to weatherproof power distribution – mainly by replacing the majority of sensitive power lines in forest terrain with underground cable. The pace of this work was accelerated after Hurricanes Gudrun and Per and of the approximately 57,000 km of power line that were regarded as the problem, less than 5,000 km now remain to be converted, see *Diagram 40*. This has cost up to SEK 40 billion. Both the functional requirement and the regulations correspond to the visions and planning targets that the DSOs were already working according to, so the requirements were not new to the industry.

The storm in southern Sweden on 7 and 8 February 2011, with wind speeds approaching those in Hurricane Gudrun, was the first "test" of the new rules. Of the approximately 35,000 customers who were affected, some were without power for more than 24 hours. If this had occurred a few years ago, the consequences would have been far more severe.

However, the industry is not satisfied with this. The basic objective is to ensure that the customers receive their electricity. Although the industry's "zero vision" should be seen as an ambition, covering the last hurdle from 99.99% up to 100% is presumably both technologically difficult and financially unfeasible. In a complex system like the power grid, technical errors will always arise. The focus now is on identifying and eliminating as many of these as possible for the still existing risks. Continued efforts are being made to weatherproof the remaining sensitive line sections and install remote-controlled disconnectors, which minimize outage time for the affected customers.

TRANSITION TO EX ANTE REGULATION

DSO tariffs in Sweden are still subject to ex post regulation in Sweden, but this will change in 2012. Starting in 2012 DSO tariffs will be examined and approved in advance for periods of four years. This is an eagerly awaited reform that will give both the customers and DSOs clear advance notice about the financial conditions. Sweden is the last country in the EU to make the change from ex post to ex ante regulation.

In March 2011 the DSOs will apply to the Energy Markets Inspectorate (EI) for a revenue cap for the period from 2012 through 2015. Together with the application, the DSOs submit

TABLE 23

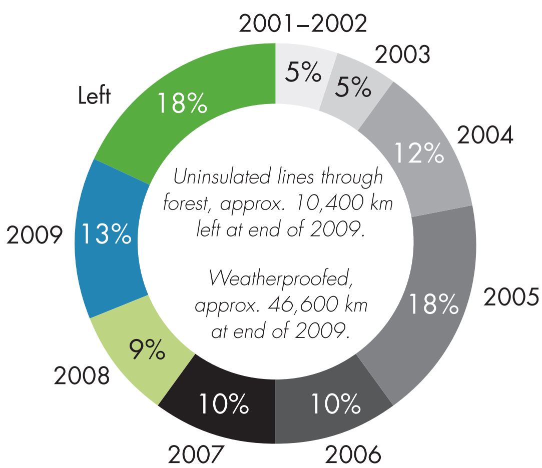
KEY STATISTICS (ACCORDING TO DIFFERENT RELIABILITY INDICES) FOR OPERATING INTERRUPTIONS IN LOCAL NETWORKS WITH A DURATION OF MORE THAN 3 MINUTES IN 2009

2009 Own networks	INDEX: SAIFI System Average Interruption Frequency Index no./year	SAIDI System Average Interruption Duration Index min./year	CAIDI Customer Average Interruption Duration Index min./year	ASAI Average Service Availability Index %	Total no. of interruptions	Total no. of customers affected
24 kV	0.25	16.15	63.48	99.99	3,863	1,264,323
12 kV	0.58	39.83	69.06	99.99	12,321	2,866,392
<10 kV	0.01	0.74	337.98	99.999	88	10,942
0.4 kV	0.03	4.45	140.07	99.999	26,892	157,734
Total	**0.87**	**61.17**	**70.71**	**99.99**	**43,164**	**4,299,391**
All networks	**1.12**	**70.11**	**62.68**	**99.99**	**46,543**	**5,558,982**

Source: Swedenergy

DIAGRAM 40

RATE OF WEATHERPROOFING IN THE SWEDISH DISTRIBUTION GRID, 2001–2009



Source: Swedenergy

data that makes it possible for the EI to assess the request and decide on a revenue cap. For several years the EI has been working on rules to govern this assessment. In 2010 the EI completed a number of reports describing how the assessment should be carried out and how the DSOs should prepare the documentation required by the EI.

APPROVAL OF TARIFFS FOR 2009

The Energy Markets Inspectorate, EI, has approved the tariffs of 157 DSOs for 2009 and there are 16 remaining DSOs whose tariffs have yet to be resolved. In most cases the EI feels that the tariffs are within a level that is considered reasonable. The explanation for why these DSOs' tariffs have not yet been approved is that the EI has requested additional documentation to be submitted by the DSOs together with their application for a revenue cap for the upcoming ex ante regulation of network tariffs in March 2011.

GRID CONNECTION

In 2010 the EI started to apply its new method for assessing the reasonableness of the connection fees charged by the DSOs. As a result, the backlog of connection cases that has been piling up for several years was finally settled.

The industry welcomed a new method aimed at expediting the process for customers, DSOs and public authorities. It is also hoped that the new method will bring an end to the large number of legal proceedings.

The administrative courts have not yet taken a position on the EI's new method and it thus remains to been seen whether the method will hold up in a court of law.

LAND ISSUES

Changes in the compensation rules in the Swedish Expropriation Act went into effect on 1 August 2010. The new rules state that when a DSO expropriates land, it must compensate the owner for the market value of the land plus a mark-up of 25%. The main motive for this change is that land is being forcibly taken by private profit-seeking companies to an increasing extent. The industry has drawn up a recommendation that specifies the sub-items that are to be attributed to norm calculated expropriation compensation and thereby adjusted upward by 25% according to the new rules.

Swedenergy, together with Svenska Kraftnät (the Swedish National Grid) and Boverket (the Swedish National Board of Housing, Building and Planning), has started the process of updating a long awaited report on "Power Transmission and Distribution Systems in Physical Planning". The report will provide guidance answering the question of how the need for land for power lines and transformer stations can be met in competition or cooperation with other interests. It will also serve as a manual regarding land needs for different types of utility lines and will provide an overall picture of the legislation that governs physical planning, electric power facilities and environmental aspects.

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