

EI R2009:08

The Swedish Energy Markets Inspectorate's  
report in accordance with the EC Directives  
for the internal markets for electricity and  
natural gas 2009

Energimarknads  
inspektionen



The Energy Markets Inspectorate  
Box 155, 631 03 Eskilstuna.

The Energy Markets Inspectorate EI R2009:08

Authors: Elin Söderlund, Elin Brodin, Cia Sjöberg, Henrik Gäverud, Lena Lange  
Jaakonantti, Marielle Liikanen, Margareta Bergström, Michael Pellijeff.

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Eskilstuna 2009

## Preface

A review of the energy markets must, according to the Energy Markets Inspectorate's (EI's) instruction, comply with the requirements of the electricity and natural gas market directives. This includes the annual preparation of a report in accordance with the reporting requirements pursuant to the directives. The report covers regulation, competition and issues regarding the security of supply.

The report also includes a presentation of the Swedish Competition Authority's assignment to report on certain competitive issues in the electricity market in accordance with article 23.8, paragraph 2, of the Electricity Market Directive. This presentation is in section 2.2.3 of the report.

The report follows the structure of the national report, which has been developed in cooperation with other European regulatory authorities and the European Commission. The purpose of the report structure is to specify the tasks that should be included in the member states' presentations in accordance with the electricity and natural gas market directives. A summary of all national reports will be available at the ERGEG's (European Regulators' Group for Electricity and Gas) website, [www.energy-regulators.eu](http://www.energy-regulators.eu).

Work on this report was directed by Elin Brodin and Elin Söderlund. The project group consisted of Cia Sjöberg, Henrik Gäverud, Lena Lange Jaakonantti, Marielle Liikanen, Michael Pellijeff and Margareta Bergström.

Yvonne Fredriksson

Director-General



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# 1 Summary

## 1.1 The electricity market

### 1.1.1 The wholesale market

The Nordic region had a common spot price for electricity for 9% of the time during 2008. For the remainder of the time, the prices differed because of limitations in the transfer capacity between Nord Pool's electricity spot areas, due to, among other things, a broken cable in the Oslo fjord. For 2007, the equivalent figure was 28%. When all areas are integrated into one common Nordic electricity market, competitive pressure increases in all parts of the Nordic region.

Trade on Nord Pool's spot market amounted to 298 TWh during 2008, which is an increase of 2% compared with 2007. This corresponds to physical trade of 76% of the electricity consumption in the Nordic region. In 2006, this figure was 69%. Trade on Nord Pool's financial market also increased during 2008, to 1,437 TWh compared with 1,060 TWh the year before, an increase of 35%. The total volume of traded and cleared emission rights and credits (EUAs and CERs) increased by 28% compared with the previous year. A high turnover on Nord Pool increases confidence for price formation among operators in the market.

The three largest electricity producers in Sweden: Vattenfall, E.ON and Fortum, accounted for 85% of electricity production in Sweden throughout 2008, which was the same amount as in 2007. Three electricity producers had, during 2008, a production capacity of 5% or more of the total installed electricity production capacity in Sweden.

Total electricity production in Sweden amounted to 146 TWh in 2008, an increase of 0.5% compared with the previous year. Electricity consumption amounted to 144 TWh, which was a decrease of approximately 1% compared with the consumption in 2007. The decrease was mainly due to the economic crisis, which meant that large electricity consumers, such as industrial companies, reduced their production, which led to a subsequent reduction in their energy needs.

### 1.1.2 The retail market

The Swedish electricity market has been completely open (100%) since 1996. Unlike the wholesale market, the end-user markets in the Nordic region are primarily national markets. In spring 2009, NordREG, the organisation for the Nordic region's regulatory authorities, presented a report to the national

governments which included a number of harmonisation proposals, the purpose being to facilitate a common Nordic end-user market.<sup>1</sup>

Approximately 11% of all domestic consumers in Sweden changed their electricity supplier in 2008. The total amount of household consumers that changed their electricity supplier fell by approximately 6% from 2007 to 2008. In addition, around 16% of all electricity consumers renegotiated their electricity contracts in 2008 with their existing suppliers.

Variable-price contracts for electricity are becoming increasingly common in the Swedish electricity market. In April 2009, 27% of customers had a variable-price contract, compared with 18% in April 2008. The share of customers with so-called *open-ended price contracts* is decreasing and amounted to 30% in April 2009, compared with 37% in 2008.<sup>2</sup> The reduction in the number of customers with an *open-ended price* is due to the fact that an increasing number of customers are making an active choice regarding electricity suppliers and types of contract.

The customers' total electricity cost decreased slightly during 2008. In 2008, the electricity retail price for a consumer with an electrically heated detached house amounted to 42% of the total electricity cost, while the electricity network charge amounted to 18%, with taxes and VAT at 40%. The part of the total electricity cost that varied the most over time was the electricity retail price.

In 2008, 124 electricity retail companies sold electricity to domestic consumers in Sweden.<sup>3</sup> In 1996, there were approximately 220 electricity retail companies. However, in later years, the number of electricity retail companies has remained the same. The decrease, since 1996, came about primarily through mergers and acquisitions, where many municipalities chose to sell their electricity retailing companies or, in some other way, link these mainly to the large energy groups such as Vattenfall, E.ON and Fortum. Some 20 retail companies are still entirely independent of these three major groups.

Vattenfall, E.ON and Fortum are the largest electricity retail companies in the Swedish retail market. Vattenfall has approximately 30% of the retail market, E.ON approximately 12% and Fortum approximately 8%.<sup>4</sup>

Since 1 January 2007, there has been a requirement in the Electricity Act<sup>5</sup> which stipulates that the electricity retail companies are obliged to report their prices and contractual terms for electricity to the EI. This information is then made public on

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<sup>1</sup> Market Design – Common Nordic end-user market (NordREG, Report 3/2009).

<sup>2</sup> Customers who have not actively chosen an electricity supplier or contract form are assigned a so-called "open-ended" price by their designated electricity supplier. The open-ended price is often higher than the price for other types of contract.

<sup>3</sup> The figure is based on the number of electricity retail companies that are obliged to report their prices and contract terms and conditions to the EI.

<sup>4</sup> The figures are based on pre-sold volumes to own end-consumers throughout the year 2006.

<sup>5</sup> Chapter 8 11b § The Electricity Act.



the EI's website ([www.elpriskollen.se](http://www.elpriskollen.se)), the purpose being to help consumers compare electricity retail prices.

### 1.1.3 Transmission capacity

The projects Fenno-Skan 2, Järpströmmen-Nea, Sydlänken (The Southern Link), Skagerack 4 and Stora Bält (the Great Belt), which have already been started, was in 2009 supplemented by a further three projects by the operators of the Nordic national grid. These three projects have been identified as areas where investments in the electricity grid are necessary in order to increase the possibility of transferring electricity between the Nordic countries.<sup>6</sup> The three projects are The South-West Link (an extension of the Southern Link) between southern Norway and southern Sweden, Ørskog-Fardal along the Norwegian coast and Ofoten-Balsfjord-Hammerfest in northern Norway.

### 1.1.4 Unbundling of monopoly operations and competitive operations

Affärsverket Svenska Kraftnät (the Swedish Transmission System Operator, TSO) is the owner of the transmission network in Sweden and is owned by the Swedish state. Svenska Kraftnät, from an ownership point of view, is separated from operations subject to competition.

At distribution level, a requirement was introduced in Swedish legislation, on 1 January 1996, for the legal unbundling of network operations and competitive operations (electricity production/trading in electricity). According to the Electricity Act, a company which conducts network operations may not generate or trade in electricity. On 1 July 2005, new requirements were introduced, meaning that a board member, managing director or an authorised signatory in a company that carries out network operations and which forms part of a group whose total electricity network has a minimum of 100,000 electricity users may not, at the same time, be a board member, managing director or an authorised signatory of a company that generates or trades in electricity.

According to the Electricity Act, the company that has the network concession is obliged to establish a compliance programme. The purpose of the compliance programme is to ensure that the network owner acts objectively and does not unduly favour any operator in the market.

The government proposed, during spring 2009, that some changes should be made to the Electricity Act. It stated that these changes should clarify the requirements,

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<sup>6</sup> Nordic Grid Master Plan 2008.

at a functional level, of companies that carry out network operations and electricity production/retailing respectively.<sup>7</sup>

#### 1.1.5 Security of supply

In 2008, an additional 414 MW of electricity production capacity was made available in Sweden. At the same time, there was a capacity shortfall of 298 MW, which meant that the net increase amounted to 116 MW. The greatest change of electricity production capacity took place within wind power, where the increase was 233 MW in 2008.

Additional electricity production capacity from projects which are currently under production and will be put into operation 2009–2012 amount to a little more than 1,300 MW.<sup>8</sup> All in all, these facilities are expected to produce a little more than 6 TWh per year. Of the total amount, approximately 640 MW comes from wind power, 600 MW from CHP (Combined Heat and Power) and 12 MW from hydroelectric power.

#### 1.1.6 The EI's assessments

The electricity market in Sweden was opened up for competition in 1996. Since then, the market has developed and integrated with other markets in the Nordic region. The Inspectorate's assessment is that the electricity market, in general, functions well. The Nordic electricity market is one of the most developed in Europe. Trade on the Nordic electricity exchange, Nord Pool, is increasing steadily and has now reached a level at which more than 76% of the electricity consumed in the Nordic region is also traded on Nord Pool. This is a very positive trend that promotes effective price formation and transparency in the electricity market.

The EI, over the past year, has worked with NordREG, the Nordic regulatory authorities, on proposals regarding the development of a common Nordic end-user market. Work has shown that there are many processes and regulations in the Nordic countries which need to be harmonised in order to make it attractive for electricity suppliers in the Nordic region to become established across country borders. The Inspectorate regards the work of harmonising these processes, rules and regulations as an important step in reaching a more integrated and well-functioning Nordic electricity market. A joint Nordic end-user market will create the conditions for increased competition in the electricity market which will benefit both Swedish and Nordic electricity consumers.

From 2012, an ex-ante review of electricity network tariffs will be introduced in Sweden. The changes aim, among other things, at ensuring that there will be

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<sup>7</sup> Bill. 2008/09:216, Delimitation of electricity supply network operations.

<sup>8</sup> According to statistics from EME Analys. There is no guarantee that the statistics have included the exact number of projects under construction.

absolutely no doubt at all that Swedish legislation fulfils requirements in accordance with the EU's electricity market directive. The Inspectorate takes the view that the introduction of an ex-ante system will create more predictability, both for consumers and companies, regarding the total size of network tariffs. The network companies will know how much they can charge consumers in the form of network tariffs for the next regulatory period, provided that the assumptions and conditions which form the basis of determining the revenue framework are fulfilled. Consumer interest will be promoted through regulation and its ability to make demands on the network companies to become more efficient and discourage companies from making use of their position as a monopoly.

From 1 July 2009, electricity network companies are obliged to read consumers' electricity meters once a month. The reform, which should be regarded as a milestone in the development of the electricity market, will bring about several improvements. For consumers, the meter reform will mean that bills will be based on actual consumption. This will increase consumers' insight regarding their consumption and, in the long run, contribute to an increased understanding of and more confidence in the electricity market. At the same time, the reform will make it possible for electricity suppliers to develop new products and find new ways of competing in the market.

The Nordic wholesale market is divided up into electricity spot areas. In the event of transmission constraints in the national grid between two areas, prices will differ between these areas. In this way, transmission constraints will be dealt with via different prices in the market. During the autumn, the Nordic energy ministers reached an agreement regarding a review of the division of areas in the Nordic region. Following the energy ministers' agreement, the Swedish TSO Svenska Kraftnät has been given the assignment to initiate the process of dividing Sweden up into further spot areas. The assignment will take place following consultation with the EI, The Swedish Competition Authority and Nord Pool Spot AS. The EI regards the Nordic energy ministers' initiative to try to find a marketable solution to the problems associated with transmission constraints within the Nordic grid as positive. In certain circumstances, having different spot prices for electricity in different parts of Sweden is a market oriented and efficient way of dealing with transmission constraints within the country. At the same time, the EI emphasises that it is important that operators are given reasonable advance notification if Sweden were to be divided up into several price areas. Present contracts are based on a system with one price area and operators need time to make practical preparations.

## 1.2 The natural gas market

### 1.2.1 Supply

Sweden has no natural gas resources of its own.<sup>9</sup> All natural gas consumed in the country is imported through the pipeline that runs between Denmark and Sweden.

Over the past year, a number of plans have been presented to provide further supply routes to the Swedish natural gas system. In November 2008, the building of a terminal for Liquid Natural Gas (LNG) was started north of the Nynas Refinery in Nynäshamn. The company Nynäshamns Gasterminal AB is owned by AGA. The facility is expected to be operational during 2010. There are no plans to connect the facility to the existing natural gas network.

Another project is the gas pipeline Nord Stream, which is planned to go from Russia to the European gas network through the Baltic Sea. It is intended that the gas pipeline should consist of two parallel pipelines which pass through five countries' economic zones, including Sweden. The project need to be environmentally assessed by the countries affected before it can start. No plans have been submitted regarding a connection to Sweden.

The project Skanled, which runs from southern Norway to the west coast in Sweden, has been evaluated for some time. The project has been put on hold. According to information from those responsible for the project, this is due to the uncertain economic situation. However, the project may be resumed in the future.

### 1.2.2 The retail market

The Swedish natural gas market has been completely open since 2007. There are approximately 47,000 natural gas users in Sweden. Some 2,600 of these are commercial or industrial customers and the remainder are domestic customers. The number of end users has decreased over the past few years. The decrease is due to the fact that the number of gas users has fallen in Gothenburg and Malmö.

Throughout 2008 there were seven natural gas companies in Sweden, of which, six sold gas to end consumers.

Prices for end consumers increased somewhat for all customer categories between 2007 and 2008. The price of oil has had a great impact on the price of natural gas and therefore increased oil prices have driven up the price of natural gas. Increased taxation on fossil fuels has also contributed to prices gradually increasing for end consumers.

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<sup>9</sup> Biogas, however, is produced. Biogas comes under the concept of natural gas in the Natural Gas Act (2005:403).

### 1.2.3 Security of supply

Peak demands and shortfalls in the supply are primarily dealt with by balance providers, who are responsible for balancing the space available provided through pressure variations in the TSO, so-called linepacking. If additional action is required, Svenska Kraftnät uses market mechanisms to deal with imbalances as far as it is possible. This means that the balance providers carry out regulatory gas trading.

### 1.2.4 The EI's assessments

The liberalisation of the market, which was implemented on 1 July 2007, has improved the conditions for a well-functioning natural gas market in Sweden. Instead of being tied to their local gas companies, since 2007, consumers in the gas market can now use a natural gas supplier of their choice. Freedom of choice creates competition between the natural gas suppliers. Competition takes place with the companies offering lower prices and/or better terms and conditions. This creates driving forces for increased efficiency among the suppliers and, consequently, the potential for a more efficient natural gas market.

Despite the opening up of the market in 2007, competition in the Swedish natural gas market is limited. No new gas retailers have been established since the market was opened, and there is still only one supply pipeline to the Swedish market.

The 2008 study of the gas market carried out by the Inspectorate showed that, despite considerable efforts to produce information, just over a third of gas consumers were still unaware that they could change to another gas supplier.<sup>10</sup> There is a need for clearer, more available and comparable information about retail prices compared with what is available today.

The EI believes that additional supply routes of natural gas to Sweden is central to the development of the Swedish natural gas market. An additional supply pipeline would increase transmission capacity and reduce the risk of future capacity shortages. It would also improve the conditions for competition, as more operators would be given the opportunity to operate in the Swedish natural gas market.

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<sup>10</sup> Customer activity in the natural gas market (EI, EI R2008:11).

## 2 The electricity market

### 2.1 Regulation issues

#### 2.1.1 General issues

The Swedish electricity market was reformed in 1996. The new regulations mean that the trade and production of electricity was subject to competition while network operations remained a regulated monopoly. The purpose of the electricity market reform was, among other things, to increase the choice for consumers and to create the conditions for increased competition.

2.1.2 Transmission constraints and mechanisms to deal with these  
The need to transfer electricity within Sweden and within the Nordic region is influenced primarily by variations in the supply of hydroelectric power and seasonal variations in consumption.

The national grids in the Nordic region are not designed to be able to fully satisfy the transmission of electricity at all times. This has the effect of producing transmission constraints, so-called bottlenecks. Normally, transmission constraints in the Swedish national grid are associated with large hydroelectric power production in the north, which leads to a greater need for transit to the south,<sup>11</sup> or with large transits to the north, from Denmark and the continent to the west coast of Sweden and further on to southern Norway.<sup>12</sup> The Nordic national grid operators (TSOs) have, through a cooperation agreement within Nordel, agreed to common principles for the calculation of transmission capacities within the Nordic market.<sup>13</sup>

Transmission constraints between Nord Pool's electricity spot areas are dealt with primarily via market sharing. This means that the transmission constraints are dealt with through price signals: the price in a deficit area will be higher than the price in a surplus area. The Nordic market is, at present, divided up into eight so-called electricity spot areas.<sup>14</sup> Sweden is one electricity spot area. An electricity spot area can form its own price area or form common price areas together with one or more electricity spot areas. The system price shows, in such a situation, the

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<sup>11</sup> Through the sections which are limited in direction from north to south: section 1 – between River Lule and River Skellefte, section 2 – north of the River Dal and section 4 – south of the nuclear power stations in Ringhals and Oskarshamn.

<sup>12</sup> Through the section limited in direction from south to north, the so-called west-coast section in the region surrounding Gothenburg.

<sup>13</sup> System Operation Agreement and "Principle for determining the transfer capacity in the Nordic power market".

<sup>14</sup> Norway has three areas (NO1, NO2 and NO3), Denmark has two (DK East and DK West) and Sweden (SE) and Finland (FI) consist of one area each. There is also a German area, Kontek.

uniform Nordic price which would apply if there were no transmission constraints. The system price is also a reference price for the financial market and for bilateral contracts. As a result of Sweden's central geographic location in the Nordic region, most of the time the country forms a common price area with at least one other electricity spot area. Throughout 2008, the entire Nordic markets had the same price for only 9% of the time. The price area differences were due, to a great extent, to a broken cable in the Oslo Fjord, which occurred in March 2008. When all areas are integrated into one common Nordic electricity market, competitive pressure increases in all parts of the Nordic region.

Transmission constraints in Sweden are dealt with in two different ways, through a reduction of the trading capacities and through counter trading. By reducing the trading capacity, usually the export capacity to the south, demand on the market to transport electricity through Sweden is reduced, which, in turn, reduces the load on the national grid. Decisions on the reduction of trading capacities are taken prior to operation and are made public to the market's operators before the spot market has closed.<sup>15</sup> If a reduction in trading capacity is insufficient to avoid a transmission constraint, or, alternatively, if the conditions have changed between trade on the spot market and the operating hour,<sup>16</sup> Svenska Kraftnät uses counter trading to deal with the transmission constraint. Counter trading amounts to Svenska Kraftnät ordering an upgrade of production in the shortfall area and/or a downgrade of production in the surplus area. The costs of counter trading are charged to Svenska Kraftnät and thereby provide signals that the network needs to be reinforced.

In the future, Sweden will most likely deal with certain transmission constraints by dividing up the market, i.e. various parts of Sweden will belong to different price areas. At present, Svenska Kraftnät has been assigned by the government to initiate the process of dividing up Sweden into further so-called registration areas to Nord Pool Spot AS.<sup>17</sup> According to the assignment, the change should be implemented as quickly as it is deemed possible, taking into consideration partly the changes in the various IT systems that need to be implemented and partly the financial needs of the market to facilitate forward planning. Svenska Kraftnät is investigating different alternatives to the market divisions in Sweden, meaning that the country can be made up of two, three or four registration areas.<sup>18</sup> The assignment will take

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<sup>15</sup> Trading capacity is determined bilaterally between those responsible for the systems in each country. Those responsible for the system in each country make an assessment regarding how much capacity can be made available for trade so that criteria for the safe operation of the system is followed (the criteria are set out in the Nordic System Operations Agreement).

<sup>16</sup> Svenska Kraftnät does not thereby alter established trade capacities that have been made public to the market's operators.

<sup>17</sup> The government approval document for the budget year 2009 regarding business operations for the Swedish national grid within the Expenditure area 21 Energy (Communication from the Swedish Parliament. 2008/09:100).

<sup>18</sup> Swedish registration areas – A progress report (Svenska Kraftnät, 2009).

place following consultation with the EI, The Swedish Competition Authority and Nord Pool Spot AS.

Table 1 shows the proportion of hours during 2008 when certain price areas in the Nordic region had a common price.

**Table 1: Proportion of the total number of hours during 2008 when the price was the same on the Nordic electricity market**

Percentage of hours	Areas with a common price
97%	SE and FI
9%	SE, FI, NO1, NO2, NO3, DK East and DK West

NOTE: NO1 = SOUTHERN NORWAY, NO2 = CENTRAL NORWAY, NO3 = NORTHERN NORWAY.

SOURCE: THE ENERGY MARKETS INSPECTORATE AND NORD POOL

### 2.1.3 Regulation of transmissions and distribution companies

The Swedish power grid has three levels; the national grid, regional grid and local grid. The national grid consists of 220 kV and 400 kV transmission lines. The regional networks connect to the national grid and have a lower voltage level, normally 40–130 kV. The regional networks transport electricity from the national grid to the local networks and, in some cases, direct to major electricity users. The local networks are connected to the regional networks and transport electricity to households and most industries. From the local networks, up to and including 20 kV, the power is transformed within the distribution areas to the normal domestic voltage of 400/230 V.

The Swedish electricity network consists of approximately 528,000 km of conductors, of which 300,000 km are buried in the ground and 228,000 are overhead power lines.

The national grid is owned and looked after by the state by Affärsverket Svenska Kraftnät, which is also the transmission system operator (TSO) responsible for the system in Sweden. Svenska Kraftnät handles the operative running of the national grid and is responsible for the short-term balance in the electricity network. Five companies run the regional network operations and 172 companies run the local network operations.

### 2.1.4 Supervision of the distribution companies' network tariffs

In the government bill (2008/09:141) "Preliminary examination of network tariffs", changes have been proposed to the Electricity Act (1997:857). The bill was



adopted by the Swedish parliament on 16 June 2009.<sup>19</sup> The changes signify a transition from an ex-post regulation of network tariffs to an ex-ante regulation. The maximum collected revenues which a network concessionaire may charge during a regulatory period via network tariffs are determined in advance. The EI should determine the revenue framework for the local and regional networks. A decision regarding the revenue framework for the national grid will be made by the government from a proposal presented by the EI.

By 2011, the EI's job is to develop a regulatory method for the ex-ante regulation of network tariffs for electricity so that the revenue frameworks can be decided for all electricity network companies (local, regional and national) for the first regulatory period 2012-2015.

The new regulatory method for ex-ante regulation should prevent unreasonable network tariffs and ensure that network operations are carried out efficiently. The regulatory method should also be designed so that it is in accordance with the requirements which otherwise follow from the Swedish and EU legal framework in the area. The design of the new regulatory method should be transparent and the network companies should understand how they are going to be regulated by the new method. The regulatory method should not increase companies' administrative burdens to any great extent, other than what is regarded as reasonable. The switch to the new ex ante regulatory system, which comes into force in 2012, will contribute to a more predictable regulation of network tariffs.

Up to and including December 2008, the Inspectorate used the regulatory tool Nätnyttomodellen (the network performance assessment model) to supervise network tariffs based on the principle of regulation in retrospect. In January, when it was clear that the government intended to present a bill to Parliament regarding the ex ante regulation of network tariffs, the Inspectorate decided to change the regulatory method. The Inspectorate will use another regulatory method for the years 2008–2011, and this will be based on the information that has already been collected from the companies.

The network companies are obliged, according to the Electricity Act, to establish a separate economic report of network operations in the form of an annual report. The annual report must be presented to the EI no later than 7 months after the end of the financial year, and it should contain a complete income statement and balance sheet. The annual reports are examined by the network companies' auditors and are checked by the EI before the data is used for the regulation of the network tariffs. The reports are public.

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<sup>19</sup> Official records of the proceedings 2008/09:133 (16–06–2009) regarding a decision on bill 2008/09:163, A coherent climate and energy policy – Energy.

## Quality regulation

In the forthcoming ex-ante regulation of electricity network tariffs, the transmission quality will be taken into consideration. It has not yet been determined which quality indicators will be used. Prior to the first regulatory period, it is likely that only the companies' disruptions will be included. The government, or following government authorisation, the EI, with the support of the new regulations regarding the preliminary examination of the tariffs, will issue regulations as to what should be regarded as good power quality.

Table 2 shows interruptions in the local networks between 2000 and 2007.<sup>20</sup> The figures indicate average values per customer and are divided into planned and unplanned interruptions.

**Table 2: Interruptions in the local networks, average values per customer**

	2000	2001	2002	2003	2004	2005	2006	2007
<b>Average number of interruptions per customer</b>								
Planned interruptions	0.19	0.18	0.25	0.19	0.19	0.21	0.19	0.29
Unplanned interruptions	0.88	1.03	0.97	0.90	0.89	1.26	1.06	1.27
<b>Average interruption period per customer (min)</b>								
Planned interruptions	27	27	29	27	25	32	22	22
Unplanned interruptions	89	128	123	118	72	890	88	298

SOURCE: THE ENERGY MARKETS INSPECTORATE

### 2.1.5 Regulation of tariffs by the TSO

The national grid consists of approximately 15,000 km of transmission lines, which carry voltage levels of 220 kV and 400 kV. Svenska Kraftnät is responsible, in its capacity as system operator, for drawing up the transmission tariffs. The tariff method is designed so that the tariffs are objective and non-discriminatory and that the electricity producers pay a smaller proportion of the network's total revenues compared to the customers. The network tariffs are also set so that the collective revenue of Svenska Kraftnät for the network operations is reasonable in relation to the objective and subjective conditions in running the network operations. Svenska Kraftnät's transmission performance will be fully evaluated for all conductors throughout the country. However, the tariff must be drawn up with due consideration to the location of the connection point.

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<sup>20</sup> Latest available statistics.

EI analyses the appropriateness of the tariffs in the national grid. Every year the EI collects financial and technical data from Svenska Kraftnät in the form of an annual report.<sup>21</sup> The annual report should include a complete report of network operations, including an income statement and balance sheet. The annual report must be presented to the EI no later than 7 months after the end of the financial year. When the report has been received by the EI, the Inspectorate carries out a quality review of the report's separate report. The tariffs for the national grid will be included in the new regulation, and the regulation will include a preliminary examination of the network tariffs which come into force in 2012 (see 2.1.4).

#### 2.1.6 Use of bottleneck revenues

In accordance with the regulation on cross-border electricity trading,<sup>22</sup> Svenska Kraftnät, together with other Nordic grid operators in Nordel, decided that they would use the revenue from managing bottlenecks for investments to provide reinforcement to the national grids and the links between the various countries.<sup>23</sup> As a result of current budget legislation, Svenska Kraftnät, which is a public utility, is unable to allocate financial resources between years for investments.<sup>24</sup>

#### 2.1.7 Current network tariffs

Table 3 shows the average network tariff for three typical customers (in accordance with the classification carried out by Eurostat) for the period July–December 2008. The network tariff includes the cost of transmission within the TSO. The tariff also includes charges made by the authority which amount to SEK 54 per year for low-voltage subscribers and SEK 3,577 per year for high-voltage subscribers (with an installed effect of 1 MW or greater). For every electricity subscriber, the state, each year, levies three so-called official charges. The charges are used for financing the state operations for electrical safety, electrical preparedness and activities for supervising the network monopoly.

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<sup>21</sup> This is done on the basis of the "National Swedish Board for Industrial and Technical Development regulations and general advice (1995:1) on reporting of network operations", revised by NUFTS 1998:1.

<sup>22</sup> The bill The European Parliament and Council Regulation (EC/1228/2003), regarding the conditions for access to the network for cross-border electricity trading.

<sup>23</sup> The European Parliament and Council Regulation no. 1228/2003 of 26 June 2003 regarding the terms and conditions for access to the network for cross-border electricity trading.

<sup>24</sup> The EI published, during summer 2008, a report on bottleneck revenues: Revenues resulting from cross-border congestion management – Report according to point 6.5 of the Congestion Management Guidelines.

**Table 3: Electricity network tariffs 2008, Eurostat's typical customers**

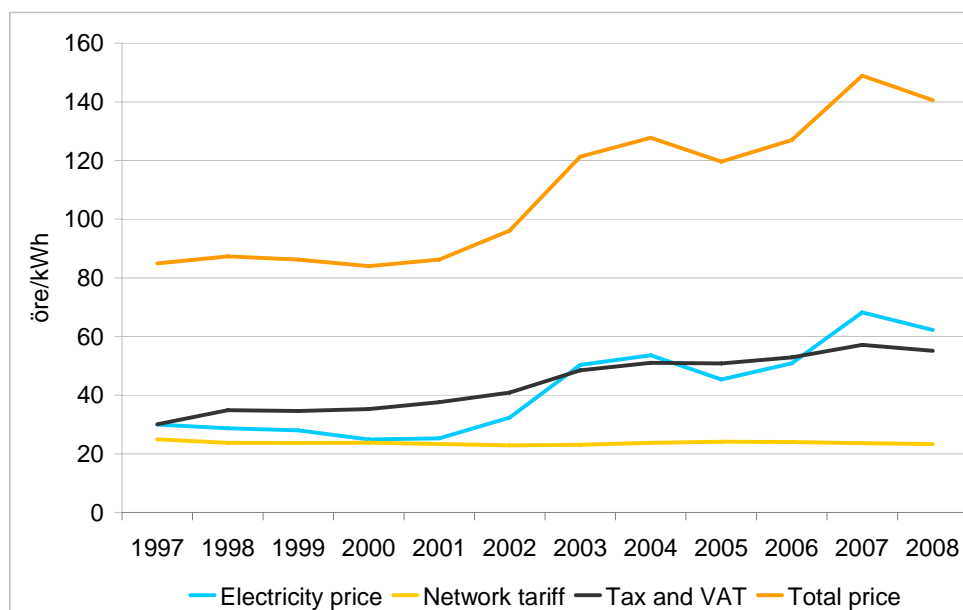
	Number of electricity network companies	Network tariff (öre/kWh)		
		Industrial customer 20,000–70,000 MWh	Industrial customer 2,000–20,000 MWh	Household customer 2,500–5,000 kWh
Transmission	1	-	-	-
Distribution	174.0	8.0	13.1	51.0

NOTE: AVERAGE VALUE JULY–DECEMBER 2008.

SOURCE: STATISTICS SWEDEN

Each year the EI collects statistics on network tariffs. Statistics are collected for around 20 or so typical customer groups, this is done to facilitate comparisons of network tariffs from the various electricity network companies.

Figure 1 shows that the network tariffs for a typical household customer in Sweden have been more or less unchanged between 1997 and 2008. The rising total cost for customers has, instead, been due to increased electricity trading prices and increased tax.



**Figure 1: Total electricity cost for a household customer (20 A) with an annual consumption of 20,000 kWh between 1 January 1997 and 1 January 2008<sup>25</sup>**

SOURCE: THE ENERGY MARKETS INSPECTORATE

The network tariffs have increased for most typical customers since 1 January 2008. Nearly all electricity network companies raised their electricity network tariffs between 1 January 2008 and 1 January 2009. The electricity network companies that have raised their tariffs have been asked to account for the reasons for the increase. Some of the most common explanations included increased costs for network losses, general price/cost increases, increased costs in regional and national grid, new requirements for improved supply reliability, investments in remote metering systems and increased investment in the network. Table 4 shows the network tariffs for some common typical customers in Sweden in 2009.

<sup>25</sup> The cost for electricity trading that has been used is an average value for an *open-ended contract*. The tax relates to the tax rate which applies in the municipalities that do not have the lower electricity tax which is applied in certain northerly municipalities. From 2003, the price of the electricity certificate is included in the price of electricity.

**Table 4: Electricity network tariffs as of 1 January 2009, typical customers in Sweden**

	Average as of 1 Jan 2009, SEK	Change compared with 1 Jan 2008
Apartment 2,000 kWh/year	1,006	5.5%
Small household (20 A) 20,000 kWh/year	4,860	4.6%
50 A 100,000 kWh/year	18,412	3.0%
160 A	60,807	4.3%

SOURCE: THE ENERGY MARKETS INSPECTORATE

The electricity network tariffs often consist of a fixed and a variable part. For a house that is heated with electricity (20 A, 20,000 kWh per year) the fixed cost is approximately half of the network tariff, while the other half varies. During the past 5 years, the distribution of the network tariff between fixed and variable parts has not changed significantly. The customer can influence the variable part by reducing his/her consumption.

Customers with a low level of consumption have few tariff alternatives. Most of the electricity network companies offer only one type of tariff, the simple tariff. The simple tariff means that the customer pays the same amount for their electricity irrespective of when the electricity is consumed, namely during the day or the night (24-hour period). The alternative to the simple tariff is the time tariff, this is where the customer pays different amounts depending on when the electricity is consumed – usually, prices are lower during the night and higher during the day.

Increasing numbers of electricity companies have introduced something that is akin to power tariffs for domestic customers. The network tariff consists of a smaller part at a fixed price linked to the fuse rating. The fuse rating determines the maximum possible power output. In addition, a power charge is made depending on how the household uses the electricity network. The network tariff is differentiated within a given fuse rating and different prices may apply, for example at different times of the day and also at different times during the year.

The network tariffs vary greatly between the electricity network companies. For apartment customers, for example, the lowest tariff is SEK 636 per year while the highest tariff is SEK 2,169 per year, a difference of SEK 1,533. For a house that is heated with electricity (20 A, 20,000 kWh), the network tariff varies between SEK 2,870 per year and SEK 7,934 per year. The differences are due to, among other things, the number of customers and geographic conditions. The tariffs are generally lower in urban areas and higher in the countryside where the cables cover long distances and where there are fewer customers.

The price the customer pays to use the local network covers the costs of the transmission of electricity, administration, operations and maintenance of the network, including metering and reporting. In addition, the costs cover the transmission via the regional and national grid, along with charges levied by authorities.

#### 2.1.8 Balance regulation

Balance regulation takes place through primary regulation and secondary regulation. Primary regulation means that the physical balance in the electricity system is fine-tuned through the automatic increase or decrease of production in a number of hydroelectric power stations. Secondary regulation involves manual upward or downward regulation in order to reset the primary regulation, and this takes place via the Nordic regulating power market.

The legal base for balance regulation is included in the Electricity Act.<sup>26</sup> According to the Electricity Act, electricity trading companies or other operators that supply electricity to end consumers must have a valid balancing responsibility agreement with Svenska Kraftnät. A balancing responsibility agreement means that an operator assumes the financial responsibility of ensuring that the amount of electricity taken from the network is balanced by an equal amount of electricity supplied, this is because the electricity network must always be in balance. The operator that assumes the economic responsibility of ensuring that the electricity network is in balance is called the balance provider. The electricity trading company may assume this role itself or purchase this service from another operator.

The balance provider (and other operators) can purchase electricity on the Electricity Spot Market in order to plan their balances. When the Electricity Spot Market has closed for the day, the operators are informed as to how much trade will take place. The balance providers must, no later than 16.00, send their plans for production, consumption and trade to Svenska Kraftnät. These plans must be in balance for every balance provider. After that, a new calculation of the transfer capacity is carried out and the Elbas intra-day market opens. On Elbas, the operators can adjust their balances up to just before the operating hour. The final plans produced by the balance providers must be reported to Svenska Kraftnät before the operating hour begins.

The balance providers who are able to change their production or consumption during the operating hour can submit bids to Svenska Kraftnät for upward or downward regulation. The bids are normally presented no later than 30 minutes before the operating hour starts and they specify prices and quantities. Regulation bids are presented for predetermined regulation objects consisting of one or several

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<sup>26</sup> Chapter 8 The Electricity Act (1997:857).

production objects or consumption objects of similar type that are grouped together. It will be possible to put regulation bids into practice at short notice, i.e. within 10 minutes.

In order to balance the regulatory work as efficiently as possible, the Nordic TSOs cooperate together on a common Nordic regulatory power market. The TSOs in Norway and Sweden are jointly responsible for maintaining the frequency constant in the Nordic synchronous system, whereas every TSO is responsible for safe operation in its system responsibility area. The agreement also comprises a joint Nordic regulation list in which all regulating power bids are arranged in cost order in a common list. Assuming that no transmission limitations occur, the least expensive Nordic regulation bid will thereby be given priority.

Every year, Svenska Kraftnät produces a standard contract for balance provider agreements. According to the Electricity Act, the contents of the balance provider agreement should be objective and non-discriminatory. Svenska Kraftnät cannot conclude balance agreements before the methods and processes on which the balance agreement terms are based have been approved by the EI. If a balance provider makes a complaint concerning the balance provider agreement, the Inspectorate must decide whether the provider has been treated objectively and in a non-discriminating manner. The balance provider agreements apply until further notice. Before a standard contract for a balance provider agreement is drawn up, Svenska Kraftnät enters into discussions with the operators regarding any changes that have to be made. Discussions are also held between Svenska Kraftnät and the EI. According to the Electricity Act, the Inspectorate will give approval if the methods can be assumed to be objective and non-discriminatory. The method decisions are valid immediately. The standard contract for a balance provider agreement is public and is published on the homepage of Svenska Kraftnät.

A process is currently in progress for harmonising the terms for the balance providers in each Nordic country, with the aim of making it simple to maintain a common Nordic retail market. The Nordic system operators have decided, in an agreement, to harmonise, as a first stage, the rules for “gate closure” for final plans, cost base for balance settlement, the way imbalances are calculated and methods of pricing imbalances. The harmonising process is supported by the supervisory authorities in the Nordic countries, and this first stage in the process was implemented on 1 January 2009.

#### 2.1.9 Balance settlement

The cost of imbalances of the balance providers is calculated by Svenska Kraftnät in arrears, in the so-called balance settlement. The purpose of the settlement is to calculate the costs of the imbalance of every balance provider between the measured and the planned production/purchase on the one hand and consumption/sales on the other, and to distribute the costs of balance regulation



that Svenska Kraftnät has made between the balance providers who have contributed to the imbalance in the system. Balance settlement takes place for every hour of the day and for the whole of the year. Balance settlement is made per balance provider for Sweden as a whole, based on the metered values per settlement area.

For regulation objects above 63 A, the settlement will be based on hourly values. For objects below 63 A, the settlement will normally take place in accordance with the profile method. Hourly metering will always be employed for generation objects.

Electricity network companies are responsible for metering and reporting the hourly and profile metered values to Svenska Kraftnät. The EI has issued regulations for how metering and reporting will be carried out.

Balance settlement is carried out in two stages. The preliminary imbalances are first determined for every hour. Since the consumption of profile customers is measured only once a year, final settlement is carried out after 13 months.

The balance providers pay a fixed charge based on the volume of generation and/or consumption and a charge based on their imbalances. The charges include the costs of the automatic balance regulation (primary regulation), part of the costs of disturbance reserves and the costs of operation and administration of the system.

In the regulation market, the regulation price is set by the highest activated upward regulation bid during an upward regulation hour (and vice versa for downward regulation). The pricing of imbalances is carried out in accordance with a two-price model. According to the two-price model, the operator that has imbalance in the same direction as the total imbalance pays a regulation price for the electricity he/she purchases, while if the imbalance is in the opposite direction compared with the total balance, the operator instead pays the spot price for the imbalance. These prices are published on Nord Pool every hour.

The EI supervises whether the electricity network companies follow the regulations for metering and reporting, while Svenska Kraftnät checks that the balance providers follow the rules in the balancing agreement. Following the scrutiny of the seven electricity network companies' reports of hourly meter values, submitted in November and December 2008, the EI concluded that the electricity network companies are complying with the current regulations.

## 2.1.10 Effective unbundling

### Transmission

Svenska Kraftnät is the TSO in Sweden and is owned by Swedish state. Svenska Kraftnät, from an ownership point of view, is separated from operations subject to competition.

### Distribution

At distribution level, a requirement was introduced in Swedish legislation, on 1 January 1996, for the legal unbundling of network operations and competitive operations (electricity generation/trading in electricity). According to the Electricity Act, a company which conducts network operations may not generate or trade in electricity.

On 1 July 2005, stricter requirements for the unbundling of electricity distribution operations from electricity trading and/or electricity production operations were introduced. According to the new requirements, in a company conducting network operations and which is part of a larger group that has an electricity network with a total of more than 100,000 electricity users, a board member, the managing director or authorised company signatory may not, at the same time, be a board member, managing director or authorised company signatory in a company that generates or trades in electricity. Most Swedish network companies are not covered by this requirement, since they have less than 100,000 customers. In Sweden, six groups have electricity networks with more than 100,000 customers. These groups have a little more than 60% of the total amount of customers in Sweden.

There is no requirement in Swedish legislation that a network company may not be included in a group that pursues trading in or generation of electricity. Network companies that are part of a group that carries out generation of or trading in electricity use, in most cases, the group name, with the addition of “electricity network”, or similar, to distinguish the network operations from the generation and supply operations. If a network company is part of a group whose business is production and/or trade, the same company logo is generally used, and the group website is often divided into electricity network and electricity trading.

According to the Electricity Act, all electricity network companies are obliged to produce an annual report that is a separate financial report for the network operations. The annual report also contains a special report comprising technical data, including information on the frequency of power cuts in the company’s electricity network. The report must be signed by the board of directors and be examined by an auditor. The report is public and is sent to the EI. The Inspectorate has the possibility to actively supervise network companies that fail to comply with the provisions of the Electricity Act or with the regulations of the Inspectorate. As an example, network companies may have to pay a delay charge if they submit their annual reports too late. The EI can also direct a network company to take action in

order to meet the requirements of the Electricity Act. Failure to observe the directive may be punishable by a fine.

According to the Electricity Act, the company that has the network concession is obliged to establish a compliance programme. The purpose of the compliance programme is to ensure that the network owner acts objectively and does not unduly favour any other operator in the market. The compliance programme should describe the actions taken by the network company in order to counteract discriminatory behaviour towards other operators in the electricity market. The network owner must produce an annual report which accounts for the measures taken in accordance with the compliance programme. The report must be sent to the EI no later than 15 March every year.

The government proposed, during spring 2009, that some changes should be made to the Electricity Act, the purpose being to clarify the requirements regarding the functional distinction between companies that carry out network operations and electricity production/retailing respectively.<sup>27</sup> The proposal implies, among other things, that a network company that has a least 100,000 electricity subscribers should not provide employees in senior positions with salaries or other benefits which are based on results in those areas of the group which are involved in the production of or trade with electricity. In addition, the network company, in accordance with the proposal, must ensure that it has the sole and independent right to make a decision with regard to assets which the company needs to secure operations, maintenance and the expansion of the electricity network. The changes aim to implement the requirements of the electricity market directive.<sup>28</sup> It is proposed that the changes to the Electricity Act should come into force on 1 January 2010.

## **2.2 Competition issues**

### **2.2.1 Description of the wholesale power market**

The Swedish wholesale power market forms part of the integrated Nordic market.<sup>29</sup> Three electricity producers have 5% or more of the total installed electricity production capacity in Sweden. Together, Vattenfall, E.ON and Fortum have approximately 75% of the total installed electricity production capacity. Table 5 shows the large difference between the three biggest companies and Statkraft, which is the fourth largest electricity company in Sweden, in terms of installed electricity production capacity.

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<sup>27</sup> Bill. 2008/09:216, Delimitation of electricity supply network operations.

<sup>28</sup> Directive of the European Parliament and Council 2003/54/EC, as of 26 June 2003, on common regulations for the single market for electricity and the annulment of directive 96/92/EC.

<sup>29</sup> The Nordic region here relates to: Sweden, Norway, Denmark and Finland (not Iceland).

**Table 5: Five largest electricity producers in Sweden expressed in installed electricity production capacity, as of 1 January 2009**

Group	Installed power <sup>30</sup> (MW)	Share of total installed effect
Vattenfall	13,766	40.3%
E.ON	6,019	17.6%
Fortum	5,759	16.8%
Statkraft	1,262	3.7%
Skellefteå kraft	814	2.4%
<b>Total</b>	<b>27,620</b>	<b>80.8%</b>

SOURCE: SWEDENERGY

The five largest electricity producers in Sweden accounted for almost 88% of Sweden's total electricity production in 2008, see Table 6. Together, the three largest of these: Vattenfall, E.ON and Fortum, accounted for almost 85% of Sweden's total electricity production in 2008.

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<sup>30</sup> Total installed electricity production capacity in Sweden is 34,181 MW, as of 1 January 2009.

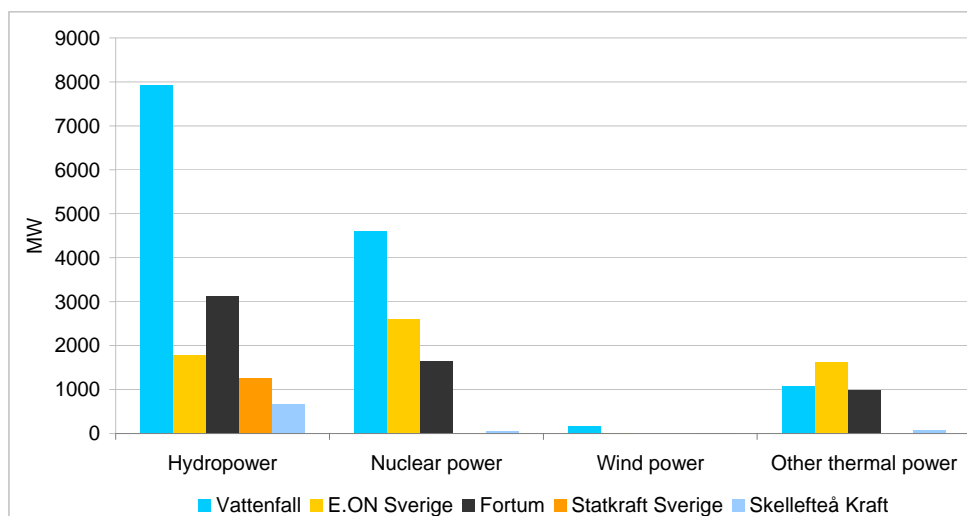
**Table 6: The five largest electricity producing companies in Sweden, electricity production in Sweden, TWh**

Group	2007	2008
Vattenfall	64.4	66
E.ON	31.9	29.8
Fortum	26	27.9
Skellefteå Kraft	3.4	3.3
Statkraft	1.3	1.3
<b>Total</b>	<b>127.4</b>	<b>128</b>
<b>Total electricity production</b>	<b>145</b>	<b>146</b>
<b>Five largest companies' share of total electricity production</b>	<b>87.6%</b>	<b>87.9%</b>

SOURCE: SWEDENERGY

Vattenfall is owned by the Swedish state and is the largest electricity producer in Sweden. In 2008, Vattenfall produced 45% of Sweden's electric power, which was more than the total production for E.ON Sverige and Fortum Sverige during the year. At the turn of the year 2008/2009, an exchange was carried out between the German listed limited company E.ON AG and Statkraft AS. The deal meant that Statkraft was bought out as owner of E.ON Sverige. Broadly speaking, the change meant that E.ON Sverige is now wholly owned by E.ON AG and that, in exchange, Statkraft received 2,500 MW in increased production capacity. The business deal meant that Statkraft increased its power resources in Sweden by approximately 970 MW, meaning that Statkraft is now Sweden's fourth largest electricity producer. Fortum Sverige is a company in the Fortum Group whose parent company is owned (60%) by the Finnish state. Statkraft Sverige AB is a wholly owned subsidiary of Statkraft, which is a state-owned Norwegian company. Skellefteå Kraft is wholly owned by Skellefteå Municipality.

Figure 2 shows the five largest electricity producers and their production capacity divided up into the different forms of power, as of January 2009. The figure shows that the two largest electricity producers in Sweden, Vattenfall and E.ON, produce electricity within all of the reported forms of power. Vattenfall have a share of around 50% of the production capacity for hydroelectric power and nuclear power. Ownership in wind power is not dominated to the same extent by the large companies.



**Figure 2: Electricity production capacity per type of production and company in Sweden, January 2009**

NOTE: OTHER THERMAL POWER IS PRODUCED BY CHP INDUSTRY, CHP DISTRICT HEATING, CONDENSATION AND GAS TURBINE, DIESEL ETC.

SOURCE: SWEDENERGY

### Trading volumes on Nord Pool and bilaterally

A high turnover on Nord Pool increases confidence for price formation among operators in the market. The total volume of traded and cleared contracts on Nord Pool amounted to 2,577 TWh in 2008, which was an increase of approximately 9% compared with the previous year. Financial trading increased by 35% compared with the previous year and amounted to a volume of 1,437 TWh. The total volume of EUAs and CERs increased by 28% compared with the previous year. Trade on the physical electricity spot market increased by 2% and was the equivalent of 76% of the total energy consumption in the Nordic region.<sup>31</sup> Trade also increased in the electricity-based market and amounted to 1.8 TWh compared with 1.6 TWh the previous year. Table 7 shows Swedish operators' turnover on Nord Pool and bilateral trade which was cleared on Nord Pool.

<sup>31</sup> However, the value of turnover on the spot market decreased by one third during 2008 compared with 2007, this was due to lower prices on the spot market.

**Table 7: Swedish operators' turnover on Nordic Pool and bilaterally, TWh**

	Purchase volume on Elspot <sup>1</sup>	Turnover on the financial market <sup>2</sup>	Bilateral financial trade/turnover on Nord Pool <sup>3</sup>
2006	110.8	272	433
2007	134.3	406	381
2008	132.7	206.7	175.9

<sup>1</sup> RELATES TO THE TOTAL PURCHASE VOLUME IN THE ELECTRICITY SPOT AREA SWEDEN. EQUIVALENT SALES VOLUMES THROUGHOUT THE YEARS 2002–2008: 34.1 TWH, 32.6 TWH, 67.8 TWH, 64.9 TWH AND 105.6 TWH, 129.5 TWH, 130.6 TWH.

<sup>2</sup> RELATES TO TURNOVER BY SWEDISH OPERATORS IN THE ELECTRICITY DERIVATIVES MARKET.

<sup>3</sup> RELATES TO SWEDISH OPERATORS' BILATERAL ELECTRICITY DERIVATIVES TRADING CLEARED ON NORD POOL.

SOURCE: NORD POOL

The number of operators in the Nord Pool spot market amounted to 320 in May 2009. The number of members on Elbas (the regulating power market) amounted to 78. On Nord Pool's financial market, the number of operators amounted to 385.

#### Electricity production and consumption in Sweden

Electricity production in Sweden is based principally on nuclear power and hydroelectric power. In a normal year, hydropower and nuclear power account for approximately 90% of the electricity generated in the country. Other thermal power production accounts for approximately 9%. Wind power makes up the remainder.

In 2008, the total amount of electricity generated in Sweden was 146 TWh, an increase of less than 1% compared with 2007. Hydroelectric power accounted for 47% and nuclear power for 42% of the total amount of electricity produced in the country. The increase in electricity production during the year can be explained by improved hydrological conditions compared with the previous year, and the electricity from hydroelectric power could be increased by 7% compared with the previous year. Electricity produced by wind power increased by 43% compared with 2007 and amounted to 2 TWh. Electricity production from nuclear power reduced by almost 5% compared with the previous year. The excellent water situation led to Sweden net exporting 2 TWh of electricity in 2008. In 2007, Sweden net imported 1.3 TWh.

Sweden has a relatively large proportion of electrical heating, approximately 30 TWh, of which two thirds is due to the outdoor temperature. That is why the temperature has a relatively large impact on Sweden's electricity consumption. The trade cycle and growth in society also have a large impact on electricity consumption. The total amount of electricity consumption in Sweden throughout 2008 amounted to 144 TWh, which is the lowest level over the past 5 years. Housing and services accounted for approximately half of the electricity consumed during the year, while industry accounted for 40%.

Table 8 shows the electricity balance in Sweden throughout the years 2004–2008.

**Table 8: Sweden's electricity balance 2004–2008, TWh**

	2004	2005	2006	2007	2008
<b>Production in the country</b>	<b>148.8</b>	<b>155.0</b>	<b>140.3</b>	<b>145.0</b>	<b>146</b>
Hydroelectric power	60.1	72.0	61.1	65.5	68.4
Nuclear power	75.0	69.8	65.0	64.3	61.3
Other thermal power	12.9	12.3	13.3	13.8	14.3
Wind power	0.9	0.9	1.0	1.4	2
<b>Electricity consumption in the country</b>	<b>146.7</b>	<b>147.6</b>	<b>146.3</b>	<b>146.3</b>	<b>144</b>
<b>Network losses</b>	<b>11.1</b>	<b>12.4</b>	<b>11.0</b>	<b>11.9</b>	<b>11</b>
<b>Import</b>	<b>15.6</b>	<b>14.6</b>	<b>20.5</b>	<b>18.5</b>	<b>15.6</b>
<b>Export</b>	<b>-17.7</b>	<b>-22.0</b>	<b>-14.4</b>	<b>-17.2</b>	<b>-17.6</b>
<b>Net exchange</b>	<b>-2.1</b>	<b>-7.4</b>	<b>6.1</b>	<b>1.3</b>	<b>-2</b>

COMMENT: NEGATIVE VALUES RELATE TO EXPORT.

SOURCE: STATISTICS SWEDEN AND SWEDENERGY

## 2.2.2 Description of the retail market

Unlike the wholesale power market, the retail markets in the Nordic region are primarily national markets. This is explained by the fact that the balance responsibility is linked to the customer's supply point. A foreign electricity supplier must therefore be a balance provider, either on his/her own or by agreements with others, for all customers in the countries in which electricity is sold. Since conditions in the Nordic countries differ, balance responsibility may be complicated. Normally, therefore, Swedish end-consumers purchase electricity from electricity companies that are established in Sweden and have balance agreements, directly or through agents, with Svenska Kraftnät. The cooperative organization for Nordic regulatory authorities in the energy field, NordREG (Nordic Energy Regulators), has, during spring 2009, on assignment by the Nordic energy ministers, presented a report<sup>32</sup> with proposals for action to create a joint Nordic end-user market for electricity. The ultimate objective is for the measures to be implemented by the market by 2015.

<sup>32</sup> Market Design – Common Nordic end-user market (NordREG, Report 3/2009).



When the electricity market reform was carried out in 1996, there were approximately 220 electricity trading companies in Sweden. Since then, the number has decreased. However, in later years, the number of electricity retail companies has remained the same. In 2007, there were 125 electricity suppliers and at the end of the year 2007/2008 the amount was 124.<sup>33</sup> Of these, 104 companies sell electricity to customers throughout the whole country. The decrease in the number of electricity retailer companies is primarily due to mergers and acquisitions, where many municipalities have chosen to sell their electricity retailing companies.

Table 9 shows the market concentration in the Swedish retail market for electricity based on the number of consumers and the sales volume for 2006. From the table it can be seen that Vattenfall is the operator that has the largest sales volume in the Swedish electricity retail market. The three largest electricity retail companies: Vattenfall, E.ON and Fortum had, throughout 2006, a market share of approximately 43% based on the number of customers in each group's own electricity trading company. Only these three companies have a market share which exceeds 5%.<sup>34</sup> Twenty or so electricity trading companies are completely independent from the three major energy groups.

Most electricity suppliers are part of conglomerates which also own electricity production. Less than half of all electricity retailing companies belong to groups that do not produce electricity. Foreign ownership of electricity retailing companies in Sweden amounts to approximately 40%.

**Table 9: Market shares for electricity trading based on the number of customers and electricity supplied throughout 2006**

Company	Market share <sup>1</sup>	Market share <sup>2</sup>	Market share <sup>3</sup>
E.ON	16.4%	11.8%	14.6%
Fortum	13.5%	7.6%	13.6%
Vattenfall	12.8%	30.4%	36.3%

<sup>1</sup> BASED ON NUMBER OF CUSTOMERS.

<sup>2</sup> BASED ON QUANTITIES SOLD (VOLUME DELIVERED) TO OWN END CUSTOMERS.

<sup>3</sup> BASED ON TOTAL VOLUME DELIVERED BY THE GROUP.

SOURCE: THE SWEDISH COMPETITION AUTHORITY, BACKGROUND PM REF 408/2006

<sup>33</sup> The information is based on the electricity retailers that according to the Electricity Act are obliged to report their electricity prices to the EI.

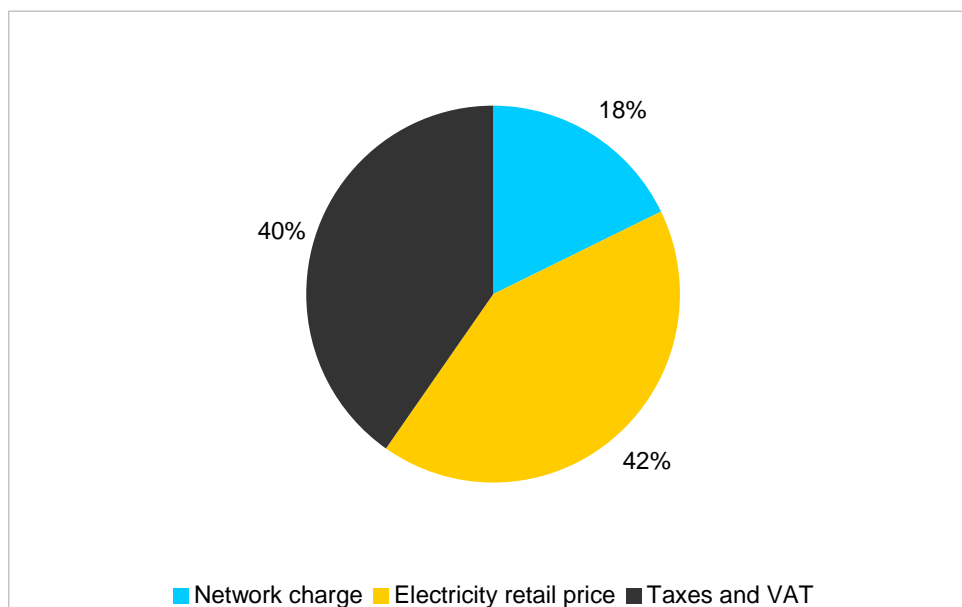
<sup>34</sup> The Swedish Competition Authority (2006), Ref. 408/2006.

### Price of electricity to end consumers

A consumer's total cost for electricity consists of:

- Network charge
- Electricity retail price
- Taxes and VAT

The share of electricity supply in the total cost of electricity has increased over the past decade. However, between the years 2008 and 2009, it decreased marginally. For a domestic customer who lives in an electrically heated single-family house, the cost of electricity supply amounted to 42% on 1 January 2009, compared with 43% a year earlier. The network tariff accounted for 18%, while the energy tax and VAT together accounted for 40%, see Figure 3.



**Figure 3: Total cost of electricity for household consumers in an electrically heated single-family house on 1 January 2009**

NOTE: PRICES FOR CUSTOMER WITH AN ELECTRICALLY HEATED DETACHED HOUSE NOT LOCATED IN AN AREA WITH A REDUCED RATE OF ENERGY TAX. PRICES RELATE TO A 3-YEAR AGREEMENT AND A CONSUMPTION OF 20,000 KWH PER YEAR THE VALUES ARE NOT CALCULATED ON THE BASIS OF FIXED PRICES.

SOURCE: STATISTICS SWEDEN

Table 10 shows the share of the total electricity price to end consumers with an average during the second half of 2008, according to Eurostat's classification of customers.

**Table 10: Electricity price to end-users in 2008, öre/kWh, Eurostat's typical customers**

	20,000–70,000 MWh <sup>1</sup>	2,000–20,000 MWh <sup>2</sup>	2,500–5,000 kWh <sup>3</sup>
Network charge	8.0	13.1	52.5
Electricity retail price	52.5	53.9	61.08
<b>Total (including tax)</b>	<b>61,031</b>	<b>67,532</b>	<b>177,223</b>

<sup>1</sup> INDUSTRIAL CUSTOMER. TOTAL PRICE, INCLUDING TAX ON 0.53 ÖRE/KWH.

<sup>2</sup> INDUSTRIAL CUSTOMER. TOTAL PRICE, INCLUDING TAX ON 0.53 ÖRE/KWH.

<sup>3</sup> DOMESTIC CUSTOMER. TOTAL PRICE, INCLUDING TAX ON 28.2 ÖRE/KWH.

NOTE: AVERAGE VALUE JULY–DECEMBER 2008.

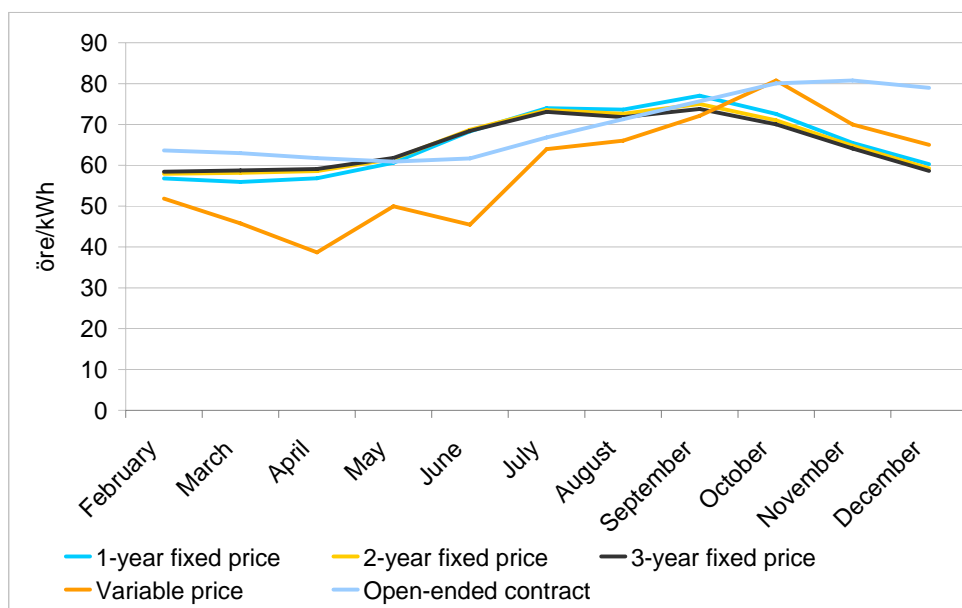
SOURCE: STATISTICS SWEDEN

Price developments on Nord Pool are reflected in the electricity retailer prices to consumers, which generally meant declining prices throughout winter 2008/2009. The decline in prices for variable-price contracts and for contracts that have a fixed price can be explained to a great extent by a decline in fuel prices and the global recession, which has had a negative effect on the demand for electricity with a subsequent drop in electricity prices to consumers.

The price of electricity varies between the different electricity suppliers. A comparison between the highest and lowest price in variable price contracts shows that the difference is approximately SEK 900 per year for a consumer living in an apartment. For a 1-year contract (fixed price), the difference is somewhat higher and amounts to SEK 700 per year for a consumer living in an apartment.<sup>35</sup> The development of the electricity retail price on a monthly basis for the most common forms of agreements for consumers with an annual consumption of 20,000 kWh can be seen in Figure 4.

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<sup>35</sup> The figures are based on the prices that electricity suppliers are required by the Electricity Act to report to the EI and relate to a consumer that uses 2000 kWh/year. The figures are from March 2008.



**Figure 4: Development of electricity retail prices for various types of contracts**

NOTE: AVERAGE COMPARATIVE PRICE FOR A CONSUMER WITH AN ANNUAL CONSUMPTION OF 20,000 KWH, EXCLUDING TAXES AND VAT. ELPRISKOLLEN STARTED AT THE END OF JANUARY 2008.

SOURCE: ELPRISKOLLEN, THE ENERGY MARKETS INSPECTORATE

The most common type of electricity supply contracts in Sweden are the open ended contract (default contract), variable price, 1-year fixed price and 3-year fixed price. An open-ended contract is the contract that the electricity customer usually pays if he/she has not made any active choice of supplier or contract. The open-ended contract is often more expensive than other types of contract that are used in the electricity market. The proportion of consumers with an open-ended contract is decreasing, but is still the most common type of contract. In April 2009, 30% of customers had an open-ended contract compared with 37% in April 2008. The proportion of consumers that have variable-price contracts is increasing. In April 2009, 27% of customers had concluded an variable-price contract, this compares with 18% in April 2008. The variable price is a price based on an average of the spot price on Nord Pool plus the electricity retailer's mark-up. Approximately 20% of consumers have a 3-year fixed-price electricity contract, while 13% of consumers have a 1-year fixed-price electricity contract.

#### Switching supplier

All in all, 11% of all domestic consumers in Sweden changed their electricity supplier in 2008. In addition, around 16% of all electricity consumers renegotiated their electricity contracts with their existing suppliers. The total amount of household consumers that changed their electricity retailer fell by approximately

6% from 2007 to 2008. However, during spring 2009 the trend has reversed and more consumers are changing supplier.

A customer who wants to change his/her electricity supplier signs an agreement with the new supplier, who then notifies the customer's network company of the supplier change. Since 1 January 2007, electricity suppliers are obliged to notify the network company of the change and submit the information no later than the 15th day of the month before the month when the supplier change is to take place, in contrast to the one month notice period previously required. The purpose of the amendment to the legislation is to speed up the process of switching supplier in order to make it simpler for electricity users to make active choices regarding their electricity supplier. No charge is payable by the consumer to change electricity supplier.

### 2.2.3 Measures aimed at preventing the abuse of market power

#### Supervision of the electricity market

Several authorities and bodies cooperate in the supervision of the Swedish and Nordic electricity markets with the aim of creating an electricity market that performs smoothly as well as taking various measures in order to prevent the exercise of market power. The EI has collective responsibility for the Swedish electricity market.<sup>36</sup> The Swedish Competition Authority has the responsibility for applying the competition rules. The Swedish Financial Supervision Authority exercises supervision of the Swedish operators on the Nord Pool financial market. The Swedish Consumer Agency is also involved in the supervision of the electricity market and has participated in drawing up the general terms of agreement of the industry, with the aim of safeguarding reasonable terms of agreement for the consumers in the electricity market. Comprehensive internal supervision of the trade and actions of the companies is also carried out within Nord Pool. The Nord Pool, which has its seat in Norway, is supervised by the Norwegian Water Resources and Energy Directorate (NVE) and the Financial Supervisory Authority of Norway.

#### Responsibilities of the Swedish Competition Authority and its activities in the electricity market

The Swedish Competition Authority is the authority that exercises supervision to ensure that companies in the Swedish electricity market do not infringe any of the bans against competition limiting behaviour specified in the Competition Act<sup>37</sup> and the EU Treaty.<sup>38</sup> The Competition Act is aimed at eliminating and counteracting obstacles to effective competition in the production of and trading in goods,

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<sup>36</sup> The Electricity Act (1997: 857) and the Pipelines Act (1978:160).

<sup>37</sup> The Competition Act (2008:579), Chapter 2, 1 § (restrictive practices) and 7§ (abuse of dominant position).

<sup>38</sup> Articles 81 and 82.

services and other commodities. Either on its own initiative or after notifications from companies and the general public, the Competition Authority can actively intervene in the event of restrictive practices between companies and against companies that abuse their dominant position in the market by exercising their market power. The Competition Act also includes rules on the monitoring of corporate concentrations. The Competition Authority also wants to contribute to effective competition by submitting proposals for changes to rules and other measures aimed at eliminating existing competition obstacles. Another duty of the Competition Authority is to contribute funds to Swedish research in the fields of competition and procurement.

The Competition Authority has also been made responsible for applying the laws on public procurement – the Public Procurement Act (LOU) and regulations concerning procurement in the so-called supply sectors, the act on procurements in the fields of Water, Energy, Transport and Postal Services (LUF).<sup>39</sup> Supervision takes place on the basis of the authority's own initiative, investigation into complaints received and contacts with auditors and other operators involved in the procurement field. For activities in the supply sectors, the procurement rules are somewhat more flexible. As an example, operations that are pursued on an entirely open and competitive market may be exempt from the LUF. The Commission assesses whether conditions exist for such exemption. According to a decision of the Commission, companies that generate and sell electricity in Sweden need not conform to the provisions of the LUF.<sup>40</sup> On the other hand, electricity network operations and any market within the fields of heat or natural gas are not covered by this exemption.

In a draft ratification bill dated 1 June 2009, the government proposed an addition to the Competition Act, meaning that the state, a municipality or a county council, in certain instances, can be prohibited from carrying out business operations in such a way that can harm competition. In order for a prohibition to be communicated, it is required that the procedure or activity, according to the proposal, distorts competition or is likely to distort the conditions for effective competition. It will also be required that it is not generally defensible. The proposal means that it should be possible to review and deal with distortions to competition which can arise when the state, the municipalities or a county council sells goods or services on the market. The government is planning to enforce the amended legislation on 1 January 2010.

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<sup>39</sup> Act (2007:1091) on Public Procurement (LOU). A separate law, the Act (2007:1092) on Procurement in the Areas of Water, Energy, Transport and Postal Services (LUF) applies to procurement in the supply sectors. The laws are based principally on EC Directives 2004/18/EC and 2004/17/EC.

<sup>40</sup> EUT L 287/18, 1.11.2007.

Application of the competition rules and other measures for improving competition in the electricity market

*Joint ownership of Swedish electricity production provides a competition problem*

Over the past 12 months, the Competition Authority has not finalised its work on matters concerning the law governing restrictive practices (competition legislation) regarding the production or sale of electricity. However, the Competition Authority concluded, during 2007 – which was even given some attention in last year’s report – an extensive investigation into possible infringements of the competition rules in the electricity market by joint owners in the Swedish nuclear power companies. The Competition Authority’s investigation showed that production planning for nuclear power plant up to 2001 had, to a certain degree, taken place jointly at the meetings of the joint owners and each nuclear power company. However, the planning process in the jointly owned nuclear power plants had been gradually changed with the aim of minimising the risk of insight into the business circumstances of the respective part owners. Even if the previous coordination of production contravened the competition rules, the relevant limitation rules provided no grounds for the Competition Authority to take legal action.

In conjunction with the decision not to take action in this matter on the basis of the Competition Act, the Competition Authority submitted a memorandum to the government.<sup>41</sup> In the memorandum, the Competition Agency drew attention to the risks of joint ownership of electricity generation resources and other circumstances that could obstruct or limit the competition in the electricity market. Above all, joint ownership in Swedish electricity generation involves risks of inappropriate exchange of information between competing companies. In this case, the risks of negative effects on competition are particularly serious, since the production plants are jointly owned by the three leading competing companies in the market. Joint ownership also generally reduces the confidence in the market function. The memorandum included proposals regarding actions which the government, in particular in its role as owner of the market’s largest company (Vattenfall), could take in order to limit joint ownership and other forms of cooperation between companies competing in the Swedish electricity market.

Against this background, the Competition Authority views the fact that the government appointed two negotiators in spring 2008 to investigate, on behalf of the state, the conditions for solutions that minimise the risks of competition limitations due to joint ownership in a positive manner. In its decision, the government emphasises the importance of an efficiently performing electricity market and that it is important to eliminate the risks of competition limitation to which joint ownership of the nuclear power industry could give rise. The negotiators asked the Competition Authority to further develop the Authority’s view of and the risks associated with joint ownership in the Swedish nuclear power

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<sup>41</sup> Competition in the electricity market, 7 May 2007, Ref. 408/2006.

industry. The Competition Authority provided its viewpoints in a report to the negotiators in September 2008.<sup>42</sup> The negotiators' assignment should have been completed by 31 January 2009, but the assignment has been extended until the end of the year.

The Competition Authority provided, in a report on assignment by the government,<sup>43</sup> in March 2009, a large number of competition-improvement proposals aimed, among other things, at the energy markets. The Competition Authority stated in the report that the Nordic electricity market and the electricity exchange Nord Pool, in a European comparison, were judged to work satisfactorily. However, the electricity market has several special characteristics which entail risks regarding the use of market power and reduced competition. Transmission constraints in the network, high entry barriers for new operators and joint ownership of production facilities constitute particularly significant problems. The wholesale power market is also an oligopoly, which makes it extra sensitive to market manipulation. Market power may, for example, be exercised by an electricity producer that owns both hydroelectric and nuclear power and other thermal power, via production planning, in an attempt to ensure that expensive fossil-based thermal power determines prices on Nord Pool. Fossil power has greater production costs compared to hydroelectric and nuclear power, also incurring costs for emission rights. Joint ownership of nuclear power may make it easier for owner companies to influence market prices by, for example, jointly reducing nuclear power utilisation so that fossil power is needed to meet demand and, thereby, determine the price of electricity.

In Sweden, the three largest electricity producers have a similar production mix. Vattenfall, E.ON and Fortum all have production portfolios which mainly consist of hydroelectric, nuclear and other thermal power. In the event of a coordinated limitation of nuclear power production aimed at influencing market prices, the companies can thereby equally share both the risks and the profits.

Joint ownership and cooperation is found not only in nuclear power production but also in hydroelectric power. In those instances, a hydroelectric power plant can be owned by different companies but be located on the same river. Reservoir operations and the flow into the rivers are coordinated by jointly owned water regulating companies. Hydroelectric power is a very adaptable and flexible production form, in principle, without costs for upward or downward regulation. These properties provide special conditions enabling the use of hydroelectric power plants to exercise market power.

An important prerequisite for the electricity exchange to be an effectively functioning marketplace is that there is a reasonable and challenging degree of

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<sup>42</sup> Dissolve the ownership in nuclear power, 12 September 2008, Ref. 500/2008.

<sup>43</sup> Measures for improved competition – Proposal (the Competition Authority's report series 2000 9:4).



uncertainty among the producers regarding both the supply and the demand situation in association with bidding. Both joint ownership and other forms of cooperation between the three large competing electricity producers produce a risk of eliminating much of this uncertainty, primarily with regard to the competitors' expected behaviour.

In order to ensure effective competition and strengthen consumers' and all market operators' confidence in the electricity market, the Competition Authority proposed, once again, that joint ownership in electricity production should be broken up and that the present reactors should be divided up among the three large owner companies. In addition, an equivalent streamlining of jointly owned hydroelectric power facilities and an overview of cooperation in water regulation companies should be carried out to minimise contact surfaces and information exchanges between the large electricity producers.

#### *Other proposals to improve competition in the energy markets*

The Competition Authority highlights, in the above-mentioned report to the government, that important prerequisites for a well-functioning end-consumer market for electricity, among other things, are that consumers are well-informed, active and do not feel that there are any barriers when choosing and when changing their electricity supplier. An efficient end-consumer market requires regulations, technical solutions and types of contract which support increased flexibility among electricity consumers.

From 1 July 2009, all electricity consumers in Sweden must have their meters read at least once a month. This objective aims to strengthen the connection between electricity consumption and the amount shown on the invoice and to provide electricity consumers with improved information about their electricity consumption. The improved information should, among other things, contribute to increased mobility in the electricity market, make consumers aware of their electricity consumption and, in this way, also encourage energy efficiency and energy saving. Monthly meter readings provide some opportunities for adapting electricity use based on price changes from month to month. In order for households and small companies to be more aware of short-term price variations and adapt their consumption, further reforms are required to the regulations and to product development/contract development regarding metering, reading and the pricing of electricity. For domestic consumers, the greatest potential for short-term demand flexibility is primarily by adapting heating and hot water production in electrically heated homes.

Hourly metering of electricity makes it possible to have more advanced types of contract, whereby electricity consumers are able to react to the hourly price differences on the electricity exchange or be offered predetermined prices on different occasions throughout the day and thereby adapt their consumption. Prices on the electricity exchange are often high during consumption peaks, when

there is a high demand on the electricity network. A more flexible demand among electricity consumers would, therefore, also be positive for the power balance, provide more efficient use of the network and thereby reduce the need for an expansion of the network capacity. The Competition Authority, in light of this, is of the opinion that hourly metering should be offered to all electricity consumers as soon as possible.

In addition, the Competition Authority is also of the opinion that the liberalisation of the electricity market should continue. A part of the present network monopoly which does not necessarily need to be regarded as monopolistic activity, and which could therefore be suitable, subject to competition, is the market for the metering of electricity. This market has, for example, recently been opened to competition in Germany. The primary reason for opening up the market is to make the markets more efficient for metering and metering services and to ensure a good product and market development, in addition, this would promote the development of new electricity contracts and thereby contribute to increased consumer mobility. A developed market for the metering of electricity may also be expected to promote the development of a tool which can support different forms of energy efficiencies as outlined in the European Union's Energy Efficiency Directive (2006/32/EC). The type of meter required for this purpose is a so-called real-time meter. These, in principle, measure consumption every second, which can provide consumers with an exact picture of their energy consumption and its costs. Only an open and competitive market can provide the right incentives to develop innovative metering services with a clear direction as to the electricity consumer's needs. By opening up the market for the metering of electricity from the present network monopoly, better conditions for the development of meters and metering services can be created. That is why a process aimed at opening up the Swedish market to competition for the metering of electricity should be initiated.

The Competition Authority has, in addition to this, suggested in the report that the integration of the Nordic and north-European electricity markets should be pursued. To make this possible, a number of measures that need to be taken have been highlighted, primarily network investments. Network capacity should be improved both in the Nordic region and in countries outside of the Nordic region, and the electricity exchange, Nord Pool, should be efficiently linked together with other electricity exchange areas with so-called market coupling. The Competition Authority further recommends that the monopoly for local and regional network operations should be separated from all other activities, this applies to activities both inside and outside of the energy sector. The Competition Authority is of the opinion that a distinction should be made regarding the ownership of the network operations, as this would ensure non-discriminatory access to the electricity market. Unless a distinction regarding ownership can be achieved, a complete functional distinction should be implemented with additional behavioural obligations for the employees who work for the network companies, for instance

when it concerns the dissemination of customer-specific information. In addition, the Authority is of the opinion that the present exemption from the separation requirement for energy groups, whose joint electricity network has less than 100,000 consumers, should come to an end. The Authority has also put forward proposals regarding the permit processes in the energy sector, which are aimed at simplifying procedures and making them more efficient.

Nord Pool regulations – information affecting price and market supervision  
All operators on Nord Pool are obliged to follow the regulations of the electricity exchange. These regulations concern, for example, the handling of price-affecting information. Operators (producers and other operators) are obliged to notify Nord Pool immediately in the event of the following (price-affecting information).

- All company information that may have a substantial effect on price. On the other hand, this does not include the company's own plans and strategies for trading.
- The following information on generation plants, consumption, transmission in or in direct connection to the Nordic electricity spot area:
  - Planned maintenance or production limitations that involve more than 100 MW during the forthcoming 6-week period.
  - Planned maintenance or production limitations that involve more than 400 MW of plants for production, consumption or transmission during the current year or over the next three years.
  - Breakdown comprising production capacity in excess of 100 MW, as soon as possible, although no later than 60 minutes after the breakdown has occurred (the 60-minute limit does not apply between 20.00 or 07.00). The player involved is required to notify Nord Pool within 4 hours of the reason for the breakdown occurring and the estimated outage duration.

An unknown market operator who has access to some form of price-affecting information may not trade until the operator is made public on Nord Pool via a so-called UMM (Urgent market message). This applies to both trading in electricity on the physical market and trading in financial contracts on the forwards market and trading in Swedish electricity certificates and emission rights within the EU trading system for emission rights (EU ETS). However, if there is price-affecting information in one unit of a supplier, trading may take place if the company can document to Nord Pool that there are physical or other obstacles to the transfer of information between the various units of the company ("Chinese Walls"). The regulations also include confidentiality provisions for employees and boards of directors within the companies, banning them from revealing to outsiders any price-affecting information of which Nord Pool has not been notified.

Nord Pool publishes information on matters such as supply, demand and transmission capacities between electricity spot areas and also prices for different areas and of different products. With regard to transmission capacity, Nord Pool has been publishing, since spring 2007, both the allocated transmission capacities and the type of reason and the nature of transmission limitation that may have caused a reduction in capacity. Nord Pool also reveals a limited part of bid curves (buy and sell bids with different volumes) and the so-called price cross for the system price for each individual hour. The reporting is updated once a week, and the information is published one week in arrears.

Nord Pool's regulations contain provisions for bidding on the spot market. In order to supervise bidding and create confidence in pricing, Nord Pool has a special market supervision function that continuously follows the trade. All transactions are therefore followed up to ensure that the operators submit the information that they are obliged to provide in order to prevent insider trading, price manipulation or exercising of market power. Operators are also obliged to provide Nord Pool, as soon as possible, with all the information that Nord Pool considers relevant to supervise trading. The market supervision unit regularly publishes reports on the Nord Pool homepage on investigations made into suspected breaches of the regulations. If an infringement of the regulations is determined, there is a sanction system that includes warnings, penalties and withdrawal of an operator's trading permit.

## 3 The natural gas market

### 3.1 Regulation issues

#### 3.1.1 General issues

On 1 July 2007, the final stage was implemented in the opening of the natural gas market in Sweden, when all natural gas customers became eligible to choose their supplier, which, since 2005, has been possible only for non-domestic customers. See Table 11 for particulars of the gradual opening of the natural gas market.

Table 11: Gradual opening of the natural gas market

	Limit for eligibility (Nm <sup>3</sup> /år)	Part of volume opened to competition
1999		0%
2001	25 million Nm <sup>3</sup>	NA
2003	15 million Nm <sup>3</sup>	50%
2005	Non-domestic consumers	95%
2007	0	100%

SOURCE: THE NATURAL GAS ACT AND THE ENERGY MARKETS INSPECTORATE

3.1.2 Transmission constraints and mechanisms to deal with these  
The available capacity of the Swedish transmission system is around 15 TWh per year. During 2008, consumption was around 9.5 TWh.<sup>44</sup>

About 2% of Sweden's energy demand is met by natural gas. In the 30 or so municipalities where the natural gas network is available for distribution, it equates to approximately 20% of energy consumption, which is on a level with other European countries that have natural gas networks.

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<sup>44</sup> Calculated on the lower calorific value.

At present, there are no transmission limitations in the Swedish transmission system, neither nationally nor on the import connection from Denmark. In Sweden, there is no second-hand market for transmission capacity where unutilised primary capacity is made available for trading purposes.

### 3.1.3 Regulation of transmissions and distribution companies

The Natural Gas Act (2005:403) specifies that the tariffs for the transmission of natural gas will be reasonable, objective and non-discriminatory. When the tariffs for the transmission of natural gas are set, special consideration will be given to the number of customers connected, their geographical locations, the amount of energy transmitted, the subscription costs for the supplying pipelines, the reliability of supply and the pipeline pressure. This provision in the Natural Gas Act is aimed at ensuring that the tariff is based on the costs that the network company incurs in its operations.

According to the Natural Gas Act, the owner of a natural gas pipeline must not apply a network tariff before the methods used for setting the tariff have been approved by the EI. Special guidelines for method application have been drawn up by the Inspectorate. The verification of the methods on which the setting of the tariff is based is aimed at ensuring that the tariff is objective and non-discriminatory. However, the method involves no appraisal of the fairness of the tariffs. According to present regulations, the evaluation of fairness takes place retroactively.

From 2011, EI will change to ex ante regulation of gas network tariffs. In 2008, the EI developed a method for the advance inspection of the natural gas tariffs. In short, the method means that the EI introduces a regulation period of 4 years and decides on a revenue framework for each company. The revenue framework is equivalent to the reasonable revenues which the company may charge their customers. The first regulatory period is from 2011 to 2014. In 2009, preparations are being made so that companies can present proposals regarding revenue frameworks (in 2010) to the EI. These proposals will be tested and the EI will make a decision regarding which is to be implemented.

#### Collection of technical and economic data for tariff supervision

Supervision of the fairness of the tariffs will require special acquisition of data. In the initial stage, a thorough valuation of the plant assets of the network companies will have to be made. All operating costs of the network company will be collected and these will then be distributed onto different activities in order to facilitate the benchmarking of the operating costs of the companies.

According to the Natural Gas Act, network companies are obliged to prepare separate accounts for the transmission, distribution and storage operations in the form of an annual report. The annual report is then submitted to the Inspectorate

no later than 7 months after the end of the financial year and will contain comprehensive profit and loss statements and balance sheets for each of the operations. The annual reports are examined by the network companies' auditors and are checked by the EI before the data is used for the regulation of the network tariffs. The reports are public.

#### 3.1.4 Balance regulation

As far as possible, imbalances are handled with market mechanisms by Svenska Kraftnät. If a commercial solution is not adequate, Svenska Kraftnät instructs the pipeline owner to restrict or interrupt the transmission of natural gas to customers. This is regulated in the Natural Gas Act.

Svenska Kraftnät concludes agreements with natural gas companies concerning balance responsibility, with the aim of maintaining a short-term balance in the natural gas system. According to the balance responsibility agreement, the balance provider will aim for a balance between his/her supply and the delivery of natural gas. A balance plan will be sent to Svenska Kraftnät no later than 14.00 on the day before the delivery day. A balance settlement carried out by Svenska Kraftnät is done as a daily settlement no later than 11.00 on the day after the delivery day, and this is based on the reported metered values from the network owners and reported trading values from the balance providers.

The balance provider has a balance account in which imbalances are accumulated. If the balance in the balance account exceeds the permissible maximum limit or is below the permissible minimum limit, the difference is balance gas. The pricing of the balance gas is based on the basic balance price calculated through the weekly trading carried out every week with the balance provider, plus a penalty charge. The purpose of the penalty charge is to give the balance providers the incentive to carry out such planning that the accumulated imbalances will be within the permissible range.

The permissible range for the balance accounts of the balance providers is calculated by Svenska Kraftnät on the basis of an assessment of the limits within which the gas pressure in the TSO can be varied without causing problems to the users. Operating restrictions and operating safety assessments are taken into account in the calculation.

Differences between the preliminary metered values reported by the network owners after the delivery day and the final values reported after the delivery month are regulated with correction gas. Before regulation with correction gas is carried out, reading of customers' meters which are measured monthly is performed and the calorific value is determined. This is carried out, on final settlement, with the balance providers and by Svenska Kraftnät no later than the 25th of the month after the delivery month.

Invoicing is done once a month and comprises balance gas, correction gas and a consumption energy charge of 0.9 SEK/MWh.<sup>45</sup> Balance provider companies submit securities for the credit exposure that may occur to Svenska Kraftnät via the company's day-to-day activities.

### 3.1.5 Effective unbundling

#### System responsibility for the natural gas market

Svenska Kraftnät has been the authority responsible for the system on the Swedish natural gas market since 2005. System responsibility means that Svenska Kraftnät is responsible for the short-term balance being maintained in the Swedish natural gas system. The operator's responsibility for the system does not cover the operation of the Swedish natural gas system. Responsibility for operating, maintaining and expanding the pipeline system rests with the owners of the natural gas pipelines.

#### Transmission and distribution

According to the Natural Gas Act, a company that pursues the transmission of natural gas must not pursue trading in natural gas within the same company (legal separation). The accounts for these two commodities will be kept separate.

In a company that has a concession for a natural gas pipeline, a member of the board of directors, the managing director or an authorised signatory may not simultaneously hold these posts in a company that trades in natural gas. However, there are no requirements in Swedish legislation that a gas network company must not be included in a group of companies that pursues production of or trading in natural gas. If a natural gas company does not follow the provisions of the Natural Gas Act or the regulations issued by the EI, the Inspectorate is entitled to open supervision of the company. Failure to observe the directive may be punishable by a fine. If the annual report is presented late, the company may have to pay a delay charge.

From 1 July 2005, the Natural Gas Act includes rules requiring companies that engaged in the transmission of natural gas to draw up a supervision plan. In addition, the companies will publish, in their annual reports, the measures they have adopted according to the plan. The purpose of the compliance programme is to ensure that the network owner acts objectively and does not unduly favour any other operator in the market. The compliance programme should describe the actions taken by the network company in order to counteract discriminatory behaviour towards other operators in the market.

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<sup>45</sup> The cost is based on consumption measured as the higher calorific value.



## 3.2 Competition issues

### 3.2.1 Description of the natural gas market

Sweden has no natural gas resources.<sup>46</sup> All the natural gas used in the country is imported through the pipeline that runs between Denmark and Sweden. From Denmark there are also pipelines to the Continent, meaning that Sweden is linked to the Continental system.

Two companies, E.ON Sverige and Dong Energy (formerly Dong Sverige AB), sell natural gas in the Swedish wholesale market. No information is available on the market shares of the companies in 2007, although there is nothing to show that any major changes have occurred since 2006. During 2006, E.ON Försäljning Sverige AB (a wholly owned subsidiary of E.ON Sverige AB) sold around 5.3 TWh on the wholesale market, this represents a market share of 48%. However, the figure does not take into account the fact that part of this amount was sold to companies in the E.ON group, which, in turn, resold the natural gas to end customers. Table 12 shows the development of the Swedish wholesale market.

**Table 12: Development of the wholesale natural gas market**

	Total consumption (TWh)	Production	Import-capacity (TWh) total	Number of companies with >5% generation and import capacity <sup>1</sup>	Number of companies with >5% of the gas market
2005	9.7	0	15	2 <sup>1</sup>	5
2006	10.1	0	15	2 <sup>1</sup>	5
2007	10.5	0	15	NA	NA
2008	9.5	0	15	NA	NA

<sup>1</sup> SWEDEN DOES NOT HAVE A NATURAL PRODUCTION OF NATURAL GAS. THERE ARE TWO NATURAL GAS IMPORTERS.

NOTE: CONSUMPTION EXPRESSED IN LOWER CALORIFIC VALUE THE CONSUMPTION EXPRESSED IN LOWER CALORIFIC VALUE IS APPROXIMATELY 10% LOWER THAN THAT EXPRESSED IN HIGHER CALORIFIC VALUE.

SOURCE: STATISTICS SWEDEN, SVENSKA KRAFTNÄT AND THE ENERGY MARKETS INSPECTORATE

The Danish state has a 73% holding in Dong Energy, E.ON Nordic has a 99% holding in E.ON Sverige. Swedegas has a holding of about one third in E.ON Ruhrgas, which is a member of the E.ON group. Other natural gas companies are owned by Swedish municipalities.

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<sup>46</sup> However, biogas is produced. Biogas comes under the concept of natural gas in the Natural Gas Act (2005:403).

### 3.2.2 Description of the retail market

There are roughly 47,000 natural gas users in Sweden, of whom 2,600 are corporate customers and the remainder are domestic customers. The number of end users has decreased over the past few years. The decrease is due to the fact that the number of customers using gas only for cooking has decreased in Gothenburg and Malmö.

More than 30 municipalities in Sweden have access to natural gas. In the municipalities that are connected to the natural gas network, natural gas accounts for around 20% of the energy supply.

During 2007, roughly 54% of the natural gas was used in industry and around 29% in CHP and district heating plants. Dwellings accounted for only 4% of the total consumption during 2008. Other commercial and industrial operations accounted for the remainder of the consumption.<sup>47</sup>

Table 13 shows the development of the retail market in Sweden.

**Table 13: Development of the retail natural gas market**

	Total consumption (TWh)	Number of companies with >5% of retail market	Number of independent gas suppliers	Market share of the three largest gas suppliers (%)
2005	9.7	5	0	81
2006	10.1	5	0	88
2007	10.5	NA	0	NA
2008	9.5	NA	0	NA

NOTE: CONSUMPTION EXPRESSED IN LOWER CALORIFIC VALUE THE CONSUMPTION EXPRESSED IN LOWER CALORIFIC VALUE IS APPROXIMATELY 10% LOWER THAN THAT EXPRESSED IN HIGHER CALORIFIC VALUE.

SOURCE: STATISTICS SWEDEN, SVENSKA KRAFTNÄT AND THE ENERGY MARKETS INSPECTORATE

### Market concentration

Since the introduction of natural gas in 1985, the Swedish natural gas market has been characterised by a small number of operators and a high degree of vertical integration. In 2008, there were six natural gas companies that sold gas to end consumers. In 2006, the three largest gas retailers (E.ON Sverige 53%, Dong Energy 21% and Göteborg Energi 14%) accounted for approximately 88% of all sales to end consumers. No data is available for 2008, although there is nothing to indicate that any major changes have taken place since 2007. No new natural gas supplier has established itself in the Swedish natural gas market since 1 July 2005,

<sup>47</sup> The figures are based on preliminary information from Statistics Sweden.

when all non-domestic customers became entitled to choose their own gas supplier. Dong Energy sells natural gas only to corporate customers.

#### Natural gas price to end consumer

The total cost of natural gas to households is broken down as follows:

- Network charge
- Gas retail price
- Taxes (energy tax and VAT)

Table 14 shows the costs payable by three typical customers for the transmission of gas (network tariff) and for the energy (natural gas). The prices of natural gas to virtually all customer groups in both domestic and industrial sectors rose in the second half of 2008.

**Table 14: Natural gas price to end consumers in 2008, öre/kWh, Eurostat's typical customers**

	30,000– < 300,000 MWh <sup>1</sup>	< 300 MWh <sup>2</sup>	> 55.000 kWh <sup>3</sup>
Network charge	6.5	17.9	22.6
Gas retail price	32.7	42.3	33.9
<b>Total (including tax and VAT)<sup>48</sup></b>	<b>44.0</b>	<b>65.0</b>	<b>99.0</b>

<sup>1</sup> INDUSTRIAL CONSUMER. THE TOTAL PRICE, INCLUDING TAX 4.8 ÖRE/KWH (EXCLUDING VAT).  
<sup>2</sup> INDUSTRIAL CONSUMER. THE TOTAL PRICE, INCLUDING TAX 4.8 ÖRE/KWH (EXCLUDING VAT).  
<sup>3</sup> DOMESTIC CONSUMER TOTAL PRICE, INCLUDING TAX 22.7 ÖRE/KWH AND VAT 19.8 ÖRE/KWH.  
 NOTE: AVERAGE VALUE JULY–DECEMBER 2008.

SOURCE: STATISTICS SWEDEN

#### Supplier switching

Throughout 2008, 168 households changed their natural gas retailer, this is the equivalent of less than 0.5% of the total number of domestic consumers. The equivalent figure for non-domestic consumers was 227, or 9% of all non-domestic consumers. The collection of statistics regarding supplier changes in the natural gas market started on 1 January 2008 and takes place every quarter.

In 2008, the EI carried out a study<sup>49</sup> which showed that only 13% of domestic consumers and 16% of business consumers in the Swedish natural gas market actively sought a better natural gas contract since the market opened in July 2007.

<sup>48</sup> Industrial prices do not include VAT.

<sup>49</sup> Customer activity in the natural gas market (EI, EI R2008:11).

One third of all consumers asked were not aware that they had the option of changing their natural gas retailer.

#### Measuring of consumption

The opening of the natural gas market has meant that greater demands have been made than before on the measuring and reporting of the consumption of natural gas consumers. Following this, the EI drafted new regulations in 2008 which, among other things, regulate how natural gas consumers' consumption should be measured and reported.

The new regulations, among other things, mean that natural gas companies must now measure and report larger consumers' consumption at least once every day, average-sized consumers' consumption at least once a month and domestic consumers' consumption at least once every year.

## 4 Security of supply

### 4.1 Electricity

#### 4.1.1 Power balance

Since the electricity market reform in 1996, the installed power in the Swedish electricity production system has been reduced. The capacity margin between supply (including imports) and demand dropped by almost 20% between 1996 and 2000. This involves an increased risk of isolation of certain customers in the country if a major power station should break down under very cold conditions in the winter. Against this background, the government introduced a Peak Load Reserve Act in 2003.<sup>50</sup> The peak load reserve is created by the Svenska Kraftnät TSO that enters into agreements with power producers for making further production capacity available, and with electricity users for making consumption reduction available. The law is temporary and expires on 15 March 2011. The EI has presented a proposal to the government for the years following 2011. The proposal includes a gradual winding-down of the extent of the power reserve, starting in winter 2011/2012. Following winter 2019/2020, the power reserve should, according to the proposal, be entirely discontinued.

#### Power balance in winter 2007/2008

The highest electric power consumption (peak demand) during winter 2008/2009 was 24,900 MW and occurred on 16 January 2009 at 08.00–09.00. The domestic power generation capacity then amounted to 24,400 MW and the net import was 500 MW. The power peak forecast for the 2008/2009 winter was 27,200 MW for a normal winter and 28,900 MW for a 10-year winter. During the 2007/2008 winter, peak demand reached 24,500 MW. Sweden's highest electricity consumption figure occurred on 5 February 2001, when the electricity consumption was 27,000 MW.

The transmission capacity in the national grid during winter 2008/2009 was normal. No interruptions of major significance occurred during the winter.

#### Forecast for winter 2011/2012

Each year, Svenska Kraftnät conducts a detailed forecast of the power balance for the coming winter.<sup>51</sup> Svenska Kraftnät also conducts a less extensive forecast of the power balance for two winters ahead.

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<sup>50</sup> The Power Reserve Act (2003:436).

<sup>51</sup> Svenska Kraftnät, "The Swedish power balance in the winters of 2007/2008 and 2008/2009". The publication of the next report, "The Swedish power balance in the winters of 2008/2009 and 2010/2011" is planned for August 2009.

The power balance in Sweden has been forecast as relatively favourable over the next few years. If all plans for upgrading the nuclear power stations are implemented, the installed generation capacity will increase by around 1,200 MW by winter 2011/2012. CHP and industrial back-pressure generation are expected to increase by 800–900 MW by winter 2011/2012, and half of the increase is based on bio fuels. The installed hydroelectric production capacity is expected to increase slightly. The installed condensing and gas turbine power generation capacity is expected to remain constant during the period up to 2011/2012. Wind power has not yet come up to the levels necessary for achieving significance in the power balance.

#### 4.1.2 Installed electricity generation capacity

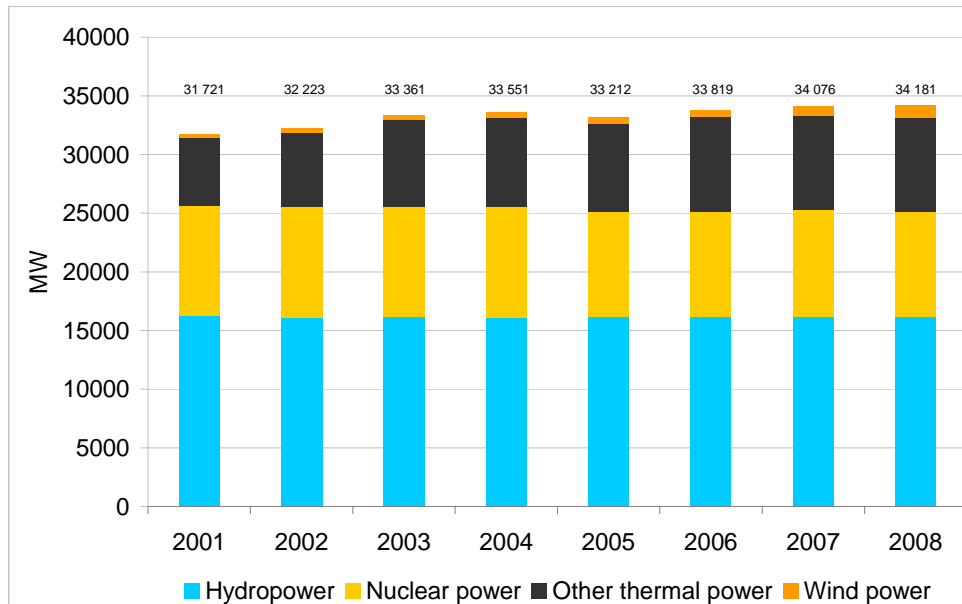
During 2008, the increase in generation capacity in Sweden's power stations amounted to 414 MW, whereas the loss of capacity totalled 298 MW. The net increase thus amounted to 116 MW.

The total electricity generation capacity in Sweden has increased every year since 2000, with the exception of 2005, as shown in Figure 5.<sup>52</sup> The increase in installed power from 2003 and the immediately succeeding years largely consists of plants that were previously mothballed, but these have been made operational again as a consequence of the Peak Load Reserve Act.<sup>53</sup> The total electricity generation capacity in Sweden's power stations at the end of December 2008 amounted to 34,181 MW.

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<sup>52</sup> The "Other" thermal power category includes condensing power, CHP generation (industrial and district heating) and gas turbines.

<sup>53</sup> The Power Reserve Act (2003:436).



**Figure 5: Installed electricity generation capacity in Sweden**

SOURCE: NORDEL

Table 15 shows the installed electricity generation capacity in 2008 and the change in capacity from the preceding year per source of energy. Hydroelectric power had the highest installed electricity production capacity, 16,195 MW, followed by nuclear power, 9,838 MW. Of the total net increase in electricity production capacity 2008, wind power accounted for the largest part, 233 MW. Accordingly, the installed wind power capacity increased by 30% compared with 2007. The nuclear power capacity decreased by 1% in 2008, which corresponds to 125 MW. Hydroelectric power capacity also decreased, in total a decrease of 14 MW, which is the equivalent of 0.1%. The production capacity of other thermal power increased by 22 MW, the equivalent of 0.3%.

**Table 15: Installed electricity production capacity 2008 and change from 2007, MW**

Type of power	Installed electricity production capacity 31-12-2008	2008		Net change from 31-12-2007	Change from 2007
		Addition	Loss		
Hydroelectric power	16,195	26	40	-14	-0.1%
Wind power	1,021	236	3	+233	+30%
Nuclear power	8,938	8	133	-125 <sup>54</sup>	-1.4%
Other thermal power	8,027	144	122	+22	+0.3%
<b>Total</b>	<b>34,181</b>	<b>414</b>	<b>298</b>	<b>+116</b>	<b>+0.3%</b>

SOURCE: SWEDENERGY

#### 4.1.3 Investments in new electricity production capacity and planned upratings

In Sweden, investments in new electricity generation capacity will take place on commercial grounds. In June 2009, the government decided<sup>55</sup> that the Phase-Out Act regarding nuclear power should be abolished and the prohibition on construction in the Nuclear Engineering Act<sup>56</sup> should be withdrawn.

Future electricity production capacity, which is at present under construction and which will be taken into operation 2009–2012, amounts to a little more than 1,300 MW.<sup>57</sup> These facilities are calculated together to produce just over 6 TWh per year.

Figure 6 shows these projects distributed by power type. Of the total, approximately 640 MW is wind power, which is the equivalent of 49% of the total electricity production capacity under construction. Thermal power accounts for approximately 600 MW, the equivalent of 46%; hydroelectric power 12 MW, the equivalent of a little less than 1%.

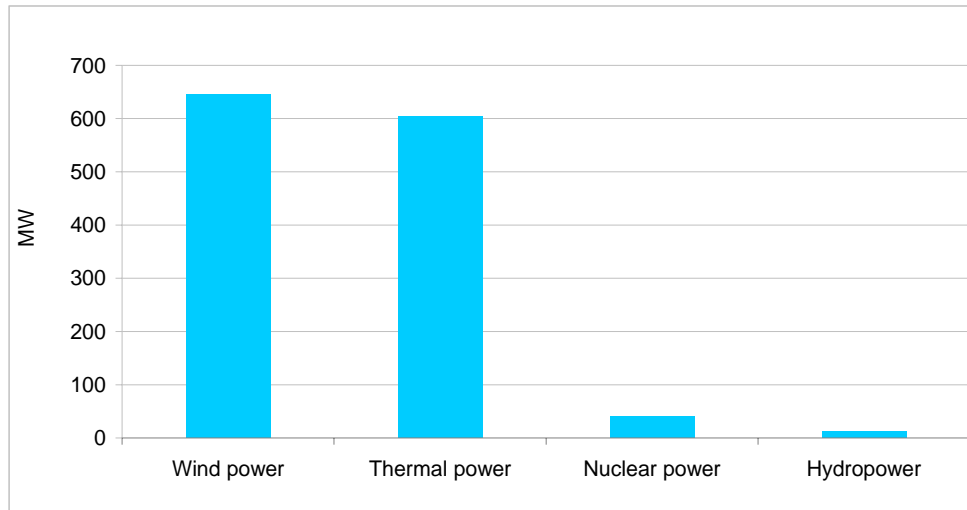
<sup>54</sup> The reason for the net decrease in nuclear power is due to the changes made to the accounting method. Nowadays, it is the power reported to Nord Pool.

<sup>55</sup> Official records of the proceedings 2008/0 9:133 (16-06-2009) regarding a decision on bill 2008/0 9:163, A coherent climate and energy policy – Energy.

<sup>56</sup> Act on (1984:3) Nuclear Engineering Operations.

<sup>57</sup> "The development of the electricity market Winter 2008/2009", the EI, 2009. There is no guarantee that the statistics have included the exact number of projects under construction.





**Figure 6: Projects in the construction phase, with commissioning in 2009–2012**

SOURCE: EME ANALYS

Wind power facilities under construction are estimated to produce a little more than 1,840 GWh per year together, which can be compared with wind power production during 2008 which amounted to 1,995 GWh. Wind power production is estimated to increase by almost 100% from the 2008 year level to 2012. An explanation behind the increase in wind power projects is the forthcoming increase in the quota obligation over the next few years for the electricity certificate system which, in turn, is increasing the demand for electricity from renewable sources.

On 13 March 2009, the government presented a bill<sup>58</sup> which, among other things, aimed to simplify and shorten the permit process required for the construction of wind power. The government is also planning to extend the planning objectives of wind power<sup>59</sup> from 10 TWh in 2015 to 30 TWh in 2020. Together with the proposal for an extended quota obligation in the electricity certificate system, it forms part of Sweden's plans to reach its renewable energy objectives.<sup>60</sup>

#### 4.1.4 Transmission capacity

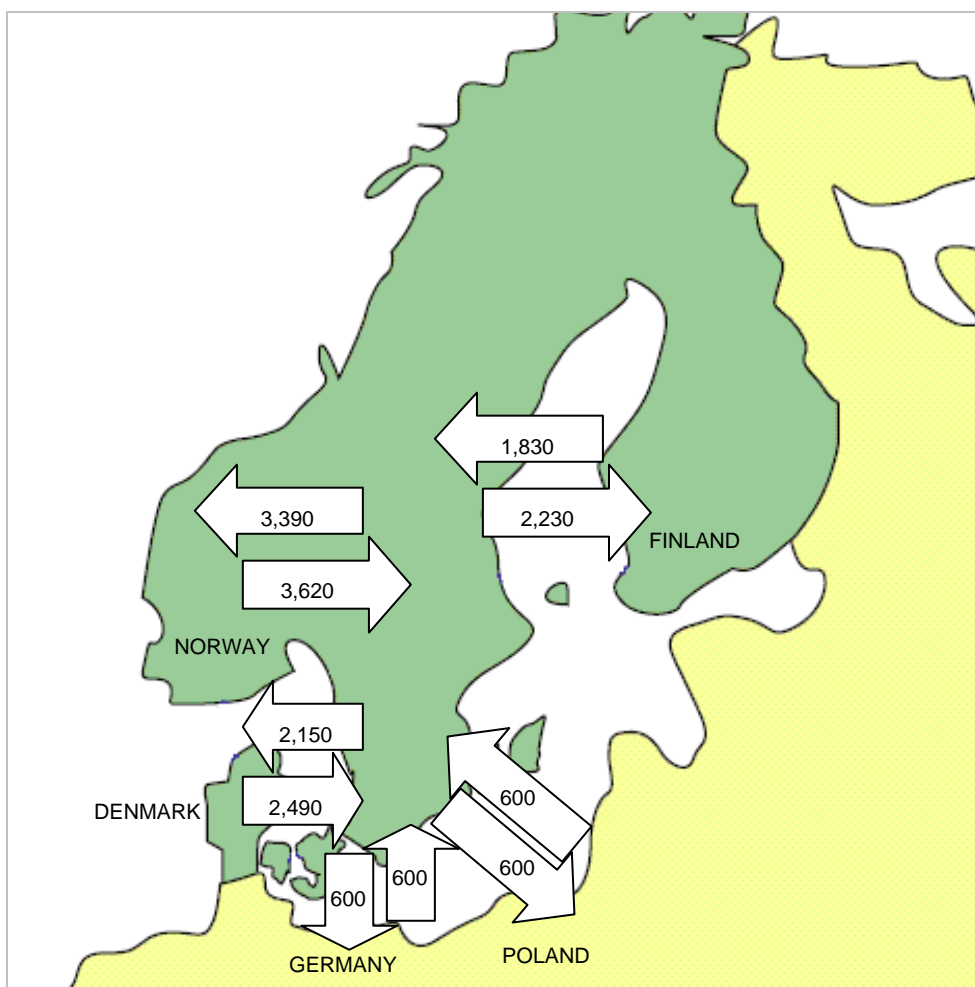
Figure 7 shows the Swedish national grid with transmission capacities in MW with neighbouring countries. The network's connections between neighbouring countries have their limitations, and this can lead to a variation in the capacity of

<sup>58</sup> Testing wind power, 2008/0 9:146. The regulations are proposed to come into force as of 1 August 2009.

<sup>59</sup> The planning target involves creating conditions in national planning for the annual production of a certain number of TWh of electricity from wind power.

<sup>60</sup> The target means that 20% of energy consumption should be met by renewable energy by the year 2020 and at the share of biofuels should be 10%.

each link, depending on the direction in which electric power is transmitted. The figure shows only one link with every neighbouring country, although Sweden actually has several links with each country. In 2008, the flow of electricity from neighbouring countries to Sweden amounted to 15.6 TWh. The flow of electrical energy from Sweden increased to 17.6 TWh, which resulted in a net inflow of 2 TWh compared with 1.3 TWh the year before.



**Figure 7: Existing transmission capacities between Sweden and neighbouring countries, 2008**

SOURCE: NORDEL

There are several projects underway which are aimed at enhancing transmission capacities and reducing the presence of bottlenecks in the electricity network. Fenno-Skan 2, Järpströmmen-Nea, Sydvästlänken (The South-West Link), Skagerack 4 and Stora Bält-förbindelsen (the Great Belt Link) are projects which

are currently under way. Fenno-Skan 2 is a new direct-current link between Sweden and Finland. The project is run by Svenska Kraftnät and the Finnish national grid company Fingrid, and it is expected to be operational by the end of 2011. Järpströmmen-Nea aims at reinforcing transmission capacity in central Sweden. The construction of Järpströmmen-Nea is currently under way, and Svenska Kraftnät estimates that it will be operational by spring 2010. Sydlänken (The Southern Link) is now part of the larger infrastructure project Sydvästlänken (The South-West Link). The Norwegian and Danish national grid companies, Statnett and Energinet.dk, have reached an agreement on the joint laying of a fourth cable between Norway and Denmark, Skagerack 4. The cable will be taken into operation during 2012 at the latest. The project entitled the Great Belt Link is run by Energinet.dk and is estimated to be operational during 2010.

The Nordic national grid operators have identified a further three areas where investments in the electricity grid are necessary in order to increase the possibility of transferring electrical power between the Nordic countries.<sup>61</sup> These three areas are additional to the already ongoing projects:

- The South-West Link (an extension of the Southern Link) between southern Norway and southern Sweden.
- Ørskog-Fardal along the Norwegian coast.
- Ofoten-Balsfjord-Hammerfest, in northern Norway.

The South-West Link is an extension of the project with the Southern Link and reinforces the Swedish national grid in southern Sweden with a link, westwards, to Norway. The purpose is to reduce bottlenecks between Norway and Sweden and provide increased security for the electricity supply. Svenska Kraftnät has made a decision regarding the Swedish part of the project, while the Norwegian part requires further investigation.

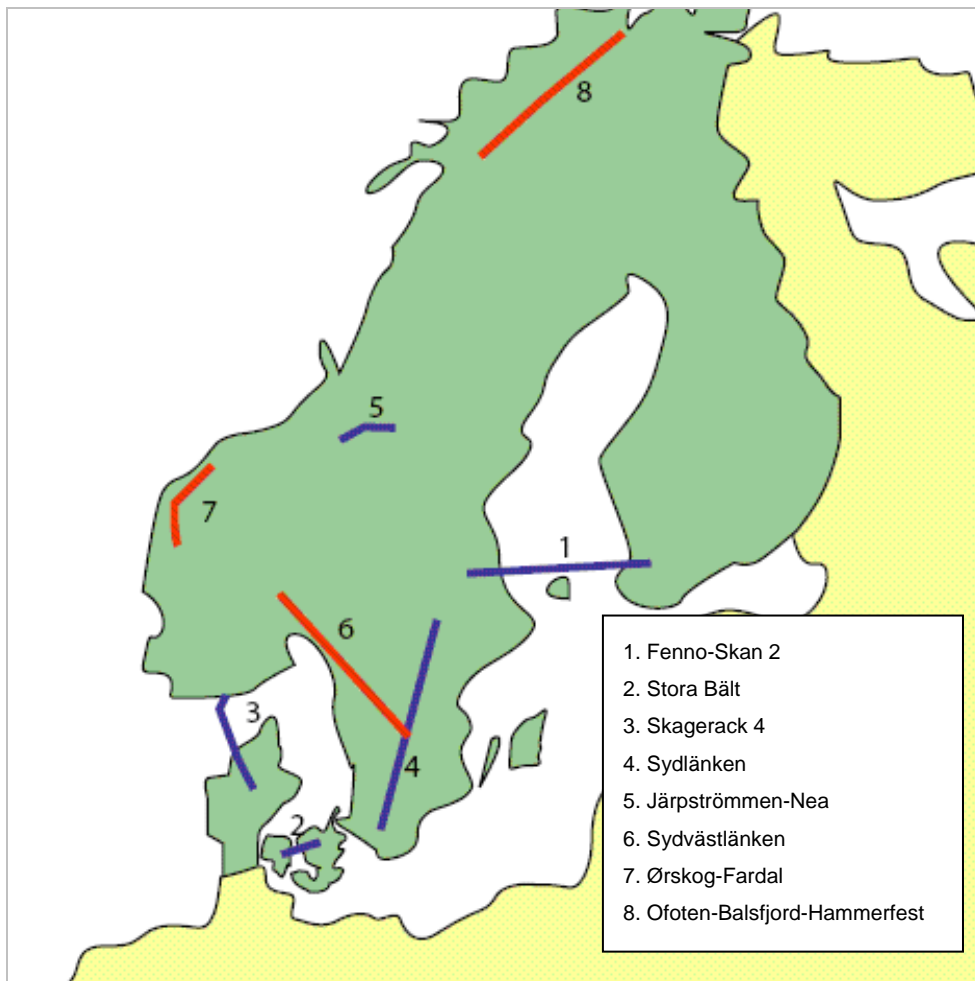
The objective with the Ørskog-Fardal link is to ensure a reliable supply in central Norway. In combination with the Järpströmmen-Nea link, it also further reinforces transmission capacity in central Sweden and reduces the occurrence of bottlenecks.

The Ofoten-Balsfjord-Hammerfest link is expected to meet future transmission needs. An expansion of gas and oil extraction are planned in the area, as well as a major expansion of wind power.

Figure 8 illustrates the geographic location of the planned and ongoing projects.

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<sup>61</sup> Nordic Grid Master Plan 2008.



**Figure 8: Planned network construction**

SOURCE: NORDEL

#### 4.1.5 Quality of the electricity network and its level of maintenance

The Swedish electricity network is made up of approximately 528,000 km of cables, of which 300,000 km are buried in the ground and 228,000 are overhead power lines. The power-line network in Sweden has three levels: the national grid, regional networks and local networks.

The national grid comprises conductors for 400 kV and 220 kV, which interconnect the generation plants, regional networks and electricity networks in neighbouring countries. The regional network consists of power lines at between 130 kV and down to 20 kV, which interconnect local networks and connect certain major industrial customers to the national grid. Local networks can be classified into low-voltage network (400/230 V) and high-voltage network (10–20 kV).

The national grid is made up of approximately 15,000 km of cabling, primarily aerial cable. The regional network's total cable length amounted, in 2007, to approximately 30,300 km. Of these, 2% is ground cable. The total length of the cable in the local network amounted, in 2007, to approximately 482,150 km, of which 38% was aerial cable and 62% ground cable.

#### Reliability of supply in the electricity network

Reliability of supply is affected by factors, such the type of power line used. In general, ground cables are more reliable than aerial lines, because they are less sensitive to bad weather. The proportion of underground cables in local networks has increased. However, there are risks involved in ground cables, such as cable failure due to excavation or plant work. In an aerial line network, an insulated conductor is more robust than an uninsulated conductor. Around 46% of the aerial lines in the local networks are insulated.<sup>62</sup>

In 2005, the government introduced a performance requirement, meaning that interruptions may not last longer than 24 hours. The requirement applies from 2011. According to the Electricity Act, the electricity network companies are obliged, from 1 January 2006, to carry out risk and vulnerability analyses and to draw up a plan of action that shows how reliability of supply in their own networks will be improved. The purpose of the regulations is to reduce vulnerability in the electricity network and to contribute to conformance to the Electricity Act requirements. The requirement applies to events within the network owner's so-called control responsibility. The risk and vulnerability analyses and the plan of action are then submitted to the EI. The Inspectorate has started the work of drawing up regulations that will be completed by the end of 2009.

Rules concerning interruption compensation were introduced on 1 January 2006. The rules mean that an electricity subscriber whose transmission of electricity has been broken for a least 12 hours has the right to compensation by the electricity network company to which the consumer is connected. The requirement applies to disruptions which fall within the network owner's area of responsibility. Compensation must be paid out automatically. The Electricity Act also includes provisions for damages from the electricity network company in the event of personal injury, material damage or damage to property. The EI issued regulations in April 2007 concerning interruption compensation in accordance with the provisions of the Electricity Act.

In November 2007, the EI issued regulations concerning the obligation of the electricity network companies to report power cuts in accordance with the provisions of the Electricity Act. From 2011, comprehensive and detailed interruption reporting will be made at customer level for both short-term and long-

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<sup>62</sup> According to information from 2007.

term failures. From 1 January 2008, long-lasting and extensive power cuts have been reported to the Inspectorate. The purpose of reporting these cuts is to make it possible to assess the delivery quality in the electricity networks and the Inspectorate's chances of intervening in time if the actions taken are insufficient to ensure that delivery security is maintained in a specific electricity network. The evaluation of delivery quality also forms the basis for evaluations of the network tariffs' fairness. The EI has also initiated a project aimed at developing regulations regarding the requirements that must be fulfilled so that the transmission of electricity will be of good quality and in accordance with the Electricity Act's requirements. Part of the regulations regarding technical requirements are expected to be ready by the end of 2009, while the remaining parts concerning voltage quality and guidelines for power disruptions are expected to be completed during 2010.

The electricity network companies undertook a voluntary obligation in 2001 to weather-protect all uninsulated conductors through forests, a total of 57,000 km. In January 2005, there was a violent storm which led to an increase in the rate of investments in the electricity networks, and roughly half of the investments were completed by the end of 2006. Weather-protecting the electricity network is expected to be completed by 2011, when the Electricity Act's functional requirements come into force.

The electricity network companies have also set up the ELSAM organisation for collaboration in the event of disturbances in the electricity network, which represents a regional division into electricity collaboration areas in the event of disturbances.

#### 4.1.6 Roles of the authorities

Sweden is now at an investment phase in which there are many plans for building new power production plants. In Sweden, investments in new power generation capacity will be made on commercial grounds. In 2003, a market-based support system was introduced in Sweden for renewable electricity generation.<sup>63</sup> The support system has increased the investments in CHP generation from both bio fuels and wind power.

No permit from the EI is needed for building a new electricity generation plant in Sweden. A permit is, however, required according to both the Environmental Code,<sup>64</sup> and the Planning and Building Act.<sup>65</sup> In 2005, the Swedish Parliament decided to shorten and simplify the environmental review in Sweden. The new interim laws have been valid since 1 August 2005. After that, two further proposals

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<sup>63</sup> The Electricity Certificates Act (2003:113).

<sup>64</sup> The Environmental Code (1998:808).

<sup>65</sup> The Planning and Building Act (1987:10).

for simplification have been presented in the bill 2008/09:146 – testing of wind power.

Power transmission lines may not be erected without a permit, a so-called network concession. A network concession is granted by the EI or by the government in the case of links with foreign countries or lines in the national grid.

The EI bears the responsibility for supervising the development of security of supply within the electricity and natural gas markets in accordance with Article 4 of Directive 2003/54/EC as well as Article 5 of 2003/55/EC and Article 5 of 2004/67/EC.

Being the authority responsible for the system, the Svenska Kraftnät TSO is responsible for maintaining the instantaneous balance between the supply and delivery of electricity in the Swedish electrical system. Svenska Kraftnät is also responsible for the reliability of the national grid for electricity. The responsibility involves maintaining the reliability of the electrical system and procuring a peak load reserve before every winter in accordance with the interim Peak Load Reserve Act.<sup>66</sup> The TSO will also work on relevant measures that can be taken for reducing the risk of power shortage in Sweden, monitoring the availability of high-load capacity in the Swedish electrical system and acting for high integration and harmonisation of the electricity markets in the Nordic countries. In its capacity of being responsible for the system, Svenska Kraftnät also has the authority to order the isolation of electricity users, as a last resort, in the event of electricity shortfall.

Svenska Kraftnät continuously provides information on its homepage on the power situation in Sweden, with an hour-by-hour forecast for the next 24 hours and an indication for the days that follow. Information is also given on the measures that Svenska Kraftnät adopts in the event of a difficult power situation. The operators in the market are informed by means of a so-called urgent market message (UMM), which is published on the Nord Pool homepage. The purpose of the UMM is to enable all market players to simultaneously obtain information that may affect pricing.

The Swedish Energy Agency is the central administrative authority for the supply and use of energy. One of the tasks of the agency in the field of secure energy supply is to act towards securing the availability of electricity and other energy in the short and long term, and to monitor the development of the energy markets and the energy system. The Agency has the coordinating responsibility for the general security of supply in the field of energy in the event of shortage situations. It should be possible to meet a supply crisis in the field of energy by preparing measures for supplying alternative energy, suppressing consumption and informing energy users. The coordinating responsibility also involves training,

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<sup>66</sup> The Power Reserve Act (2003:436).

exercising and reporting to the government on the security of supply situation in the fields of electricity, heat, oil and natural gas. In the event of a supply crisis, it is also important for the individual electricity users to have a good level of knowledge about, and take responsibility for, their electricity supplies. The Agency has prepared advice and tips aimed at specific target groups for preventing and relieving the effects of failure of electricity and heat supplies. This information is aimed at individuals, property owners, medical care personnel, purchasers of stand-by generators and others.

The Agency also participates in the work of the EU and IEA (International Energy Agency) towards secure oil and gas supplies, and in the field of secure electricity supply at Nordic level within, among others, NordBER. The Swedish Energy Agency has a crisis organisation that is trained to deal with various types of energy crises.

#### 4.1.7 Projects for reducing the consequences of power shortage

If Svenska Kraftnät decides to request the isolation of electricity users in an electricity shortage situation, the decision to isolate the supply would be made high up in the electricity network, at regional level. This would lead to all electricity users in large geographical areas being affected by the power cut. No consideration is given to the electricity users needs, regardless of how sensitive they are to power cuts.

In view of this, the Swedish Energy Agency has been instructed by the government to draw up a proposal for how isolation can be carried out so that the total number of people affected will be as few as possible. The Agency has therefore proposed that isolations should be carried out in local networks, which provides the means for prioritising the electricity users who are to be isolated. The consequences of power cuts are reduced if the users who have the greatest need for electricity can be prioritised and the available electricity can be delivered to them.<sup>67</sup>

Elforsk, the Swedish Electric Utilities' R&D Company, has a research programme code-named Market Design, for developing the electricity market. The research programme is engaged on a number of studies related to reducing consumption. An important point of departure in the projects is that the measures will be profitable to both the electricity supplier and the electricity user. The Elforsk studies generally demonstrate that there is significant willingness and ability of electricity users to reduce their electricity consumption, provided that the incentives are appropriate.

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<sup>67</sup> The proposal is presented in the report entitled "Prioritizing of electricity users in the event of electricity shortage", Swedish Energy Agency 2007:38.



## 4.2 Natural gas

### 4.2.1 Natural gas consumption

The total natural gas consumption has increased in Sweden since its introduction in 1985. Over the past few years, consumption has been around 10 TWh, although, between 2007 and 2008, there was a decline. In 2008, consumption of natural gas in Sweden was approximately 9.5 TWh<sup>68</sup>, compared with 10.5 TWh in 2007. In the 30 or so municipalities where the natural gas network is available for distribution, it equates to approximately 20% of energy consumption, which is on a level with other European countries that have natural gas networks.

Swedish natural gas consumption is expected to increase somewhat over the next few years, following the enlargement of Öresundsverket, in Malmö. The existing facility is to be modernised in order to install a gas-fired district-heating power plants with a production capacity of 440 MW of electricity and 250 MW of heating. Together, the facility is expected to consume 5.6 TWh of natural gas per year when fully operational. Öresundsverket is expected to commence operations during 2009.

### 4.2.2 The natural gas system

All natural gas consumed in the country is imported through the pipeline that runs between Denmark and Sweden. From Denmark there are pipelines to the Continent, meaning that Sweden is linked to the Continental system. The Swedish market is concentrated on the west coast along the pipeline that runs from Trelleborg in the south to Stenungsund in the north, with a branch pipeline to Småland, see Figure 9.

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<sup>68</sup> Expressed in lower calorific value.



Figure 9: The Swedish natural gas network

SOURCE: SVENSKA GASFÖRENINGEN

The natural gas network can be divided up into transmission, distribution and storage. The transmission lines that cover long distances transport the gas under high pressure, a maximum of 80 bar. Pressure reduction is then carried out at so-called measurement and regulation stations, before the local distribution network delivers the natural gas to customers. The distribution system is normally designed for a maximum pressure of 4 bar. In 2007, the Swedish natural gas network consisted of approximately 620 km of transmission pipelines and approximately 2,600 km of distribution pipelines. The existing transmission pipeline between Malmö and Gothenburg has the capacity to transport approximately 22 TWh of gas annually. By using compressors, capacity can be increased to around 30 TWh.

However, since the market demand is not constant over the year, the transmittable energy is around 15 TWh without compressors and 20 TWh with compressors.

#### Storage of natural gas

On 1 May 2006, the first Swedish storage facility for natural gas came into commercial use. The storage plant is owned by E.ON Sverige AB. The plant is located in southern Halland and is principally a demonstration plant. The storage plant is relatively small, with a volume of 10 million Nm<sup>3</sup>. For the foreseeable future, however, Sweden will still have to rely on storage facilities in Denmark and storage in transmission lines (linepack), or adjust supplies in-line with consumption fluctuations in the market.

#### 4.2.3 Plans for new supply alternatives

The following plans for new supply to the Swedish natural system were being considered in 2008.

On 26 May 2008, the Environmental Court of Justice approved the application for the construction of a new terminal for LNG in Nynäshamn. The terminal is to be placed just north of the Nynas refinery in Nynäshamn. The facility will act as an intermediate repository where the LNG will be gasified before use. On 7 November 2008, construction began. The project has been run jointly by AGA, Fortum and Nynas, but AGA will be the sole owner of the terminal. The terminal makes the availability of natural gas in Mälardalen and Bergslagen possible. There are no plans to connect the facility to the existing natural gas network. The facility is expected to be operational by 2011 and will have a storage capacity of 20,000 m<sup>3</sup>. Initially, a few vessels each month will arrive with the LNG, primarily from Norway and Central Europe.

At present, the Skanled project has been put on hold. The project planned to provide a natural gas pipeline which was to be laid out at sea from southern Norway and carry on to Sweden's west coast. Skanled is an industrial cooperative effort between Sweden, Norway and Denmark. According to information from the people responsible for the project, the reason for the project being put on hold is the current uncertain economic situation. However, the project may be resumed in the future.

A further project, which is currently being planned, is the Nord Stream project, with a gas pipeline in the Baltic Sea from Russia which connects to the European gas network. The gas pipeline is planned to be 1,220 km long and consists of two parallel pipelines which pass through five countries' economic zones (Russia, Finland, Sweden, Denmark and Germany). The purpose of the project is to create an alternative delivery route from the Russian gas reserves. Russia is the sole and largest gas supplier to Europe, and, today, most of the supplies come via pipelines through the Ukraine. The project has to be environmentally assessed by the

countries affected before it can start. No plans have been submitted regarding a connection to Sweden.

#### 4.2.4 Quality of the natural gas network and its level of maintenance

##### The transmission system

The Swedish transmission system consists principally of steel pipelines. The status of the system is inspected at regular intervals and defective or worn equipment is replaced. According to the operators, the pipelines are expected to have a useful life of at least 40 years, whereas certain supervisory, control and regulation equipment is expected to have a useful life of between 15 and 20 years.

The table below provides a summary of the inspections carried out, the frequency of inspection and the method used.

**Table 14: Own inspection of the transmission system**

Inspection of the transmission system	Time intervals	Method
Supervision of work near the pipeline	6 times/year	Inspection from the air
Inspection of the safety zone near built-up areas	Once a year	Inspection from the ground
Inspection of the Öresund pipeline	Every 3 years	Echo sounding
Inspection of the protective coating round the pipeline	Every 8 years	Inspection by so-called "intelligent pig"
Checking the thickness of the pipeline material	Every 8 years	Inspection by so-called "intelligent pig"

SOURCE: THE ENERGY MARKETS INSPECTORATE

##### The distribution system

The distribution pipes are mainly made of polyethylene (PE) material. Steel pipes are sometimes used for supplying customers who need gas at pressures higher than 4 bar. Guidelines for the design, operation, care, maintenance, etc. of the distribution network for a maximum operating pressure of 4 bar are given in the Energy Gas Standards (EGN 01) drawn up by the Swedish Gas Trade Association.

#### 4.2.5 Measures for meeting consumption peaks and delivery shortfalls

Peak demands and shortfalls in the supply are primarily dealt with by balance providers, who are responsible for balancing the space available provided through pressure variations in the TSO, so-called linepacking. If additional action is

required, Svenska Kraftnät uses market mechanisms to deal with imbalances as far as it is possible. This means that the balance providers carry out regulatory gas trading.

In situations in which commercial agreements are not considered to be adequate for dealing with imbalance in the natural gas system, the Natural Gas Act allows Svenska Kraftnät to order the owners of natural gas storage facilities and gasification plants to increase or reduce infeed or supply on commercial terms. Svenska Kraftnät can also order network owners to limit or interrupt the supply of natural gas to customers. If this is done, the supply to consumers will be assured. Plans for quick, safe and effective isolation in the event of total interruption are currently being prepared.

## 5 Consumer issues

### 5.1.1 Labelling of primary energy source

With effect from 1 April 2006, electricity users were provided with information, either on or in connection with their invoices, and in advertising material, on the proportion of each type of energy source making up the average composition of energy sources used to produce the electricity delivered by the supplier during the previous calendar year. With effect from the same date, electricity users will also receive information on the environmental effects of such power production in the form of carbon dioxide emissions and of the quantities of nuclear fuel waste resulting from production of the electricity.

### 5.1.2 Vulnerable consumers

The Swedish Electricity Act includes a section that regulates consumer protection.<sup>69</sup> This prohibits the disconnection of supplies in the event of a disputed claim for payment, or if there is a risk that such interruption of supply would cause considerable personal injury or ill-health or extensive damage to property. Before supplies are disconnected, the consumer will be encouraged to, within a reasonable amount of time, settle their account and they will be also advised that they may be cut off. If correction is carried out, transmission will not be interrupted. The Electricity Act also specifies that a message on failure to pay will be submitted to the social welfare committee in the municipality to which the consumer has electricity transmitted. The consumer then has an opportunity to receive assistance from the social welfare committee for paying the debt for transmission. The requirement to protect particularly vulnerable customers is thus met, in extension, by the regulations in the Social Services legislation.

There is no particular authority that supervises individual cases concerning the disconnection of supplies, and the EI does not, therefore, have any data about the disconnection of customers.

### 5.1.3 Implementation of Annex A

Sweden has implemented large parts of Annex A via the Electricity Act with associated regulations. However, Annex A has largely been implemented by the general terms of agreement.<sup>70</sup> The general terms of agreement are negotiated by the Swedish Consumer Agency and the Swedenergy trade association, and can be considered to be general practice in the industry. The EI has the opportunity of

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<sup>69</sup> Chapter 11, the Electricity Act (1997:857). The term consumer relates to a physical person to whom electricity is transmitted or supplied mainly for purposes that are outside industrial or commercial operations.

<sup>70</sup> Network 2009 K and EL 2009 K, terms for the consumer from 1 July 2009.

submitting comments regarding the content to each of the parties when new contract terms are negotiated.

It is important for the consumer to know the general terms of agreement. The Swedenergy trade association has encouraged its member companies to send the terms of agreement to their customers. Most of the electricity suppliers and electricity network companies apply these general terms of agreement. In addition, the Consumer Agency informs municipal consumer guides and the Consumer Electricity Advice Bureau of the general terms of agreement.<sup>71</sup>

If a dispute should arise between a consumer and an electricity supplier, the consumer has the opportunity to have the dispute assessed free of charge by the National Board for Consumer Complaints in accordance with Annex A to the Directive.<sup>72</sup> The dispute must involve a sum greater than SEK 2,000 in order for the matter to be assessed.

#### 5.1.4 Prices to end customers

Electricity and gas are traded on a competitive market. The EI keeps up to date with price levels in general, but it does not supervise electricity or gas prices. However, the electricity retail companies are obliged to submit price and delivery terms that are applied for the supply of electricity to consumers. These particulars serve as a basis for an electricity price comparison and are aimed at the consumer, this information is available on the Inspectorate's website [www.elpriskontrollen.se](http://www.elpriskontrollen.se).

The Inspectorate exercises supervision of the fairness of the network tariffs, since network operations are pursued by local monopolies.

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<sup>71</sup>The Consumer Electricity Advice Bureau is an advisory bureau to which private persons can turn with questions concerning the electricity market. The principals of the Consumer Electricity Advice Bureau are the Energy Markets Inspectorate, the Consumer Agency and Svensk Energi (Swedenergy).

<sup>72</sup>The National Board for Consumer Complaints assesses the dispute, provided that it does not involve a sum below SEK 2000.