Energimarknadsinspektionen
Swedish Energy Markets Inspectorate

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THE SWEDISH ELECTRICITY AND NATURAL GAS MARKET 2016

Swedish Energy Markets Inspectorate
Box 155, 631 03 Eskilstuna
Swedish Energy Markets Inspectorate R2017:06
Authors: Jonas Lindblom (project manager), Anna Elfwén, Björn Klasman, Elin Grahn, Joachim Karlsson, Johan Roupe, Louise Goding and Katarina Abrahamsson.
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Foreword

The Swedish Energy Markets Inspectorate (Energimarknadsinspektionen, Ei) is Sweden's supervisory authority for the electricity, natural gas and district heating markets in Sweden, and monitors developments on these markets. The aim of this report is to provide an account on developments in the electricity and natural gas markets over the course of 2016.

According to Ei's instruction, the authority is to fulfil tasks that follows from Directive 2009/72/EC of the European Parliament, the Council of 13th July, 2009, concerning common rules for the internal electricity market and Directive 2009/73/EC of the European Parliament and of the Council of 13th July, 2009, concerning common rules for the internal natural gas market. Among these tasks is the publication of an annual report in accordance with the reporting requirements specified in the directives. This covers matters of regulation, competition and reliability of supply.

This report follows the format for reporting that has been agreed with the other European supervisory authorities and the European Commission. This report will be available, along with the national reports of all the other member states, on the website of the Council of European Energy Regulators (CEER): www.energy-regulators.eu

Eskilstuna, June 2017

Anne Vadasz Nilsson

Jonas Lindblom

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Summary –

The development in the electricity and natural gas markets

The Swedish markets for electricity and natural gas are open to competition. Electricity and natural gas networks operates as regulated monopolies, since it would be economically and environmentally disadvantageous to build parallel networks throughout the country.

In its role as supervisory authority, Ei continuously monitors and analyses the development in the the electricity and natural gas markets, and proposes changes to regulations and other measures in order to improve these markets.

The electricity market

The Swedish electricity network

The Swedish electricity network consists of 564,000 km of power cables, and approximately 376,000 km are underground cables and 188,000 km are overhead lines. The electricity network can be subdivided into three constituent networks: national, regional and local. The national network is referred to as the power grid, which transmits power over long distances at high voltage levels. Regional networks deliver power from the national network to local networks, and in some cases directly to major electricity users. Local networks transmit power from regional networks to households and the energy retail market.

Svenska Kraftnät is a public authority that operates Sweden's power grid and is responsible for managing supply and ensuring reliability in the Swedish electricity network. Svenska Kraftnät is certified as transmission system operator (TSM) by Ei. In its role as supervisory authority, Ei is responsible for monitoring Svenska Kraftnät.

Local and regional network companies are responsible to maintain networks at a level where reliable supply can be guaranteed.

The Swedish electricity network operates as a regulated monopoly. Ei supervises the network companies' revenues to assess whether they are reasonable. During 2016, average fees increased by 3.2 percent for apartments, by 2.5 percent for house owners with 16 Amp fuses and by 1.9 percent for house owners with 20 Amp fuses.

In 2016, Ei revised and ordered 177 revenue caps for the period 2012-2015.

The wholesale market for electricity

In 2016, 391 TWh of the power used in the Nordic and Baltic countries was traded at the Nord Pool power market. This represents an increase of 3.1 percent compared to 2015, a new trade volume record.

The total electricity use increased in 2016 (including transmission losses), and was at approximately 140 TWh. Although, the total use remained low relative to the average levels during the 2000s. At a global level, 2016 was the warmest year on record, Sweden had a quite warm year too – even though January was cold.

In 2016, National electricity production decreased with approximately 6.8 TWh, to 151.5 TWh, despite the increase in electricity use. At the end of the year, exports showed an increase by 11.7 TWh.

Wind power broke its trend of production records, decreasing its production by 7.7 percent on 2015. Nonetheless, wind power continued to represent slightly above 10 percent of total electricity production.

The retail market for electricity

As of 2016, there were 121 electricity suppliers on Ei's price comparison website, elpriskollen.se. The three biggest suppliers had a combined market share (by number of costumers) of 42 percent – a figure that has remained about the same over the past four years.

In 2016, the main proportion of consumers' total cost for electricity, 44 percent, consisted of energy taxes and VAT. The cost of electricity supply added to 30 percent and the cost of transmission to 26 percent.

The most common form of electricity contract in Sweden is the flexible price contract. The long term trend shows that an increasing numbers of customers are switching from fixed contracts to flexible contracts. In December 2016, 51 percent of Swedish household customers had flexible contracts, which is an increase of 4 percentage points since the last year. Meanwhile, 28 percent of customers had a fixed contracts with a subscription length of 1, 2 or 3 years.

The natural gas market

The Swedish natural gas network

The Swedish natural gas network is small compared to the rest of Europe, and consists of 600 km of transmission pipelines and circa 3000 km of distribution pipes. The natural gas network is located on Sweden's south-west coast.

In addition, there is a city and a vehicle gas network in the Stockholm area. The city and vehicle gas networks respectively comprise about 500 km and 40 km of pipelines.

Also, there exists small local gas networks in various parts of Sweden. Most of the small local networks carry biogas intended for vehicles, from production facilities to gas stations.

Neither the gas network in Stockholm nor the small local gas networks are connected to any transmission network.

The networks covered by the Natural Gas Act are the network in south-west Sweden and Stockholm's gas network. In the Natural Gas Act, natural gas includes biogas to the extent that it is technically feasible to use in natural gas systems. There are currently nine biogas producers connected to the south-west Swedish natural gas system, where two have connections that allow for input into the transmission network. Two additional biogas producers are connected to Gasnätet Stockholm AB's network.

Until the end of 2014, Ei's review of the gas network companies' charges was carried out retrospectively, but as of January 2015 revenues are regulated beforehand, in common with the regulations governing the electricity market. More precisely, revenues are regulated through the revenue cap that covers a four-year period. This sets an upper limit for the total revenues that network companies are allowed to raise for their natural gas operations.

In June 2014, the companies applied for revenue caps for the first period (2015-2018), totalling SEK 7.3 billion. In October 2014, Ei decided to set revenue caps at a total of just under SEK 6 billion. Four out of nine natural gas operators appealed Ei's decision to the Administrative Court in Linköping. The Administrative Court issued its rulings in February 2016. They upheld key elements of Ei's decision regarding the companies' returns. However, the Court ruled against Ei regarding depreciation periods and certain aspects of the discount rate. For example, Ei believes that the revenue caps are at a level that allows the companies to overcharge their customers. Both Ei and the network companies appealed the judgements to the Administrative Court of Appeal in Jönköping at the end of 2016. In December 2016 the Administrative Court of Appeal rejected Ei's request to consult a specialised economist in the matter.

The wholesale market for natural gas

Natural gas covers about 2 percent of Sweden's total energy needs, making it a relatively minor source of energy. However, in municipalities where the natural gas network is well developed, gas represents more than 20 percent of used energy, which is in line with the rest of Europe.

Sweden does not extract any natural gas of its own – instead supplies are imported from Denmark. In 2016, natural gas use in Sweden amounted to 10.6 TWh. Despite the lower annual mean temperature in compared to 2015 or 2014, and despite an unusually cold month of January, the increase in natural gas consumption was marginal compared to previous two years.

In practice, Sweden has no natural gas market of its own; instead the gas is traded in Denmark or Germany and then transferred via Danish transmission pipelines for further distribution through the south-west Sweden natural gas network. A few Swedish operators are present at the Danish gas exchange, Gaspoint Nordic, which is linked to the pan-European gas exchange, PEGAS, as of November 2016.

The retail market for natural gas

The south-west Sweden natural gas network supplies approximately 36,000 customers, where the largest costumers are industries and cogeneration power plants, and circa 34,500 are household customers.

Stockholm's city and vehicle gas network supplies 63,200 household customers and close to 900 business customers, including 10 industries.

At the end of 2016 there were seven operators in the Swedish retail market for natural gas, six in the south-west Swedish network and one in Stockholm's city and vehicle gas network.

The cconsumers' total cost for gas are almost unchanged since the deregulation in 2007. The explanation for this is that the gas trade price has remained quite stable at around 30-35 öre per KWh. Similarly, network fees have stayed stable at around 20-27 öre per KWh. However, taxes on natural gas have increased by around 10 öre since 2007.

The main cost component, at 48 percent of household consumers' total gas costs, is energy taxes and VAT.

Consumer protection and disputes

Ei monitors whether the companies in the electricity and natural gas markets complies with legislation, and in some cases, settles disputes between consumers and electricity network owners.

Deficiencies in the quality of supply causes considerable inconvenience for consumers and lead to elevated social costs. Each year, the social costs of power cuts amounts to approximately SEK 1 billion. Also, voltage quality variations can inflict considerable costs. A reliable electricity supply is crucial component for the functioning and development of society.

To tackle these issues, Ei carried out a supervisory review in 2016 that covered reliability of supply, voltage quality and the quality of the reports on power cuts that electricity companies submit annually to Ei. The reviews objective was to verify that the network companies implement measures to promote the network's quality of supply within the electricity network, in both the short and longer run.

Ei revised annual power cut reports and reviewed those network companies that, in 2014: had reported power cuts lasting more than 24 hours, had customers with more than 11 power cuts, or had other indicators of quality issues in their reports. Companies with deficiencies were ordered by Ei to present what measures they intended to apply in order to correct the deficiencies.

A new version of Ei website for independent price comparisons, Elpriskollen, was launched at the beginning of 2016. Ei carries out weekly check-ups on the prices submitted to Elpriskollen, along with the associated terms and conditions, to ensure that the electricity suppliers submit correct information. During the autumn of 2016, a comprehensive review of electricity suppliers' contract terms and conditions was carried out, and deficiencies were identified for some suppliers. Ei began supervisory proceedings against affected electricity suppliers.

Consumers can report a company that is not complying with the provisions in the Electricity Act or the Natural Gas Act. As supervisory authority, Ei can then choose to investigate whether the company is in breach of its statutory obligations.

Ei received 25 such reports in 2016, a reduction from the 32 reports received in 2015. Out of these, 22 reports concerned the electricity network companies' obligations under the Electricity Act and three concerned the electricity suppliers' obligations under the same act. There were no reports concerning the gas companies' obligations under the Natural Gas Act.

Ei collaborates with the Swedish Consumer Agency in the information service "Hello Consumer", an online information service where consumers can learn about their rights in different markets. Ei contributes to knowledge and information on issues concerning the energy markets.

1 The electricity market

The Swedish electricity market was reformed in 1996. Since then, production and trading electricity opened up to competition, while network operations functions through several regulated monopolies. The purpose of introducing competition to production and trading of electricity, was to increase consumers' choice and to create conditions for efficient use of production resources.

Conversely, the electricity network operation us a natural monopoly, which means that it is economically inefficient to have several operations in the same geographical area. Therefore, the Energy Markets Inspectorate regulates the revenue of the electricity network companies.

1.1 The electricity network

The Swedish electricity network is made up of 564,000 km of power cables, where approximately 376,000 km are underground cables and about 188,000 km are overhead lines. The electricity network can be subdivided into three constituent networks: national, regional and local. The national network carries power over long distances at high voltage levels. Regional networks deliver power from the power grid to local networks, and in some cases directly to major electricity users. Local networks transmit power from regional networks to households and other end customers.

Figure 1. The Swedish power grid and overseas connections

Source: Svenska Kraftnät

1.1.1 Functional distinction of electricity companies

In order to prevent cross-subsidisation by companies engaged in different types of electricity businesses, network operations may not be carried out by a corporate body that produces or trades electricity. Furthermore, network operations must be separated from all other activities in a company's financial reporting. Thus, electricity network operations must be separated, both in legal terms and for accounting purposes, from companies engaged in the production or trading of electricity. However, electricity production is permissible in an electricity network company if it intends to cover network losses or to replace power lost by power cuts. Additionally, there is a requirement that some network companies should be functionally separated from companies engaged in the production or trading of electricity.[1] This applies to companies that carry out network operations and are part of a business concern whose total electricity network exceeds 100,000 users.

Under the Electricity Act[2], companies that carry out network operations need to establish a supervision plan. Additionally, these companies have to publish an annual report describing the measures they have implemented under the plan. The purpose of the supervision plan, is to ensure that the companies act objective and do not favour any particular stakeholder in the market. The supervision plan must specify what measures the company intend to implement to prevent discriminatory behaviour towards other stakeholders.

Ei supervises the power grid operator

Svenska Kraftnät operates and manages the Swedish power grid, and is the system operator [3] of the Swedish electricity network. Svenska Kraftnät role is to commercially manage, operate and develop a cost-effective, reliable and environmentally adaptive power transmission system. In addition, Svenska Kraftnät sells transmission capacity and runs other operations associated with the power transmission system. Under the EU's Internal Market in Electricity Directive, Ei is the supervisory authority that oversees Svenska Kraftnät.[4]

Since January 1st, 2012, the revenue caps for Svenska Kraftnät and other network companies are determined in advance. Until the end of 2015, Svenska Kraftnät had supervision periods of one calendar year, while other network companies had supervision periods of four years. However, in 2016, Svenska Kraftnät's changed its supervision period to four years, similar to other network companies. Revenue caps are the maximum revenues that a network concession holder is allowed to extract from network operations during a supervision period[5]. During 2016, supervision of Svenska Kraftnät included Ei's review and the definitive annual revenue caps for 2014 and 2015. Ei decided to raise the 2015 revenue cap to adjust for the underestimated 2014 revenue cap.

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[1] In accordance with Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.
[2] 1997:857, Ch 3 Section 17
[3] 'Transmission network operator' and 'power grid company' are common synonyms of system operator.
[4] Sweden does not have an independent system operator. For this reason, the provisions concerning the supervision of independent system operators are not applicable to Ei.
[5] 1997:857, Ch 1 Section 5 a

Under the EU's Internal Market in Electricity Directive[6], system operators have to be certified. Ei received a notification of certification from Svenska Kraftnät in the autumn of 2011 and decided, in July 2012, to certify Svenska Kraftnät as system operator of the Swedish power grid. The certification is open-ended, and may be reviewed by Ei if the system operator ceases to meet the certification requirements.

1.1.2 The technical functioning of the electricity network

Reliability of supply in the electricity network is assessed by Ei on the basis of power cut reports.

A reliable electricity supply is crucial to functioning and development of society. To measure and analyse continuity of supply in the Swedish electricity networks, Ei uses data on power cuts that the electricity network companies reports annually to Ei. Since 2011, annual power cut reporting is carried out at the customer level, for both shorter and longer power cuts. A number of key figures and indicators is extracted on the basis of this data. Also, longer and more widespread power cuts must be reported to Ei on a continuous basis.

This reports allows Ei to assess the quality of supply in the electricity networks and to intervene if the measures undertaken are insufficient to guarantee continuity of supply for consumers. In addition, the assessment of the quality of supply is the basis for any adjustment of the revenue cap for each electricity network company.

shows power cuts in the local networks between 2003 and 2015. Each column shows the average number of power cuts per customer, which are divided into unannounced and announced cuts. Announced cuts are power cuts that the customer receives notice of well before they occur. Such cuts are conducted on electrical safety grounds or operational reasons, e.g. repairs and preventive measures to maintain good operational and supply continuity. Under the Electricity Act, announced cuts may not continue longer than the time required for repairs or maintenance.

[6] 2009/72/EC Article 10

Table 1 Power cuts in local networks due to faults in the network, average number per customer[7]

Year	SAIFI, announced cuts (cuts/year)	SAIFI, unannounced cuts (cuts/year)	SAIDI, announced cuts (minutes/year)	SAIDI, unannounced cuts (minutes/year)
2003	0.19	0.90	27	118
2004	0.19	0.89	25	72
2005	0.21	1.26	32	890
2006	0.19	1.05	22	88
2007	0.31	1.49	22	307
2008	0.50	1.04	26	104
2009	0.22	0.88	20	63
2010	0.14	1.03	20	71
2011	0.19	1.31	16	174
2012	0.14	1.03	17	75
2013	0.14	1.02	18	139
2014	0.15	0.98	16	69
2015	0.14	0.96	16	107

Statistics for 2016 will be completed in the summer of 2017. Source: Ei

On average, rural electricity networks are subject to more frequent and longer-lasting cuts than urban networks. Also, storm years (e.g. 2005 and 2007) have larger impact on rural networks than urban networks. Reliability of supply is influenced by the type of cable used, among other factors. Rural networks are generally more exposed to weather-related disruptions, partially because these networks have higher proportion of uninsulated overhead lines and lower proportion of underground cables than the city networks. The share of underground cables in local networks increased to reduce their vulnerability to extreme weather. However, underground cables may be subject to disruptions that are unrelated to the weather, e.g. cable breaks due to excavation or old components. In the overhead lines category, insulated lines are more robust than uninsulated ones. About 98 percent of local networks' total length in the low voltage network is insulated. At the medium and high voltage level local networks, about 74 percent of power lines are insulated[8].

Regulations covering continuity of supply and compensation for power cuts

Electricity network companies are obliged to conduct risk and vulnerability analyses and prepare procedures that show how continuity of supply within their networks will be improved. The regulations aims to ensure that electricity network companies will carry out preventive measures to reduce the vulnerability of the electricity network and to fulfil the Electricity Act's requirement that the duration of power cuts may not exceed 24 hours. Ei issued regulations regarding the annual reporting of risk and vulnerability analyses of the electricity networks, which specifies that a presentation based on the risk and vulnerability analysis and the action plan should be submitted to Ei.

[7]SAIFI=System Average Interruption Frequency Index (average number of power cuts per customer and year)
SAIDI=System Average Interruption Duration Index (average interruption time in minutes per customer and year).
[8]These figures are for 2015. Statistics for 2016 will be completed in the autumn of 2017.

In addition to the operational requirement in the Electricity Act, Ei specifies other requirements maintain satisfactory quality level for power transmissions. Some requirements regarding technical specifications to protect regional networks from falling trees and requirements regarding high loading levels were issued in 2010, while voltage quality requirements were issued in 2011. In 2013, the regulations were supplemented with guidelines concerning allowed quantity of power cuts at the customer level.

Under the Electricity Act, an electricity user subject to an interruption in power transmission lasting at least 12 hours, is entitled to compensation from the electricity network company that the user is connected to. This compensation applies to interruptions that fall within the scope of the network owner's responsibility.[9] Compensation is calculated according to a standard formula and is paid automatically. Also, the Electricity Act regulates the restitution from electricity network companies in the event of personal injury, damage to property or economic loss. Ei regulates how network owners should inform its customers about the rules for compensating power cuts.

1.1.3 Electricity network charges for connections and transmission

The Swedish electricity network operates through several companies in regulated monopolies. To ensure that concession holders do not exploit their monopoly position, Ei regulate the concession holders' revenue. Under the Electricity Act, electricity network fees must be reasonable, objective and non-discriminatory. 'Reasonable' refers to the network company's total revenue, while 'objective' refers to the company's combined fees for the particular customer category, and fees should reflect the costs for the same category. Thus, the companies may have different fees for different consumer categories, e.g. house owners or apartment costumers. Concession holders are not allowed to favour among consumer categories.

Under the Electricity Act, the electricity network companies are entitled to charge compensation for costs related to network operation and maintenance, and obtain a reasonable return on its capital. To achieve an approximation of competitive conditions, Ei defines an efficiency requirement and the minimum requirement for supply quality.

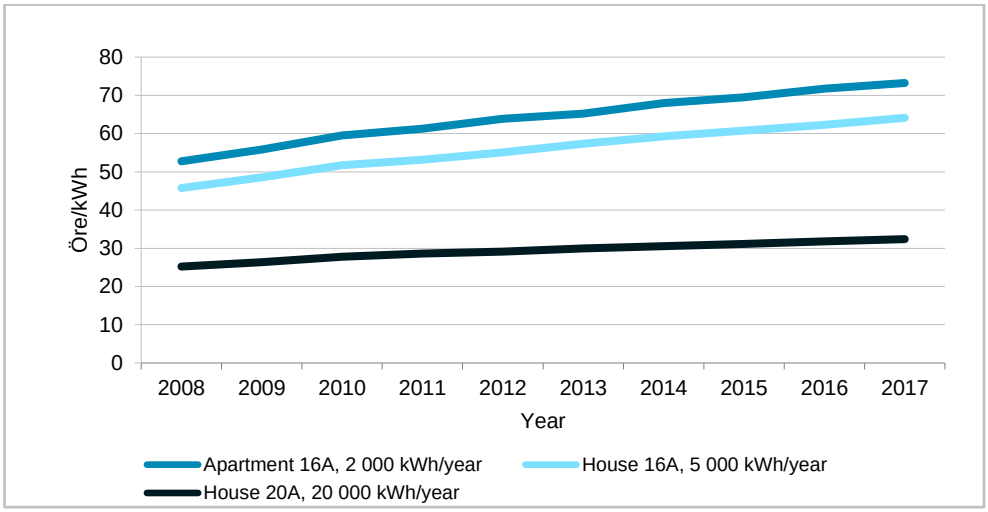
Electricity network charges consists of a fixed portion (the subscription fee) and a flexible portion (the electricity transmission charge). The fixed portion is determined by the fuse size or the power volume demanded. The flexible part is determined by the consumers' consumption. For a house with electrical heating, the fixed and flexible portions of the charge are roughly equal. To compare different network owners, Ei collects data from 15 different consumer segments.

Figure 2 shows the development of network charges for different types of household consumers in recent years. Between 2015 and 2016, fees increased by 3.2 percent on average for apartment costumers, by 2.5 percent on average for house owners with 16 Amp fuses and by 1.9 percent for house owners with 20

[9]Events within the scope of the company's responsibility are events that the company could reasonably have foreseen and that network companies are expected to invest into, in order to fulfil its operational obligations in the long term.

Amp fuses. In terms of annual costs, these increases corresponds to fees of SEK 44, SEK 75 and SEK 119, respectively. Between 2016 and 2017, average fees increased by 2.0 percent for apartment costumers, by 3.0 percent for house owners with 16 Amp fuses and by 1.9 percent for house owners with 20 Amp fuses. In terms of annual costs, these increases corresponded to SEK 30, SEK 92 and SEK 123, respectively.

Figure 2. Real-term development of network charges for household customers[10]



Source: Ei

Consumers with low electricity consumption generally have fewer tariff options than customers with high electricity consumption. The majority of electricity network companies only offers one tariff type, known as a flat rate tariff, to low consumption customers. A flat rate tariff means that the customer pays the same amount regardless of when the power is used. An alternative to a flat rate tariff is a time tariff, which means that the price varies depending on the time of the day.

A number of electricity network companies introduced output based tariffs for household customers. These consist of a small fixed fee that is linked to the fuse rating, which determines the maximum output. Additionally, house is charged based on of how they use electricity over time, e.g. different tariffs are charged for use at different times during the day or different times of the year.

Ei's preliminary decisions on electricity network charges

Since 2012, the electricity network companies' revenues are regulated in advance by revenue caps, and Ei sets the revenue cap by four-year periods for each network company. The first regulatory period was 2012 to 2015. In 2016, Ei determined the final revenue caps for the 2012-2015 period. Ex ante, regulation was introduced as a consequence to the requirements in the Internal Market in Electricity Directive. Revenue regulation of electricity network operations was previously retrospectively evaluated by the supervising authority, where the fees reasonability were assessed.[11].

[10] Mean value, adjusted for 2015 price levels, unweighted.
[11] Govt bill 2008/09:141.

The purpose of regulation is to achieve effective network company operations at low costs and to guarantee that customers pay a reasonable price for the network service. In addition, regulation further helps to ensure that consumers get a long-term reliability in supply, and to secure the Swedish electricity supply. Also, regulation seeks to provide network companies with stable conditions and long-term prospects for their operations.

Revenue caps must cover reasonable costs for carrying out network operations during the regulation period, and provide a fair return on the capital base, i.e. the capital required to conduct operations. 'Reasonable costs' are defined as the cost of appropriate and efficient network operation under similar fair conditions. When setting the revenue cap, consideration to the concession holder's ability to conduct network operations is taken into account.

The second regulation period, 2016-2019, was followed by clarifications to the regulatory framework and more detailed rules in the Revenue Cap Ordinance.[12] First, these rules specifies that the age of facilities must be considered when assessing the company's cost of capital. Second, the Revenue Cap Ordinance specifies the depreciation period. As a direct consequence of the Energy Efficiency Directive[13], an additional provision takes into account whether the network operation contributes to efficient energy utilisation or not. Ei issued regulations with additional rules regarding the assessment of quality, efficiency and costs, including method for determining the age of facilities.[14]

The network companies' revenues depend on deviations from the revenue cap in the previous period. If revenues exceed the cap in the previous period the revenues in the following period is lowered with the corresponding amount, and vice versa. But, specific to if the revenue cap is exceeded by more than 5 percent, is an additional penalty fee.

Concluding, the Electricity Act contains rules on reviewing revenue caps during and after the regulatory period, on application and decision times, and on charging periods.

The various elements of the revenue cap

The reasonable costs, that network companies is compensated within the revenue caps, are divided into cost of capital and controllable and non-controllable operating costs. Figure 3 shows the relationship between the different elements of the revenue cap.

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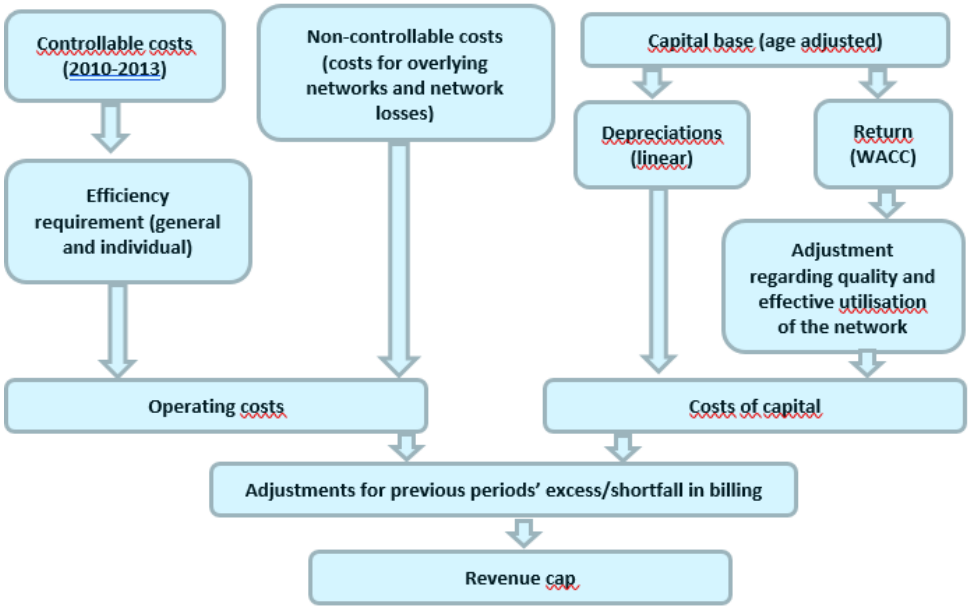
[12] Ordinance (2014:1064) on revenue caps for electricity network companies.

[13]Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

[14]The Swedish Energy Markets Inspectorate's regulations (EIFS 2015:5) on what is meant by the quality of the network concession holder's manner of conducting network operations when determining a revenue cap, the Swedish Energy Markets Inspectorate's regulations (EIFS 2015:6) on what is meant by efficient utilisation of the electricity network when determining a revenue cap, and the Swedish Energy Markets Inspectorate's regulations (EIFS 2015:2) on reasonable costs and a reasonable return when calculating the revenue cap for an electricity network company.

Cost of capital refers opportunity cost of an investment, and is calculated based on the capital base. The capital base includes fixed assets, e.g. power cables and sub-stations, which an electricity network company uses to conduct its network operations. The cost consists of two parts – the cost of consumption of fixed capital (depreciation) and the cost of binding capital (return). The capital base is valued according to the acquisition value and the return is calculated using a real pre-tax discount rate[15]. In calculating the cost of capital, Ei considers all investments by the network company during a specific regulatory period.

Figure 3. Elements of the revenue cap for electricity



Returns are also affected by the quality and efficiency of the network operation. Quality is measured on the basis of transmission interruptions. The decisive factors in assessing efficiency are the proportion of network losses, network load, and costs of overlying and adjacent networks. However, these factors are only allowed to affect the revenue cap by up to 5 percent in either direction.

Non-controllable costs includes cost of network losses, subscriptions to overlying and adjacent networks, connections to overlying and adjacent networks, and government agency fees. Companies receive full compensation for non-controllable costs.

Examples of controllable costs include operation and maintenance costs as well as customer-specific costs, e.g. measuring, calculation and reporting. Ei uses the companies' historical costs (2010-2013) as a benchmark determining the controllable costs for the regulatory period (2016-2019). To allocate expected productivity gains to consumers, the regulation includes improved efficiency requirements. To the regulatory period (2016-2019), Ei evaluated individual

[15]Set by Ei at 4.53 percent for 2016-2019 and by the Administrative Court of Appeal at 6.5 percent for 2012-2015

efficiency requirements for each company. The lowest requirement is 1 percent per year and the highest 1.82 percent per year.

Many of Ei preliminary decisions were appealed

For the 2012-2015 regulatory period, Ei set 177 revenue caps and 96 were appealed to the Administrative Court. The appeals mainly concerned the transition method and returns, i.e. the discount rate. The transition method was Ei's routine for setting revenue caps, and aimed to make revenue caps reasonable based on historical charges. This method was rejected by the Administrative Court and the Administrative Court of Appeal. The court changed the discount rate to 6.5 percent from Ei's estimated rate at 5.2 percent.

Ei's view is that the discount rate level for 2012-2015 is unjustifiably high for low risk operations, which is part of the reason why Ei appealed the rulings to the Supreme Administrative Court. However, Ei was not granted leave to appeal. In addition, the transition method has become irrelevant due to changes in the rules.

Companies that did not appeal Ei's decision can request changes to their caps with reference to the rulings by the Administrative Court of Appeal. 120 companies submitted such a request.

For the 2016-2019 regulatory period, Ei made 185 decisions regarding revenue caps. 81 were appealed to the Administrative Court. The main concern for the court was discount rate level, which Ei set at 4.53 percent[16]. The Administrative Court issued a ruling on December 14th and set the discount rate at 5.85 percent, which means that the revenue caps increased to SEK 172 billion in total. Ei appealed the Administrative Court rulings to the Administrative Court of Appeal.

The level of the revenue caps

Table 2 shows the applied revenue caps and the set caps for the 2016-2019 regulatory period, and the original decisions and the caps following the court proceedings for the 2012-2015 regulatory period. Note that caps are specified in their respective years' price levels.

Table 2. Revenue caps

Revenue caps, SEK billion	Determined caps	Amounts applied for	Caps after concessions in court	Caps after court proceedings
2012-2015 (2010 price levels)	150	183	160	196[17]
2016-2019 (2014 price levels)	163	176		

Source: Ei

[16] 4.56 percent following concessions by Ei during the proceedings.

[17] SEK 196 bn assumes that all companies have appealed the original caps or, following the court ruling, have submitted a request for a review with reference to the ruling.

Network regulation in the Nordic countries

Ei was involved, together with its corresponding authorities in the NordREG (Nordic Energy Regulators) cooperating organisation, in designing the regulatory framework and guidelines for supervision of network company operations. In 2016, the group arranged two workshops. At the first workshop, the topic was network regulation in the Nordics, where employees at different Nordic supervisory authorities shared knowledge and information. The second workshop allowed external stakeholders to participate, and dealt with developing the tariff regulation in the Nordics.

1.1.4 Cross-border issues

A prerequisite for a common market is that there exist common rules for power transmission and trade between member states in a secure, efficient and practical manner. To support this, technically feasible power transmission between national grids is fundamental. Ei takes an active role in EU's cooperative organisation for energy supervisory authorities, ACER (Agency for the Cooperation of Energy Regulators). This involves preparing opinions on proposals for joint network regulations, i.e. network codes[18], as well as collaborating on ACER's other statements and recommendations. The proposals for network codes submitted to the European Commission are processed as part of the committee procedure, in which member states' governments are represented. A large number of the new network regulations have been adopted and constitutes EU regulation that are directly applicable in Sweden and other EU member states.

Ei and its Nordic counterparts cooperate within the framework of the NordREG organisation. Ei and the Nordic supervisory authorities also cooperate with the other European supervisory authorities within the framework of the Council of European Energy Regulators (CEER). The purpose of this cooperation is to develop and improve the internal market for electricity and natural gas within the Nordics and Europe.

Joint Nordic power balancing regulation

Within the Nordic area, Nordic system operators jointly manages the power balancing[19], which means that power balancing is managed as if the Nordic synchronous area[20]was a single control area. However, this is done with maintained responsibility for each national system operator. Furthermore, there is a common market for regulation power, where the most efficient resources in the entire Nordic region are used for upward or downward regulation.

The common principles for the balancing settlement procedure were introduced in 2009. Work is currently in progress to enable common balancing settlements in the Nordics between Sweden, Norway and Finland as a step towards a common end-consumer market.[21] In order to maintain the system's frequency, system operators

[18] Network codes are series of rules which will be negotiated and determined over the next few years in the form of common network regulations (also known as network codes) and Commission guidelines (guidelines). The purpose of the network codes is to harmonise the electricity markets within the EU.
[19]Power balancing is done in order to correct frequency deviations, i.e. restores momentary balance in the power system.
[20]Electricity systems whose constituent parts are linked by means of an AC connection and which therefore have a shared frequency.
[21] The current plan is for the common balancing settlement procedure to enter into force in May 2017.

are preparing a common market for automatic reserves. The Nordic supervisory authorities are following developments and will determine jointly whether changes are to be implemented, which can thereafter be resolved nationally. Ei normally forms an opinion by reviewing changes to the general balancing agreement between Svenska Kraftnät and the companies responsible for balancing.

The Nordic system operators for some time have jointly managed congestion by means of implicit auctions[22]on the Nordic power market, Nord Pool Spot. The Nordic countries are market coupled with large parts of Europe. The methods used to calculate capacity that can be provided to the market through implicit auctions, and the methods for announcing the auctions, must be public. Changes to these methods must be approved by the supervisory authority, and an effort is underway to approve the methods and conditions that follow from the network regulation on determining guidelines for capacity allocation and congestion management (CACM). The methods and conditions to be approved for CACM are discussed within the framework of the Nordic cooperation in NordREG. The implementation of CACM may lead to a review of current methods and conditions for the Nordic wholesale market.

A number of matters are being processed by Ei as a result of the agreed network regulations. One matter deals with the capacity calculation methods for the Nordic capacity calculation area. Over the year, the Nordic system operators continued to analyse e.g. the consequences of the introduction of flow based allocation of capacity. Ei is following these efforts, and the system operators will submit a method proposal to Ei in September 2017.

Continued efforts for increased European harmonisation

Under the EU's Internal Market in Electricity Directive, supervisory authorities are obliged to monitor how access to cross-border infrastructure is managed by the system operators. The Nordic market is well established, thus, it is changes that requires most attention by supervisory authorities.

Ei works actively together with the rest of the Nordic supervisory authorities to ensure that internal rules and practices in the Nordic countries moves toward increased harmonisation.

In 2016, Ei worked with the other European and Nordic supervisory authorities on the implementation of the agreed network regulations.

Projects of common interest

An important issue for the EU member states are to increase continuity and security of supply of electricity and gas within the EU market. To achieve this, a number of projects are being elevated to the status of so-called Projects of Common Interest (PCI). These projects have a special regulatory framework intended to simplify and coordinate approval processes between the countries. In addition PCI's provide rules that allow the project owners to apply for special EU funding to facilitate financing. € 5.85 billion is available in the CEF fund[23], which project

[22]Implicit auctions means that the transmission capacity is included in the ordinary auction that determines the electricity price. The opposite is explicit auctions, in which transmission capacity is sold separately from the electricity.
[23] Connecting Europe Facility

owners can apply for during the 2014-2020 period. The projects are to contribute to market integration, to increase competition, to improve reliability of supply and reduce CO2 emissions.

Ei has several tasks under the regulatory framework, including participating in the application evaluation of projects that seeks PCI funding.

Sweden currently runs one PCI project for electricity in the form of the 400 kV line from Ekhyddan via Nybro to Hemsjö, planned to be up-and-running in 2023. The project is intended to increase the operating reliability of the grid and regional networks and to guarantee the power supply direct current link, NordBalt, between Sweden and Lithuania. The existing 400 kV lines in the area are outdated and will become objects of reinvestments in the near future. These reinvestments are extensive, and consequently the lines will be disconnected for a number of years. This will result in significant costs for end consumers in bidding area SE4, unless an alternative supply route is established between bidding areas SE3 and SE4.

The projects contributes to increase transmission capacity between bidding areas 3 and 4, and to reduce transmission losses in the Swedish electricity network by about 275 GWh/year, which leads to a reduced environmental impact in the integrated European energy system.

1.1.5 Compliance with electricity legislation

Ei's tasks as a network authority include monitoring companies' fulfilment of their obligations under electricity legislation. The act[24] specifies that Ei is the supervisory authority regarding conditions for access to the network for cross-border electricity exchanges[25]. Moreover, Ei's brief includes the fulfilment of tasks that follow from the EU's Internal Market in Electricity Directive.

Under the Internal Market in Electricity Directive[26], national supervisory authorities are to follow and implement the legally binding and relevant decisions taken by ACER and the European Commission. No specific legislation is required for this to apply in Sweden as the provision is of advisory nature. In order to enable Ei to follow the Commission's decisions, provisions have been introduced in the Electricity Act[27]and the Act on Certification of Transmission System Operators for Electricity[28]. These provisions requests that, when Ei makes decisions that are affected by the Internal Market in Electricity Directive[29], Ei must state that these decisions may be altered or annulled at the request of the European Commission.

[24] 1997:857, Ch 12, Section 1, paragraph 4.
[25]Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003.
[26] Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.
[27] 1997:857, Ch 12, Section 1 b.
[28] 2011:710, Ch 3, Section 4, and Ch 4, Section 3.
[29] 2009/72/EC Article 39.

Under the Electricity Act, Ei is entitled to request and receive information and peruse documents necessary to perform their supervision[30]. Ei may issue such injunctions that are necessary to ensure compliance with the regulations and conditions within the scope of its supervision[31]. Such injunctions may be accompanied with fines.

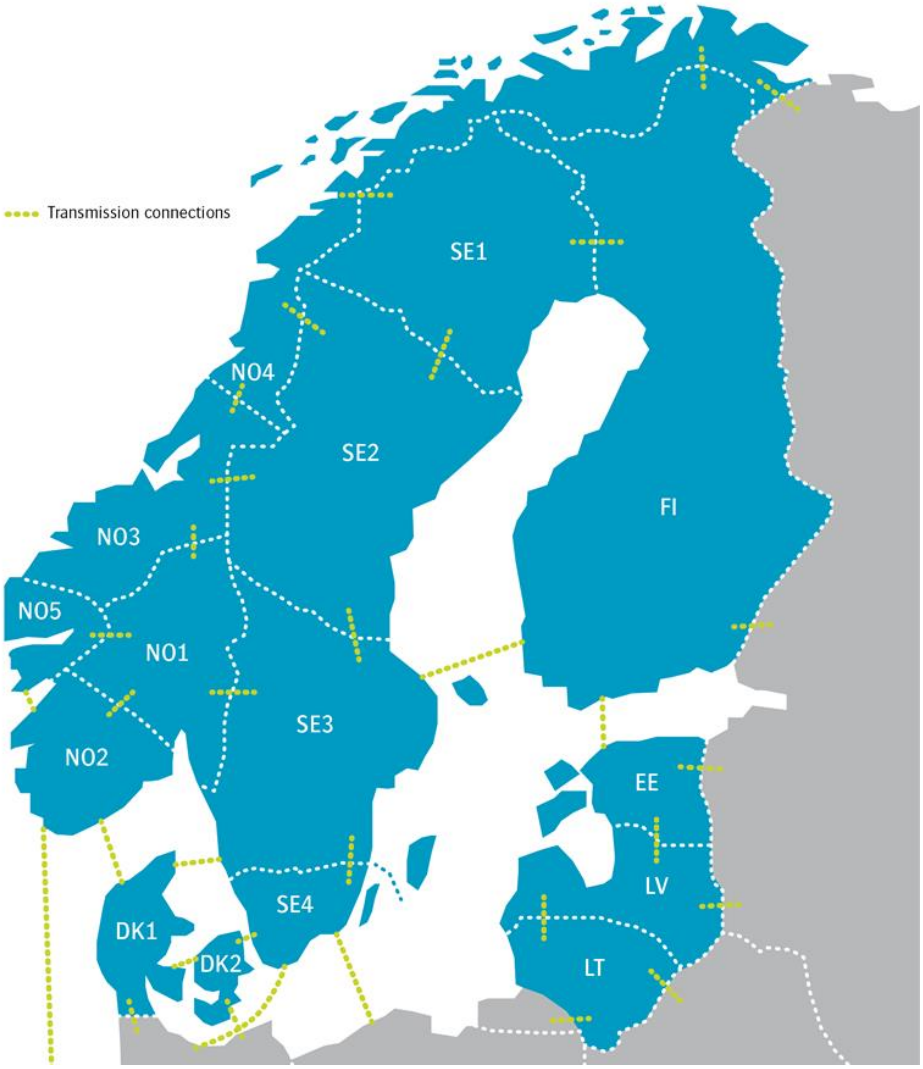
[30] 1997:857, Ch 12, Section 2
[31] 1997:857, Ch 12, Section 3

1.2 The wholesale market for electricity

The Swedish wholesale market for electricity is part of an integrated Nordic-Baltic market by interconnectors. In addition, the Nordic-Baltic network is connected to the European electricity network. The operative management of the electricity network take place in each country, where the transmission system operator is responsible for ensuring that the national network is balanced at all times.

Swedish electricity production is mainly based on nuclear power and hydroelectric power. Electricity use is influenced by the Sweden's relatively large share of power-intensive industries and that many households have electric heating. Trade in the wholesale market primarily takes place on the Nord Pool electricity exchange.

Figure 4. The Nordic-Baltic bidding areas



Source: Ei

1.2.1 Monitoring price trends, transparency and competition

Electricity trading in the Nordic-Baltic market

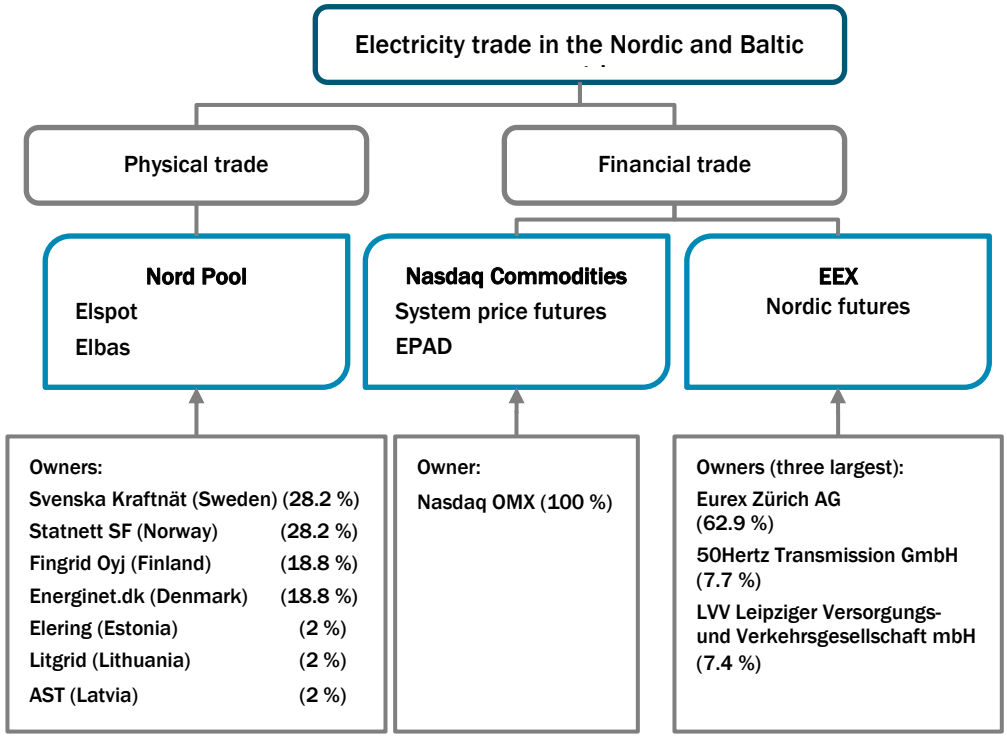
The physical delivery of electricity in the Nordic-Baltic market is traded on the Nord Pool electricity exchange. At the Nord Pool exchange, participating agents can trade electricity for delivery through the day-ahead market called Elspot. Trading is conducted through auction procedures, where buyers specify their desired quantities and producers specify their prices. Producers that specified a price lower than the resulting auction price are allowed to sell electricity equal to their offered quantity, and vice versa applies to the buyers. This guarantees that participants buy or sell electricity at a price that correspond to their financial circumstances. The auction sets a spot price for each bidding area[32], see figure , and a system price. The system price is a fictive price that assumes no congestion or transaction costs between bidding areas.

Agents on the day-ahead market that are unable to deliver or receive their purchased quantity, e.g. because of a production facility failure or shut down, can trade on the intraday market, called Elbas. The intraday market, Elbas, allows participants to buy and sell electricity continuously, up to one hour before delivery. A market participant may not withhold capacity from Elspot to later trade it on Elbas. Trading on Elbas is increasing with the growth of production methods where the outcome is more uncertain, for example wind power.

Agents that seeks to trade electricity for longer horizons that one day are referred to the financial markets. In the Nordic-Baltic market, financial trading are mainly conducted on the Nasdaq Commodities exchange. At the Nasdaq exchange, market participants buy different types of financial contracts, e.g. futures, where the terms range from a few days up to ten years. Futures are settled against the system price on day-to-day basis by Nord Pool. If futures are sold at a price that exceeds the system price, the seller are compensated by the buyer for the difference, and vice versa. Note that the financial trade does not affect the physical delivery of the electricity, and the participants sell their quantities at Nord Pool as usual. Since prices in each bidding area are set individually, participants hedge against differences between the system price and the bidding area prices. In order to hedge, participants buy EPAD contracts[33]. These contracts works similar to futures, but are settled against the price difference between a given bidding area and the system price.

[32]Sweden has been divided into four bidding areas, SE1-SE4, since 1st November 2011
[33]Electricity Price Area Differential

Figure 5. Electricity trading venues in the Nordic-Baltic market



Source: Nord Pool, Nasdaq and EEX

In 2016, 391 TWh[34] of the power used in the Nordic and Baltic countries were traded at the Nord Pool trading platform. This is an all-time-high in terms of volume, and a 3.1 percent increase since last year. Also, the volume corresponds to a 95 percent share of the total Nordic production. Trading was distributed between Elspot (386 TWh) and Elbas (5 TWh). There were 380 active members at Nord Pool in 2016 (the same number as in 2015).

Market splitting and counter-trading for congestion management

The need for electricity transmission, within Sweden and the Nordics, is mainly determined by variations in the access to hydroelectric power and seasonal variations in demand. Congestion in the Swedish power grid is normally due to a high level of hydroelectric production in the north, which leads to a need for southward transmission – combined with limited transmission capacity between bidding areas. In addition, congestion occurs in situations where there is large northward transmission, e.g. from Denmark and the continent to the west coast of Sweden and further to southern Norway.

In Sweden and the Nordics, there are two methods to manage bottlenecks – one is market splitting and the other counter-trading.

Market splitting means that the electricity market is divided into submarkets known as bidding areas, or spot price areas, see figure . Prices in the individual areas are determined by production and consumption, and by power transmission to and from adjacent areas.

[34]http://www.nordpoolspot.com/message-center-container/newsroom/exchange-message-list/2017/q1/strong-volumes-foundation-for-expansion--nord-pool-2016/

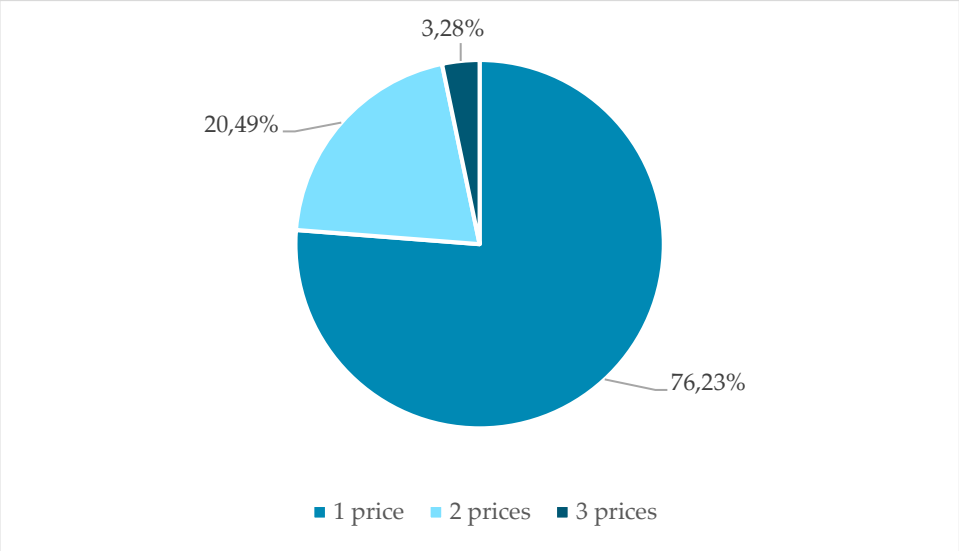
When two or more adjacent bidding areas have the same price, this is called a price area. It is common for all of Sweden's four bidding areas to constitute a single price area, particularly during hours of low demand. Also, price areas that extend across Danish, Swedish and Norwegian bidding areas are common. Sweden have four bidding areas since 2011. The revenue that Svenska Kraftnät earns from the sale of electricity between areas is reserved to reinforce the national grid. The system price resembles the price without transmission congestion between bidding areas.

In addition, Svenska Kraftnät manage congestion by counter-trading. More precisely, Svenska Kraftnät pays for increased electricity production in the shortage area, and/or reduced production in the surplus area. Counter-trading expenses are charged to Svenska Kraftnät and thus provide signals that the network needs to be strengthened.

Sweden functioned as a single price area during most of 2016

Sweden was a uniform price area during 76.23 percent of 2016. Price differences mainly occurred between the south (bidding areas 3 and 4) and the north (bidding areas 1 and 2) of Sweden. Overall, there were two price areas 20.49 percent of the time and three price areas 3.28 percent of the time. Foremost, the price differences arise during periods of congestion or production shortfalls, particularly in bidding area 4. The price differences between areas 3 and 4 are expected to be considerably reduced when the new SouthWest Link power transmission line is put into service in 2018.

Figure 6. Periods during 2016 when Sweden was divided into 1, 2 or 3 price areas, as a percentage of the entire year

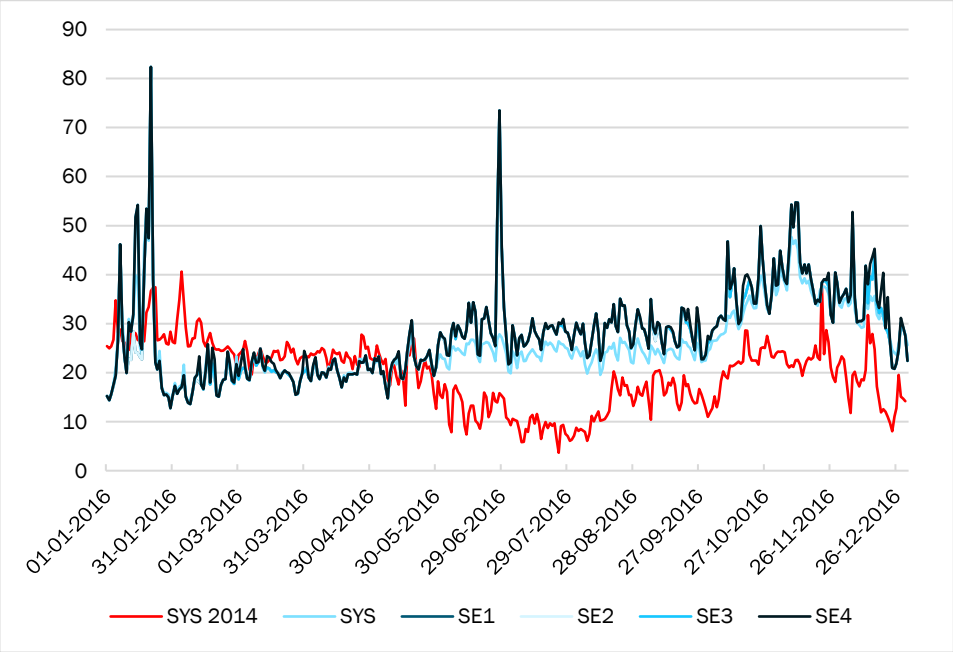


Source: Nord Pool, own calculations based on data

Price trend over the year

Figure 7 shows the daily average spot prices in 2016. The year started with slightly lower spot prices than previous year. The year-high price occurred on January 21st, at the average price of 82.38 öre/kWh. Another peak was recorded on June 28th, at the average day price of 73.49 öre/kWh. The lowest price during the year was recorded on January 30th, where all Swedish bidding areas had an average price of 12.75 öre/kWh.

Figure 7. Daily average rates on Elspot in 2016, öre/kWh[35]



Source: Nord Pool

Low electricity use, large electricity exports and all-time-high wind power production

In 2016, the total electricity use, including transmission losses, reached circa 140 TWh[36]. This is an increase over previous year - although electricity use were low in comparison to the rest of the 2000s.

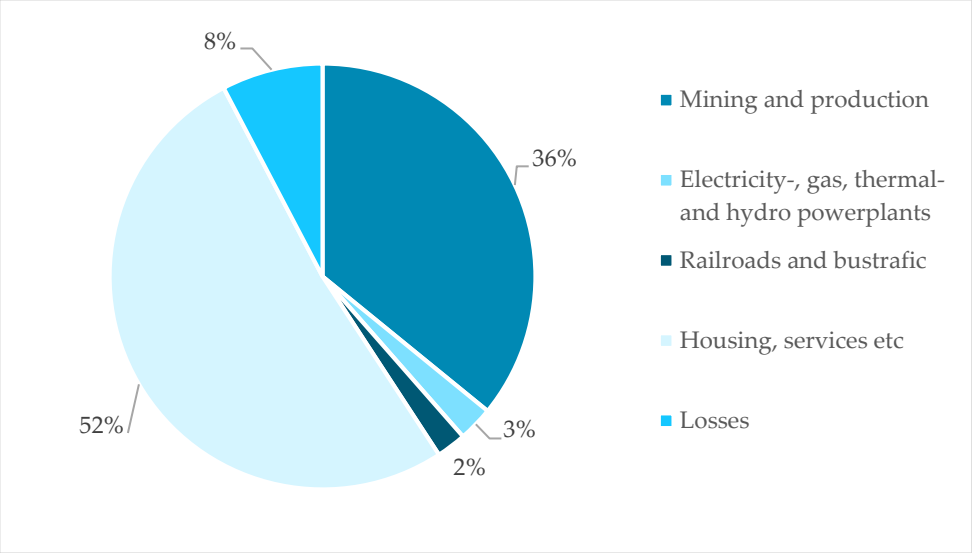
Approximately half of the power, 72 TWh, was used in the housing and service sector, which is slightly more than in 2015, see Figure . Similar to 2015, industry power use was 50 TWh over the year, which constitutes 36 percent of total electricity use.

The low power use was partially because 2016 was a historically warm year, lowering the needs for heating. However, the exceptionally cold month of January meant that the annual average temperature in 2016 was lower than both 2015 and 2014. At the global level, 2016 was the warmest year recorded.

[35]The figure shows electricity price movements during the year for all four Swedish bidding areas (SE1-SE4), the system price (SYS) and the previous year's system price (SYS-2015).

[36] Preliminary data from Statistics Sweden's monthly figures. Definitive annual data for 2016 will be published by the Swedish Energy Agency and Statistics Sweden on 30 November 2017.

Figure 8. Electricity consumption by area of use, 2016



Source: Statistics Sweden

In 2016, the National electricity production dropped by approximately 6.8 TWh, despite an increase in electricity use during the period. Still, at the end of the year, net exports resulted in 11.7 TWh, which is fairly large in the historical context.

Wind power deviated from its long-term trend of repeated production highs, lowering wind power production by 7.7 percent compared to 2015. Nevertheless, wind power continued to represent slightly over 10 percent of total electricity production. Wind power production were largest in November and December.

Table 3. Sweden's electricity balance 2007-2016, TWh. Negative figures indicate exports

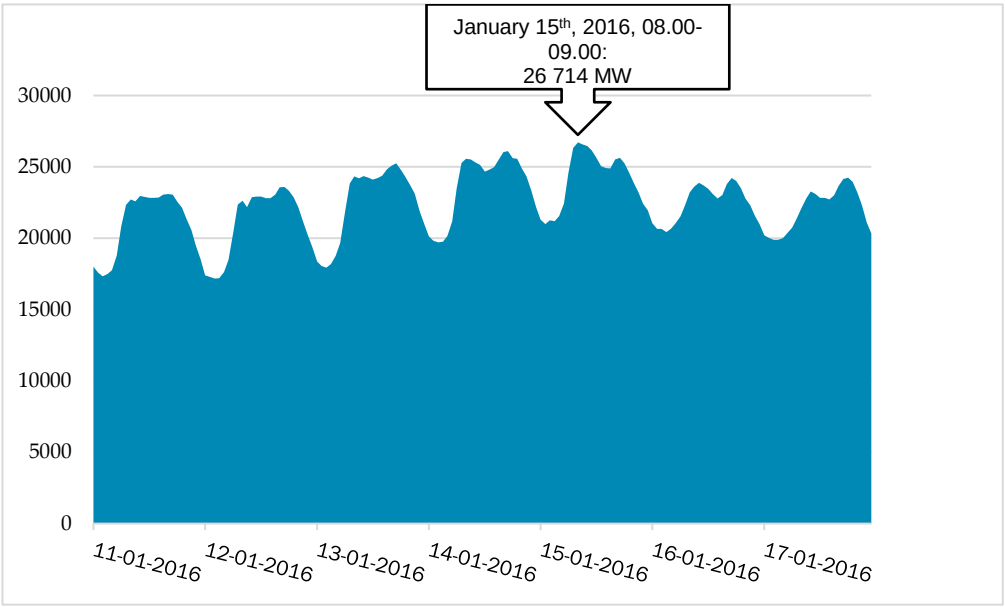
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016[37]
Domestic production	145.0	146.0	133.7	145.0	147.5	162.0	149.5	151.2	158.3	151.5
Hydroelectric power	65.6	68.6	65.3	66.8	66.7	78.0	60.8	64.2	73.9	61.2
Nuclear power	64.3	61.3	50.0	55.6	58.0	61.4	63.6	62.2	54.3	60.5
Other thermal power	13.7	14.1	15.9	19.1	16.8	15.5	15.2	13.3	13.5	14.3
Wind power	1.4	2.0	2.5	3.5	6.1	7.2	9.9	11.5	16.6	15.4
Domestic consumption	146.3	144.0	138.4	147.0	140.3	142.4	139.5	135.2	135.7	139.8
Network losses	10.7	10.5	10.2	10.7	9.7	11.0	11.0	10.2	10.4	10.7
Imports	18.5	15.6	16.4	17.6	14.8	13.1	15.1	13.9	9.3	14.3
Exports	-17.2	-17.6	-11.7	-15.6	-22.0	-32.7	-25.1	-29.5	-31.9	-26.0
Net imports	1.3	-2.0	4.7	2.1	-7.2	-19.6	-10.0	-15.6	-22.6	-11.7

Source: Swedish Energy Agency and Statistics Sweden

[37] Preliminary data from Statistics Sweden's monthly figures. Definitive annual data for 2016 will be published by the Swedish Energy Agency and Statistics Sweden on 30th November 2017.

Power consumption peaked on January 15th at 08:00-09:00, where it reached 26 714, see figure . This is roughly 300 MW short of Sweden's previous consumption peak, which occurred on February 5th, 2001, where consumption reached 27 000 MW.

Figure 9. Power consumption, 2nd week in 2016, MW



Source: Nord Pool

Good competition in the wholesale market

Ei's report on the division into bidding areas concluded that the conditions for competition in the wholesale market are good[38]. However, during periods of congestion bidding area 1 and 4 become subject to individual producers that wield market power. Bidding area 1 is primarily dominated by one large producer, and the area often has surplus electricity. But, since bidding area 1 and 2 mostly constitute a common price area, this limits the market power of individual producers.

The situation in bidding area 4 is similar, with a single large producer, although the area often has shortage of electricity and higher average prices than the rest of Sweden. One consequence of this is low liquidity in hedging instruments, EPAD contracts, as few producers are able to offer them. Nevertheless, Ei considers the competition acceptable in bidding area 4, since it often forms a common price area with adjacent Swedish and Danish bidding areas, which reduces the market power of individual producers. Also, the new Southwest Link power transmission line, projected to be operational in 2018, will improve the situation. With the link operating fully, the power transmission capacity between central and southern Sweden will increase by up to 25 percent[39].

[38] Utvärdering av effekterna av elområdesindelningen (Evaluation of the effects of the division into bidding areas) Ei R2014:08

[39]Source: Svenska Kraftnät

Swedish electricity production is dominated by a small number of major producers. Vattenfall represents slightly under 40 percent of total production, and with the 2nd and 3rd largest producers, Fortum and E.ON, this trio produces approximately 73 percent of the Swedish electricity.[40] In addition, the three largest producers owns, through different cross-holdings, the largest share of Swedish nuclear power.

Any assessment of electricity market competition must take into account that Swedish bidding areas rarely constitute isolated price areas. In general, a price area extends across several national borders. Hence, a separate study for each Swedish bidding area are likely to misrepresent how the electricity market works.

Changes in competition between electricity trading exchanges

Additional EU network regulations have been implemented over the last few years and some were still at the draft stage in 2016. Particular interest for competition in the electricity market are the opportunities opened up by the Commission Regulation (EU) 2015/1222 of July 24th 2015, establishing guidelines for capacity allocation and congestion management (the CACM guideline) for competing electricity trading exchanges in the day-ahead and intraday markets — within the one and same bidding area. Currently, all day-ahead and intraday trading in the Nordic-Baltic bidding areas takes place at the Nord Pool exchange, without competition from other platforms. If competing exchanges are active in the same area, the function of the exchanges can be likened to an interface with the common calculation algorithm that exists at the European level. Sweden received an application from Nord Pool to conduct exchange trading for physical wholesale energy products in the Swedish bidding areas, and this application was granted. Also, Ei notified that EPEX Spot could start conducting exchange trading in Swedish bidding areas. Thus, Nord Pool and EPEX are the selected electricity market operators authorised to conduct operations in Swedish bidding areas. In 2016, Ei and the other Nordic supervisory authorities began a joint review, where communication, among other things, between operators needs to be harmonized to move towards equal conditions for selected electricity market operators.

In addition, due to the CACM guideline, Ei approved Svenska Kraftnät's proposal for a transmission line between Sweden and Germany. The decision was appealed to the Administrative Court.

Possibilities of hedging in the financial electricity market

In 2016, the Commission Regulation (EU) 2016/1719 of 26th September entered into force, establishing a guideline on forward capacity allocation (the FCA guideline). Furthermore, Ei and the other Nordic supervisory authorities discussed how to implement the FCA guideline in the Nordics. Among other things, Ei and the other Nordic supervisory authorities — in dialogue with market operators — examined methods of financial hedging in the bidding areas.

Currently, Svenska Kraftnät does not issue long term transmission rights. Thus, Ei needs to take a coordinated decision on whether Svenska Kraftnät should issue long term transmission rights, during the spring of 2017 at the latest.

[40]Source: Data from 2015, Swedenergy. the 2015 Electricity Year

The transparency regulation increases transparency in the electricity market

The regulation aims to increase transparency in the energy markets by ensuring that information from the market's operators reaches those affected in an effective manner. Information that must be reported under the regulation includes physical limitations of the networks, production and consumption. This information is collected in a transparency platform run by ENTSO-E, the European Network of Transmission System Operators for Electricity[41], and are publicly available. The regulation was adopted in 2013 and reporting began in January 2015. Ei's task is to ensure compliance with the transparency regulation in Sweden. In 2015, Ei began monitoring how the companies comply with the transparency regulation.

During 2016, Ei carried out three monitoring visits. Also, an integrated part of monitoring REMIT is to continuously review the information that operators make public regarding unavailability in production, consumption and transmission (market messages). Thus, Ei checks that operators report in accordance with the transparency regulation, which is part of Ei efforts to map and document market manipulation. The supervision did not lead to any decisions on further actions in 2016. However, with the aim of clarifying the requirements that the transparency regulation puts on market operators, Ei held a continuous dialogue with the operators about the regulatory framework and the formulation of various market messages. This work continues in 2017.

Development of the Nordic wholesale market

Developments in the wholesale market and transmission operations within the Nordics are matters that the NordREG Wholesale and Transmission (W&T) group worked on during the year. The group is responsible for monitoring developments and to propose appropriate measures. Their work mainly concerns information exchange regarding network regulations and Commission guidelines that are yet to be adopted and those implemented. Work within NordREG during the period 2015 to 2016 is described in the Status Report 2016[42]. This report includes the implementation of the CACM guideline and the FCA guideline, the infrastructure of the transmission network, and analyses of transmission capacity between the Nordics and Germany.

Internal bottlenecks in Germany affect Sweden

Ei examined the proportion of the capacity in the overseas connections between Sweden and Germany that was allocated to the day ahead market (Elspot) in the years 2012 to 2014[43]. Of the three overseas connections between the Nordics and Germany, only the connection between Zealand and Germany were free of limitations.

The examination shows that the AC connection between Jutland and Germany was most affected by capacity limitations, where only a third of the maximum transmission capacity of 1 780 MW was allocated in the southbound direction during 2014. Transmission via this connection was limited at almost all hours.

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[41] European Network of Transmission System Operators - Electricity

[42]http://www.nordicenergyregulators.org/wp-content/uploads/2016/07/NordREG-Status-report-to-the-EMG-2016.pdf

[43]Transmission limitations between the Nordic countries and Germany) Ei R2015:11

Also, the connection between southern Sweden and Germany was affected by extensive capacity limitations, primarily in the northbound direction, where slightly above half of the maximum transmission capacity was allocated to the market.

Ei examined the source of the limitations and concluded that capacity allocation was regularly limited due to internal bottlenecks in Germany.

In order to estimate the social benefits, and foremost the loss of social benefits resulting from limitations in the transmission between the Nordics and Germany, a power market model[44]was used. Hourly data on actual limitations for 2012-2014 were analysed. Similarly, data on wind production for Germany, Denmark and Sweden were used. Concerning data on fuels and costs of emissions rights, a price level on a par with current prices was used. This allowed a relatively reliable estimate of limitations effects on the social benefits.

Ei's analysis shows that Sweden and Norway suffer the largest losses from transmission limitations, with a respective yearly net loss of EUR 20 million. These measures are calculated by comparing social benefits with and without limitations. This net loss comprises the sum of changes in consumer surplus, producer surplus and congestion rent. German consumers lose EUR 133 million a year, while Swedish and Norwegian consumers gain between EUR 110 and 200 million a year. German producers gain between EUR 135 and 210 million a year, while Norwegian and Swedish producers lose between EUR 120 and 220 million a year. Danish consumers gain between EUR 55 and 90 million a year, while producers in Denmark lose between EUR 40 and 80 million a year.

In 2016, problems with limitations continued to grew after the publication of the previously mentioned study.

Ei's view is that bottlenecks in the transmission system should be managed, whenever possible, where they are geographically located. If one or several countries insists on having a single price area, the consumers and producers in other countries should not suffer additional costs or reduced profitability. The current situation, where the Nordic producers are negatively affected by Germany’s approach to handle their bottlenecks, is not in line with EU’s ambitions for a common internal energy market.

Increases in variable electricity production

The government commission delegated Ei to analyse the effect of an increased share of variable electricity production on electricity producers' profitability, on the wholesale price of electricity and on the retail price. Also, Ei is to assess how an increased share of variable electricity production would affect investment incentives in existing and new electricity production, as well as in electricity production facilities that are only used when demand is high, known as peak load production. The commission further included an examination of whether the current electricity trading system is economically efficient in the short term and the long term.

[44]The power market model used in this project was Sweco's Apollo model.

Ei's conclusion was that the current market model will continue to work in the future, although it can be improved by some minor adjustments. For example, a prerequisite for a well-functioning market is that customers react to price signals, which makes increased demand flexibility an important issue. The commissioned analyses show that the existing market model provides profitability and incentives for companies to invest in the future as well. The commission was presented to the government in December 2016.[45]

[45]Vilken påverkan har en ökad andel variabel elproduktion (What effect does an increased share of variable electricity production have) Ei R2016:14

1.3 The retail market for electricity

The Swedish retail market for electricity opened to competition in 1996, which means that prices are unregulated. There are approximately 5.4 million electricity customers in Sweden, where approximately 4.6 million are household customers.

1.3.1 Monitoring of price trends, transparency and market competition

Many electricity suppliers - but some only operate locally

Electricity supply companies that offer electricity contracts to electricity consumers are required under Ei's regulation[46] to report these to the price comparison site Elpriskollen.se. Elpriskollen is run by Ei and allows users to compare current prices and offers from different electricity suppliers. According to Elpriskollen, there were 121 electricity suppliers in the Swedish electricity market[47] at the end of 2016. However, the total number of electricity supplier does not give an accurate picture of how many companies the individual customer can actually choose between, since various minor local and municipal suppliers choose to operate only in their immediate area.

At the end of the year, the three biggest suppliers had a combined market share of 42 percent (by number of customers)[48] – a figure that has remained stable over the past four years.

Relatively stable customer mobility

The number of customers who switch electricity suppliers has been fairly constant over the past six years. In total, 9.7 percent [49] of customers switched electricity supplier in 2016. Measured by volume used, these customers represented 11.8 percent of Sweden's total electricity use in 2016 (140 TWh).

In addition, the number of renegotiated contracts has been stable over the past nine years. In total, 24.3 percent[50] of all household customers renegotiated their electricity contract in 2016.

However, renegotiated contracts and switches among suppliers does not fully depict the degree of participation by customers. A customer may be active by choosing to stick with an electricity contract because he/she considers the price good. Also, costumers may decide that the cost of electricity represents such a small part of his/her total household costs that it becomes unimportant to reduce it.

[46] EIFS 2013:7

[47] The number of electricity suppliers is defined as the number that have reported, over the course of the year, at least one of the most common electricity contracts to Elpriskollen.se.

[48] Source: Nyhetsbrevet Energimarknaden (the Energy Market Newsletter) 2016

[49] Part of an estimate based on data for 2015

[50] Part of an estimate based on data for 2015

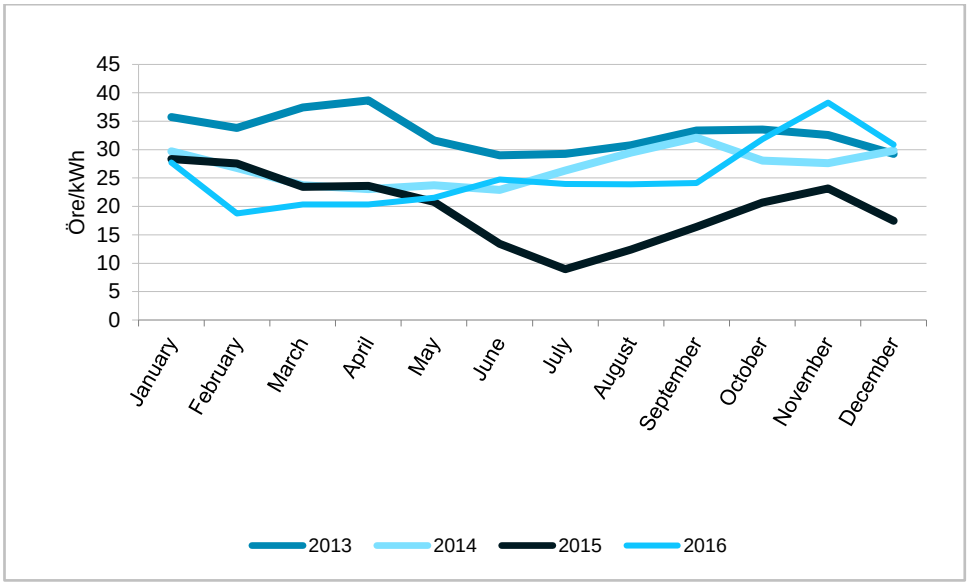
The price of electricity for customers is affected most by the price in the wholesale market

The main part of the electricity price, 85–90 percent[51], is the supplier's cost of purchasing electricity to cover customers' consumption. The electricity is purchased on Nord Pool or through bilateral agreements with producers. Flexible price contracts are based on a spot price adjusted for the customer's load profile, while fixed price contracts are based on the supplier's cost for the forward purchase of electricity adjusted for the customer's load profile. Also, for fixed price contracts there is a cost of price area hedging using EPAD contracts[52]. In addition, to the purchase price there are costs for electricity certificates, electricity disclosure, administration, electricity tax, VAT, and other costs.

Falling spot prices led to low retail prices as well

Spot prices on Nord Pool, the Nordic-Baltic electricity trading exchange, fell at the beginning of 2016 before rising halfway through the year. The reasons for the historically low prices at the beginning of the year were that electricity demand was low due to high temperatures, and that fuel prices were low. In 2016, the average system price was 25.53 öre/kWh, which may be compared with the 2015 average of 19.68 öre/kWh and the 2014 average of 26.94 öre/kWh, see Figure 10.

Figure 10. System price Nord Pool



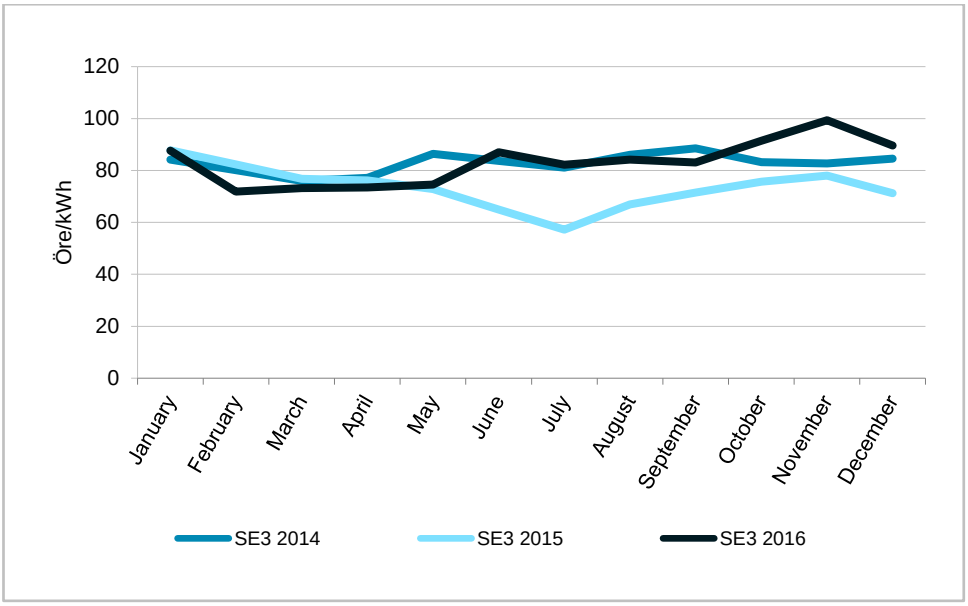
Source: Nord Pool

[51]Source: Ei's report Utvärdering av effekterna av elområdesindelningen (Evaluation of the effects of the division into bidding areas) Ei R2014:08

[52]It is the system price (which is the price that would apply if there were no congestion within the region) that is used as a reference price for the forward contracts that electricity suppliers use for hedging when they sell fixed price contracts to their customers. However, it is in the local bidding areas that the physical input from the production source and the actual consumption of electricity are priced. Since prices in the bidding areas can deviate from the system price, operators need to hedge against this price area risk, which they do by trading in EPAD contracts.

Figure 11 shows that monthly fluctuations in flexible price contracts in bidding area 3 offered to the average costumer. In 2016, contract prices remained stable over the course of the year, with a peak price in November and a yearly low in January.

Figure 11. Unit prices 2014-2015 for flexible price contracts for average customer 20,000 kWh/year, bidding area 3

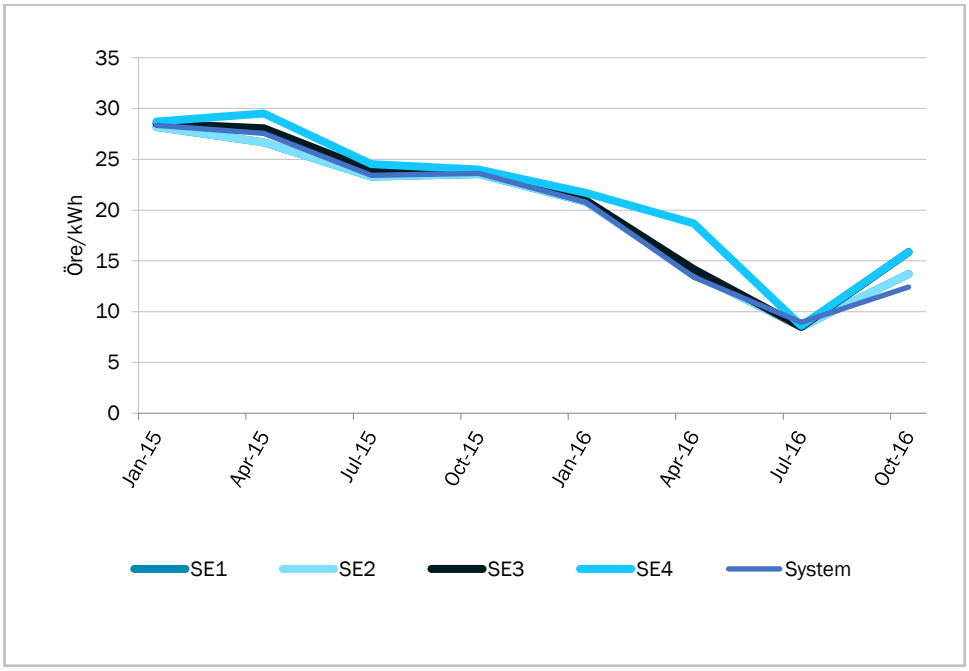


Source: Elpriskollen, Ei

Small price differences between the bidding areas

The price difference between bidding area 4 and bidding area 1 averaged 0.54 öre/kWh in 2016, which can be compared with 2015 when the average difference was 1.64 öre/kWh. The difference between bidding areas 4 and 3 averaged 0.28 öre/kWh in 2016, which can be compared with 0.85 öre/kWh on average in 2015. January was the month with the biggest price difference between the bidding areas, where bidding area 4 had an average spot price that was 2.6 öre higher than bidding area 1, see Figure 12.

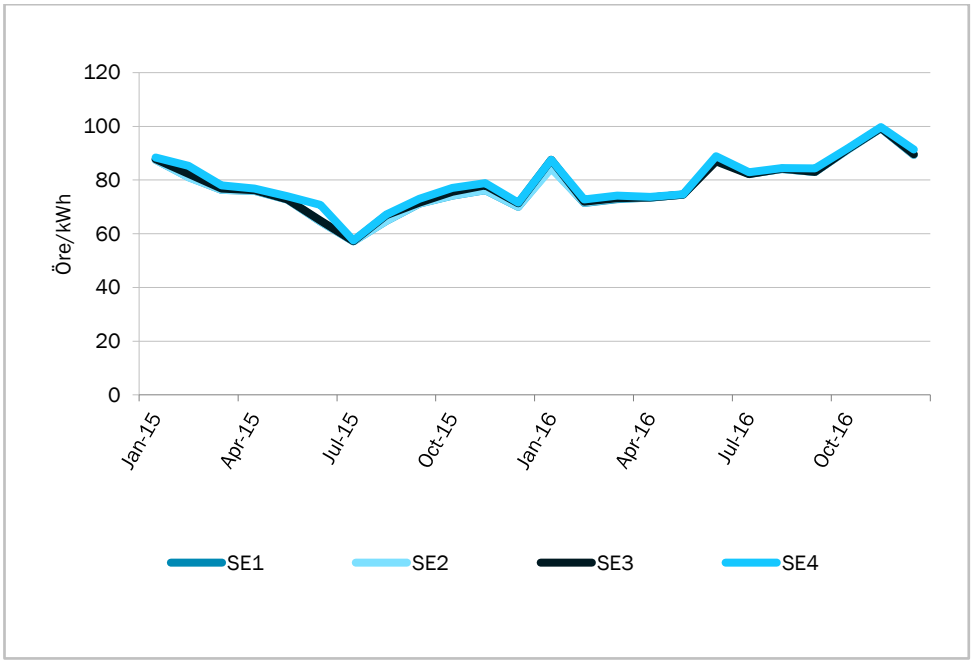
Figure 12. Spot price per bidding area and the system price 2015-2016



Source: Nord Pool

Figure 13 shows that the retail prices in the different bidding areas follow the spot prices in respective areas. Price differences between the four bidding areas' retail prices for flexible price contracts were small in 2015 and 2016.

Figure 13. Unit prices for flexible price contracts for the average customer 20,000 kWh/year.

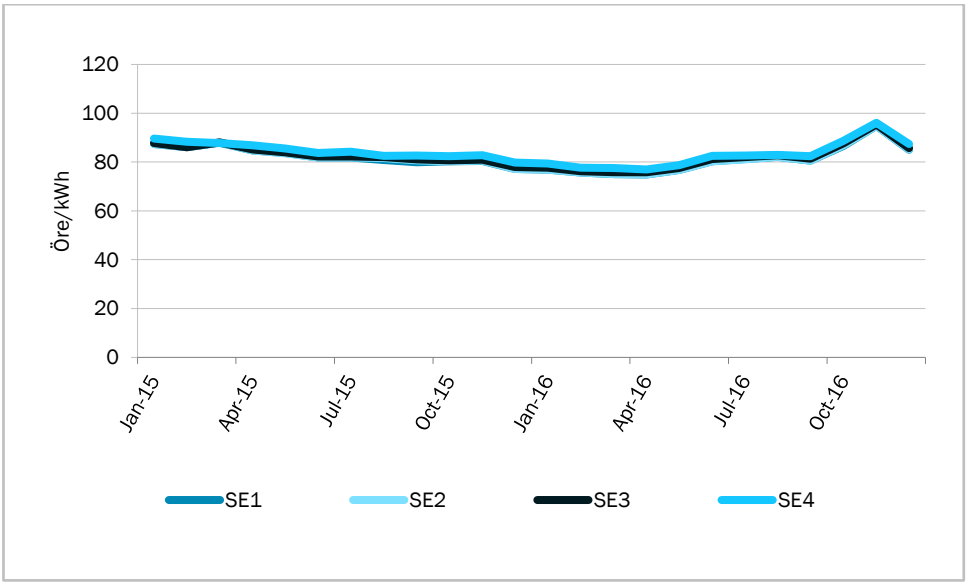


Source: Elpriskollen, Ei

For fixed one-year contracts there is a small price difference between the different bidding areas. On average, the prices for the "fixed price, 1 year" contract type were about 2 öre higher in bidding area 4 compared to bidding areas 1 and 2 during both 2015 and 2016. The difference between bidding area 3 and bidding area 1 was 0.8 öre during 2016, see figure 14.

One reason for the price differences is the electricity suppliers' need to hedge. In bidding areas with high degree of price variation, the need to hedge are higher, which results in increased costs of handling uncertainty for the electricity suppliers, affecting retail prices upwards. The lowest prices can be found in bidding areas 1 and 2, and the highest in bidding area 4.

Figure 14. Unit prices for fixed price contracts, 1 year, for the average customer 20,000 kWh/year.

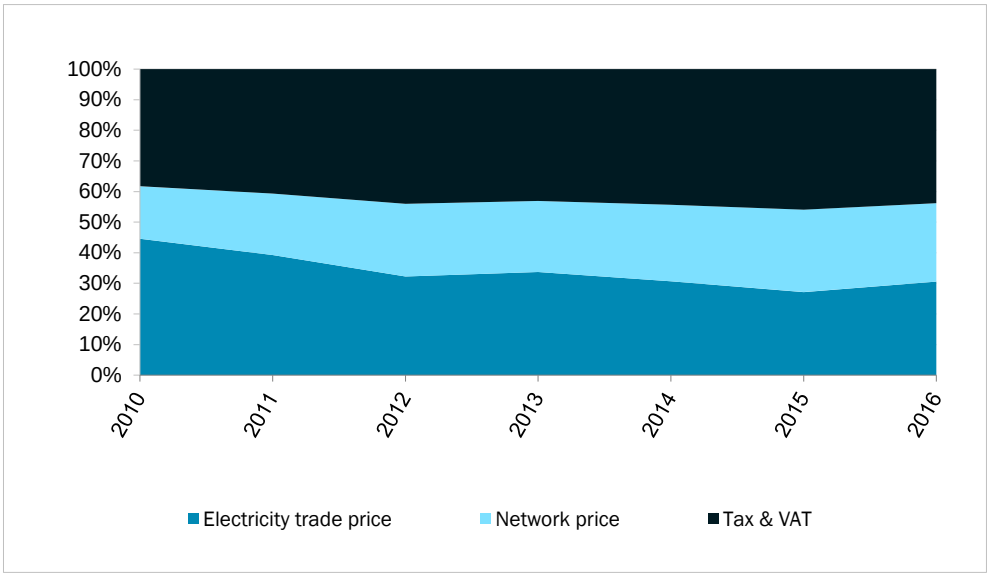


Source: Elpriskollen, Ei

Tax and VAT represent the main part of the total electricity cost

The proportions between the different parts of the total electricity cost that a house with electric heating pays have varied in recent years. This is due to increasing network prices while the unit prices decreased. Also, energy taxes and VAT increased slightly over the last few years, see Figure 15.

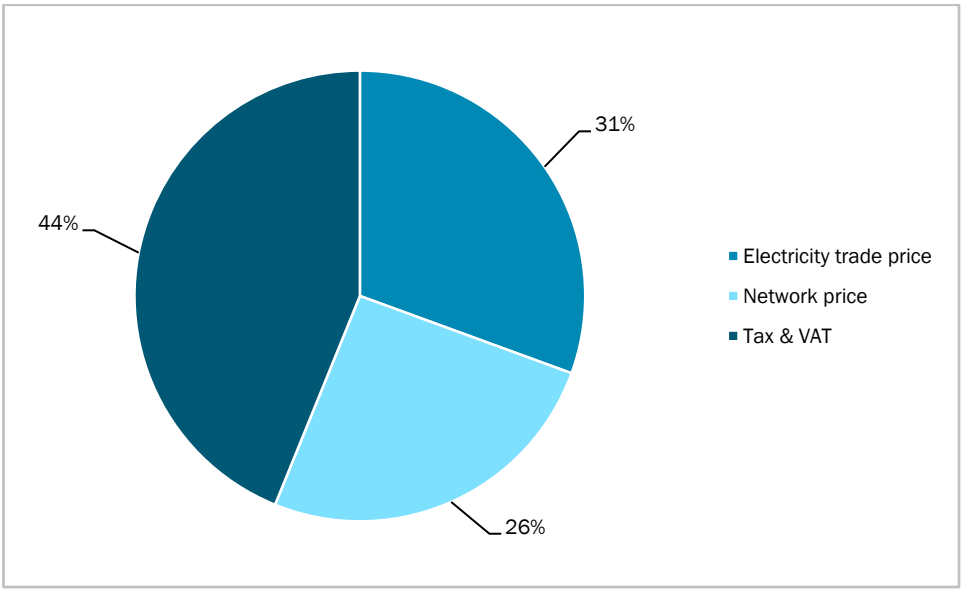
Figure 15. Distribution of the electricity cost for a consumer using 20,000 kWh/year. Cost in real terms.[53]



Source: Ei, Statistics Sweden

In 2016 the main proportion of consumers' energy cost, 44 percent, consisted of tax and VAT. Electricity trading costs accounted for a larger share, 30 percent, of the consumers' total electricity costs compared with the network transmission costs, 26 percent, see Figure 16.

Figure 16. Constituent parts of the cost of electricity in 2016, for a consumer who uses 20,000 kWh/year. Real term prices.[54]



Source: Ei, Statistics Sweden

[53] Part of an estimate based on data for 2015
[54] Part of an estimate based on data for 2015

Total electricity cost for a consumer

In 2016, the total electricity costs for customers with an annual consumption of 2,000 kWh and a flexible price contract was approximately SEK 3,700.
For a consumer with an annual consumption of 20,000 kWh and a flexible price contract, the electricity cost in 2016 amounted to approximately SEK 24,000, see Table 4 and Table 5.

Table 4. Total annual cost 2016, variable price, customer in an apartment[55]

Total annual cost 2015, variable price, customer in an apartment	SEK
Electricity supply	983
Tax	584
Total, electricity supply incl. VAT	**1958**
Electricity network	1,416
VAT electricity network	354
Total	**3,728**

Source: Ei

Table 5. Total annual cost 2016, variable price, customer in a house[56]

Total annual cost 2015, variable price, customer in a detached house	SEK
Electricity supply	7,484
Tax	5,840
Total, electricity supply incl. VAT	**16,655**
Electricity network	6,267
VAT electricity network	1,567
Total	**24,489**

Source: Ei

The total annual cost for a consumer with a one-year fixed price contract depends on when the consumer entered into the contract. In 2016, apartment customers' total annual costs averaged between SEK 3,500 and 3,900, depending on the month of the year they entered into the contract, see Table 6. For customers in houses with an annual consumption of 20,000 kWh, the total annual cost amounted to between SEK 22,000 and 26,000, see Table 7.

[55] Part of an estimate based on data for 2015
[56] Part of an estimate based on data for 2015

Table 6. Total annual cost 2016, fixed price 1 year, customer in an apartment[57]

Total electricity cost, fixed price 1 year, customer in an apartment	SEK
Electricity supply	806–1,134
Tax	584
Total, electricity supply incl. VAT	**1,738–2,147**
Electricity network	1,416
VAT electricity network	354
Total incl. VAT	**3,508–3,917**

Source: Ei

Table 7. Total annual cost 2016, fixed price 1 year, consumer in a house[58]

Total electricity cost, fixed price 1 year, customer in a detached house	SEK
Electricity supply	6,149–9,336
Tax	5,840
Total, electricity supply incl. VAT	**14,986–18,970**
Electricity network	6,267
VAT electricity network	1,567
Total incl. VAT	**22,820–26,804**

Source: Ei

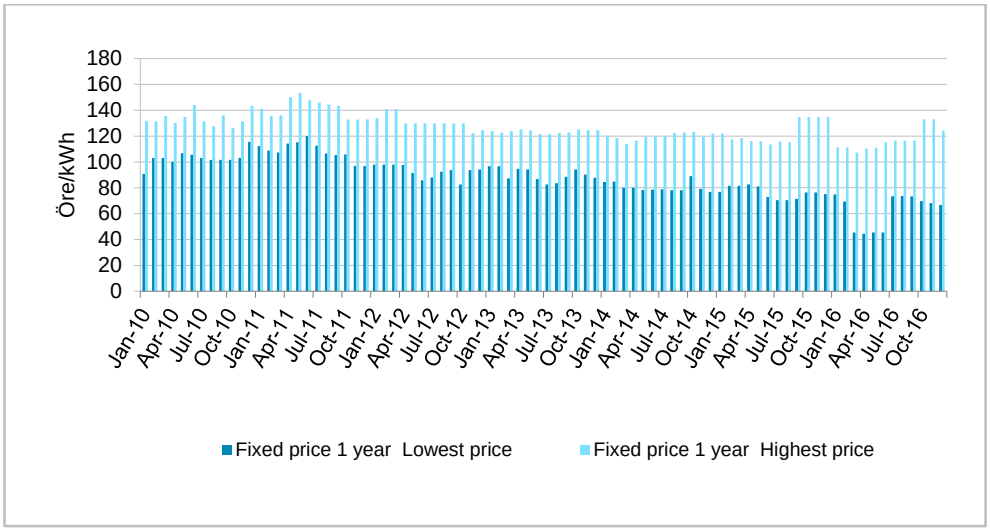
Price differences between electricity suppliers

The price difference between the highest and lowest one year fixed contracts designed for apartment costumers averaged 39 öre, 49 percent, during 2010-2016, see Figure 17.

For the flexible price contract, the price difference averaged 56 öre, during the period, see Figure 18. In percentage terms the difference was 74 percent..

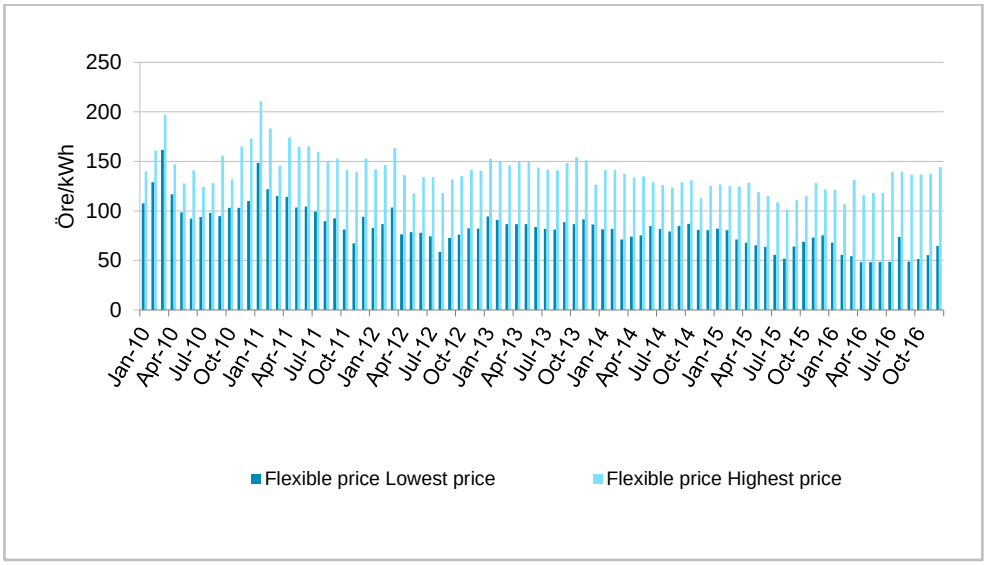
[57] Part of an estimate based on data for 2015
[58] Part of an estimate based on data for 2015

Figure 17. Highest and lowest prices for the fixed price, 1 year contract type, customer in an apartment, 2,000 kWh/year



Source: Ei

Figure 18. Highest and lowest prices for the flexible price contract type, customer in an apartment, 2,000 kWh/year

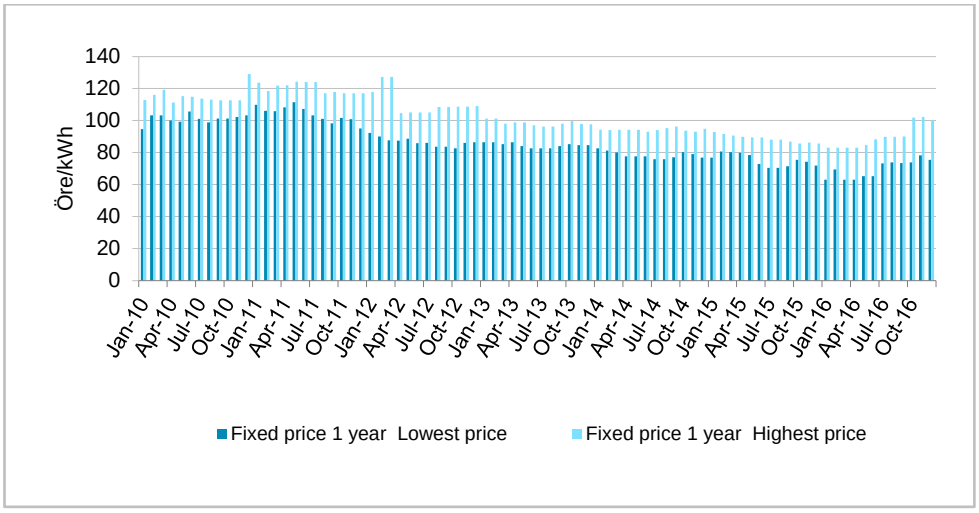


Source: Ei

The price difference was smaller among contracts offered to customers in detached houses, with an annual consumption of 20,000 KWh, than contracts offered to customers living in apartments. The greater price differences is explained by the fixed annual fees for all costumers set by some electricity suppliers. Thus, households with lower consumption may face higher costs as the fixed fee has a considerable impact on the unit price. Another contributing factor may be that customers in houses with higher consumption are more price sensitive and price conscious than customers living in apartments.

The most expensive one year contracts with fixed price were on average 17 öre, approximately 20 percent, higher comparing to the cheapest contracts during 2010-2016, see Figure 19.

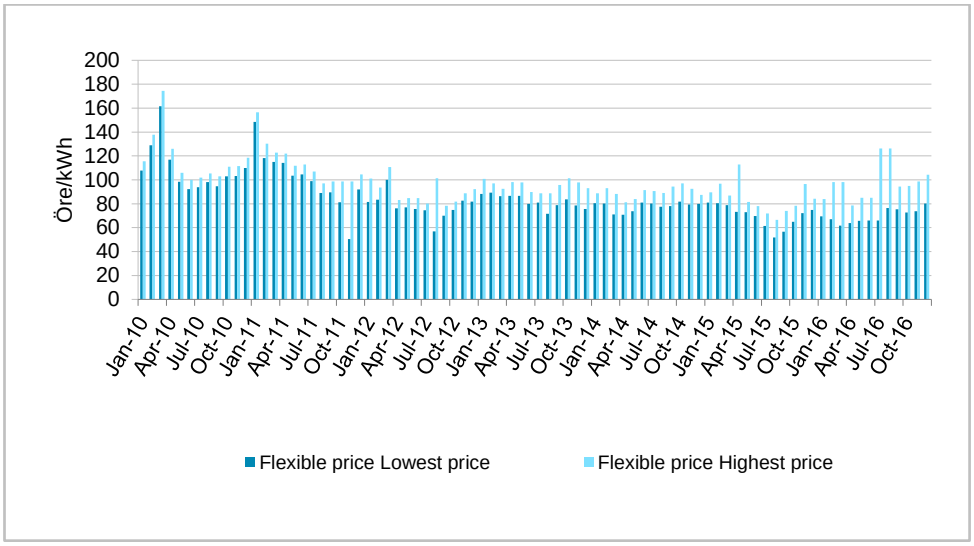
Figure 19. Highest and lowest prices for the 1-year, fixed price contract type, customer in a detached house, 20,000 kWh/year



Source: Ei

The price of the most expensive contracts with flexible price was 19 percent higher, on average 15 öre than the cheapest, see Figure 20. However, over time the price difference varied more than for the one year fixed price contracts.

Figure 20. Highest and lowest prices for the variable price contract type, customer in a detached house, 20,000 kWh/year

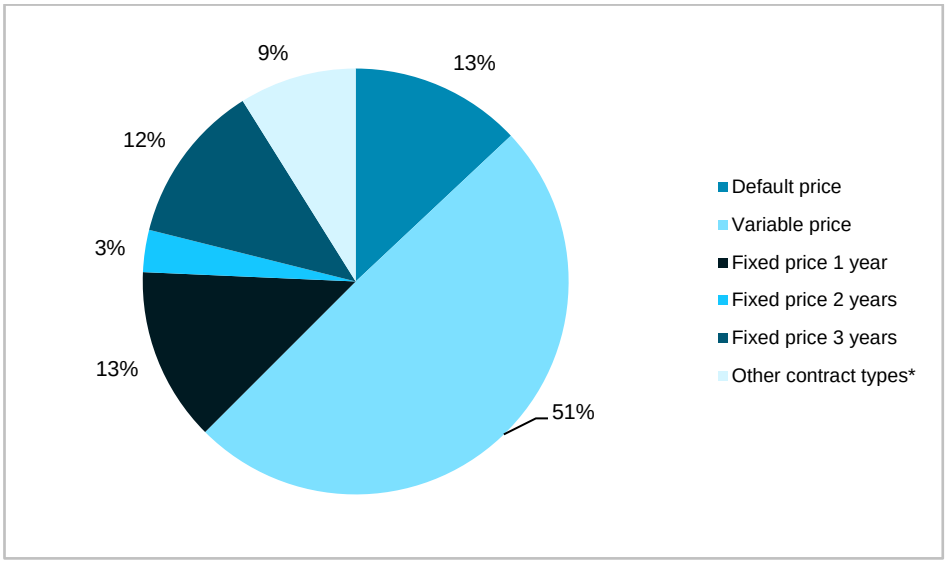


Source: Ei

More customers are choosing flexible price contracts

An ongoing trend shows that more consumers are moving from fixed to flexible price contracts. In December 2016, 51 percent of Swedish household customers had flexible price contracts, which is an increase of 4 percentage points since December 2015. 28.6 percent of the customers had a fixed price contract with a subscription period of 1, 2 or 3 years, see Figure 21.

Figure 21. Distribution of contract type for domestic customers in December 2016



*Examples of other contract types include contracts with a different subscription period than 1, 2 or 3 years. Combination contracts or mixed contracts. Source: Statistics Sweden

Many customers still have default contracts

Customers in the Swedish electricity market are free to choose their preferred electricity supplier. This means that companies operate in a competitive market with free price setting. If the customer does not make an active choice, the relevant network owner is responsible for assigning a supplier. The price of these contracts is 20-30 percent higher than other contract types. There are several possible reasons why some customers continue with these contracts despite the higher price. One reason may be that the costumers are unaware that they have a contract type that is more expensive, and that they easily can switch to a cheaper contract. Ei has noted that the information to these customers is unsatisfactory. It may also be that customers consider the cost of electricity such a small part of their total household finances that they do not bother to switch.

Working towards a harmonised Nordic retail market

Together with its Nordic sister authorities in the NordREG (Nordic Energy Regulators) cooperation organisation, Ei has been working for a number of years to achieve a harmonised Nordic electricity market. As well, there is strong political will and support for the creation of a common Nordic electricity market. The Nordic retail market is based on a model where the suppliers are central, which makes suppliers more accessible and beneficial to consumers. The purpose of this model is to promote suppliers to operate in several countries and increase competition.

Develop market regulations plays a central role in the creation of a common market. In order to achieve a common retail market, it is of importance that the market design is sufficiently harmonised in order to minimise adaptation- and transaction costs that electricity suppliers and energy service companies face when they want to operate in several Nordic countries at the same time. The work towards a common Nordic retail market includes forming of a common Nordic imbalance settlement.

NordREG notes that key processes including switching electricity supplier, moving, metering, billing and information management through data hubs already have been harmonised at the Nordic level and are currently being implemented in the Nordic countries. NordREG members have a continuous exchange of information about the implementation of these processes.

In 2016, NordREG's retail market working group[59] wrote the report *Electricity customers in the Nordic countries*, which describes the situation for the Nordic electricity customers. It was published at the beginning of 2017. The group also examined the possibility of increased cooperation and information exchange between the Nordic countries regarding supervision, which has resulted in increased knowledge about the Nordic supervisory authorities' surveillance and conditions for prosecution.

Another review carried out within the framework of NordREG describes the status of Nordic initiatives in demand side response on the market. This survey was presented in the *Status report on regulatory aspects of demand side flexibility*. The report, published at the end of the year, provides an overview of the supervisory authorities' work on demand side response.

Ei's involvement in promoting a well-functioning retail market in Europe

Over the year, Ei have had an active role in CEER's efforts to determine how the retail markets for electricity and gas in Europe should be developed. This included chairing CEER's Retail Market Task Force.

Ei is involved in four main areas of the retail customer sector: Well-functioning retail markets, barriers to entry for new market participants, data management, and strengthening the consumers' position in the market.

In the area of barriers to entry, Ei was involved in producing the CEER Benchmarking Report on Removing Barriers to Entry for Energy Suppliers in EU Retail Energy Markets, which was published in April. The report includes descriptions of the barriers that exist for new electricity suppliers in the retail market.

A new version of the price comparison website Elpriskollen.se was launched

The design of the price comparison website elpriskollen.se was updated in 2015, and the new website was launched early 2016. The purpose of the update was to create a modern and user-friendly website. Likewise, the service that electricity suppliers use to report their prices and contract terms was updated to a more accessible interface.

The purpose of updating this service was to make it easier for electricity suppliers to use and to improve the quality of the reported data. The changes were well received by the users.

[59] Retail Market Working Group

Commission on a supplier centric model and a service hub

In 2015, Ei and the Swedish TSO, Svenska Kraftnät, were commissioned by the government to continue to work on the subject of introducing a central information management model, known as a service hub. Ei's commission also includes continuing to work on previous proposals about the introduction of a supplier centric model.

Over the year, Ei worked intensively on the commission and collaborated closely with Svenska Kraftnät, which has a government commission to develop and run the service hub. To support the documentation for Ei's report, two additional consultants' reports were conducted, *Samfakturering av elhandels- och elnätskostnader* (Joint invoicing of electricity supply and electricity network costs) and *Faktureringsfrister och kreditrisk i olika samfaktureringsmodeller - finansiell analys* (Invoicing terms and credit risk in different joint invoicing models - a financial analysis). Due to the complexity, Ei requested an extension to work on the commission until June 15th, 2017. The government granted Ei's extension request in December 2016.

Demand side response in the Swedish electricity system

In 2015 Ei was commissioned by the government to examine the conditions and barriers that different electricity customers are facing when it comes to improving economic efficiency in the electricity market through increased demand side response. Demand side response means that the electricity consumer changes the consumption patterns after receiving a signal from the electricity system, or the electricity market. These might be price signals that make the consumers more inclined to shift their consumption to a certain time of day when electricity is cheaper.

In the report[60], Ei identified what barriers exist to customers' ability to be flexible. On this basis, Ei proposed around twenty measures within the electricity networks, electricity supply, consumer and the decision maker areas. Among the measures analysed were hourly metering for all consumers, better information to customers, demands for time differentiated network tariffs and for allowing pilot projects in order to test new tariffs, as incentives to the demand response. The commission was presented to the government in December 2016.

[60] Ei R2015:15

1.4 Recommendations on supplier prices, reviews and measures to promote competition

Several authorities and public bodies collaborate in the supervision of the Swedish and Nordic electricity market, with the purpose of different actions create a well-functioning electricity market without any practise of market power.

1.4.1 Responsibility within the electricity market supervision

In addition to its supervisory role, Ei continuously monitors and analyses changes in the electricity markets, and submits suggestions for changes in regulations or other measures that may improve the functioning of the markets. Ei's assignment also includes promoting effective competition within the electricity market. In 2015, Ei wrote a report describing the problems of limitations in the overseas connections between the Nordic countries and Germany, see the paragraph entitled "Examination of capacity limitations between the Nordic countries and Germany" in Chapter 1.3.

The Swedish Financial Supervisory Authority (Finansinspektionen) supervises Swedish actors that operate in the financial electricity market with the authority's permission. Supervision of trading and of companies' actions are carried out on the Nord Pool and Nasdaq Commodities exchanges. Nord Pool is based in Norway, and is therefore supervised by the Norwegian Water Resources and Energy Directorate (Norges vassdrags- og energidirektorat, NVE) and the Financial Supervision Authority of Norway (Finanstilsynet).

The Swedish Competition Authority (Konkurrensverket) is the authority that monitors whether companies in the Swedish electricity market follow the bans of non-competitive agreements and abuse of a dominant position set out in the Treaty on the Functioning of the European Union (TFEU) and the Swedish Competition Act. The Swedish Competition Act also contains prohibitions on non-competitive public sales operations. The Swedish Competition Authority can actively intervene on its own initiative, or following company or public reports against anticompetitive practices. The Swedish Competition Act also includes regulations on controlling the market concentration. The Swedish Competition Authority suggest changes in regulations which aim to eliminate existing barriers to market competition.

Supervision of the Swedish markets in accordance with REMIT

In 2011 the new regulation on wholesale energy market integrity and transparency (REMIT)[61] came into force. The regulations facilitate coherent supervision of the increasingly integrated European electricity and gas markets. As a result of this, Ei's responsibilities and its ongoing surveillance work of the Swedish markets have increased. Also, Ei applies a daily market monitoring procedure.

All trading in wholesale energy products must be reported to ACER. Reporting of the first phase began 7th of October 2015. This concerns contracts traded on organised marketplaces, and is mainly to be reported by the marketplace where

[61]The full name of the regulation is Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency.

the trade takes place. Reporting of the second phase began on 7th of April 2016 and concerns non-standardised contracts. All trading that occurs on the electricity and gas exchanges must be reported to ACER as well. This allows Ei to examine transaction data for both physical and financial trading in wholesale energy products. The surveillance is financed by means of a fee that Ei charges from the registered market participants. Exactly what types of contract are to be reported, and how this is to be done, is regulated in the implementing acts[62].

The exchanges' regulations and market surveillance

All members of Nord Pool and Nasdaq Commodities must follow specific trading regulations on either exchange. These regulations particularly concern the handling of price-sensitive information, also known as inside information, and price manipulation. Both Nord Pool and Nasdaq Commodities have internal departments for market surveillance where trade is monitored continuously.[63]The market surveillance departments on Nord Pool and Nasdaq Commodities are important, as they are to report any regulation breaches to Ei's market monitoring function.

Measures to minimise the risks in joint ownership of nuclear power

The Swedish Competition Authority has in various contexts drawn attention to the general risks of joint ownership of electric power generation resources, and the government has taken initiatives to resolve this issue. Following a proposal from Ei, the owners of nuclear power stations have adopted industry-wide ethical rules on information exchange between companies. Furthermore, independent observers hold posts on the nuclear power companies' boards and are working with monitoring the application of the industry's ethical rules. Ei nominates these observers and publishes reports each year from each of the companies, including any comments from the observers.[64]

Commission guidelines and network regulations for electricity

In its 2016 appropriation, Ei was assigned with looking at the need for complementary national legislation in connection with the commission guidelines and network regulations adopted by the European Commission. Ei was also instructed to look at whether the division of responsibilities between Swedish governmental agencies involved with energy inquiries needs to be adapted according to EU regulations.

Commission Implementing Regulation (EU) No 1348/2014 of 17th December 2014 on data reporting implementing Article 8(2) and Article 8(6) of Regulation (EU) No 1227/2011 of the European Parliament and of the Council on wholesale energy market integrity and transparency.

[63]Under Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25th October 2011 on wholesale energy market integrity and transparency.

[64]Forsmarks kraftgrupp AB:http://ei.se/Documents/Publikationer/arsrapporter/karnkraftforetag/2015/Arsrapport_Code_of_Conduct_Forsmarks_Krafgrupp_AB_2015.pdf
Ringhals AB:
http://ei.se/Documents/Publikationer/arsrapporter/karnkraftforetag/2015/Arsrapport_Code_of_Conduct_Ringhals_AB_2015.pdf
OKG Aktiebolag:
http://ei.se/Documents/Publikationer/arsrapporter/karnkraftforetag/2015/Arsrapport_Code_of_Conduct_2015_Oskarshamn_AB.pdf

In the report, *Kommissionriktlinjer och nätföreskrifter för el - översyn av ansvarsfördelning och behov av kompletterande nationell lagstiftning*[65](Commission guidelines and network regulations for electricity - a review of the division of responsibilities and the need for complementary national legislation), Ei proposes a number of legislation amendments, including some relating to the division of responsibilities between Ei and Svenska Kraftnät. Ei presented to the commission to the government in December 2016.

some relating to the division of responsibilities between Ei and Svenska Kraftnät. Ei presented to the commission to the government in December 2016.

[65]Ei R2016:13

1.5 Security of supply - electricity

Overall, the security of supply in the Swedish electricity system is good. Manual disconnection of certain electricity users, which is in line with Svenska Kraftnät's statutory instruction to do if there is no other way of achieving a balance between input and output in the electricity system, has never been needed.

1.5.1 Monitoring the balance between supply and demand

The largest addition from renewable power

In Sweden, investments in new electricity production capacity occur mainly on market-driven basis. No permission is required from Ei in order to build a new electricity production facility in Sweden. However, permits are required under both the Swedish Environmental Code[66] and the Planning and Building Act[67].

Renewable energy sources such as hydro-electric and wind power constitute more than 60 percent of the total installed capacity. These types of power also made up the biggest increase in the installed capacity compared to previous year. The largest decline was for capacity linked to fossil power.

Table 8 shows the generation capacity, divided by production type.

Table 8. Generation capacity of Sweden's power stations, by type, at 31 Dec 2016, MW

	2011	2012	2013	2014	2015	2016[68]
Nuclear	9,363	9,363	9,531	9,528	9,714	8,890
Fossil	4,793	4,636	4,635	4,866	4,501	4,501
Renewables	22,307	23,354	24,107	25,155	25,736	26,129
- Hydro	16,197	16,203	16,150	16,155	16,184	16,184
- Biofuel	2,870	3,036	3,080	3,082	2,978	2,978
- Wind	2,899	3,745	4,470	5,420	6,029	6,422
- Waste	325	346	364	419	441	441
- Solar	16	24	43	79	104	104
Total	36,463	37,353	38,273	39,549	39,951	39,520

Source, comparison figures (2011-2015): Swedenergy

[66] Swedish Environmental Code (1998:808)

[67] The Planning and Building Act (2010:900)

[68] **Data for "Nuclear" taken from Entsog's transparency platform (data from September 2016). The source for "Wind" is the Swedish Energy Agency. Data for "Fossil", "Hydro", "Biofuel", "Waste" and "Solar" are estimates.**

1.5.2 Monitoring of investments in production capacity related to security of supply

Plans for extensive reinforcement of the Swedish transmission network

The Swedish transmission network is currently undergoing significant expansion. The network is being reinforced to allow for new electricity production, to further market integration with the surrounding world and to contribute to the creation of a common European electricity market. At the same time there is a considerable need for reinvestment.

One of the biggest ongoing projects to increase capacity and security of supply in the Nordic power system is the South West Link. The aim of this power line is to reduce the existing congestion between central and southern Sweden. The South West Link is being built in two parts that will cross near Jönköping. From the junction one link extends south to Skåne, while the other extends north to Hallsberg. The entire link is estimated to be fully operational early 2018, and will increase transmission capacity between central and southern Sweden by up to 25 percent.

In addition to the South West Link, several other projects are ongoing to reinforce the electricity networks in the regions surrounding Sweden's major cities as well as the transmission capacity between the Swedish bidding areas. One such project is Svenska Kraftnät's planned line between Skogssäter (Trollhättan) and Stenkullen (Lerum), which will help secure the electricity supply in Västra Götaland.

1.5.3 Measures to manage demand peaks or supply shortages

Svenska Kraftnät is responsible for ensuring that a strategic capacity reserve is available during the winter.[69]Svenska Kraftnät secures this capacity reserve by entering into contracts with electricity producers and consumers, under which they secure a certain production level, or reductions in consumption, available to Svenska Kraftnät.

The capacity reserve has been extended until March 15th, 2025. The government submitted a proposition[70] about this to the parliament in February 2016, and the parliament adopted the proposal on May 12th, 2016.

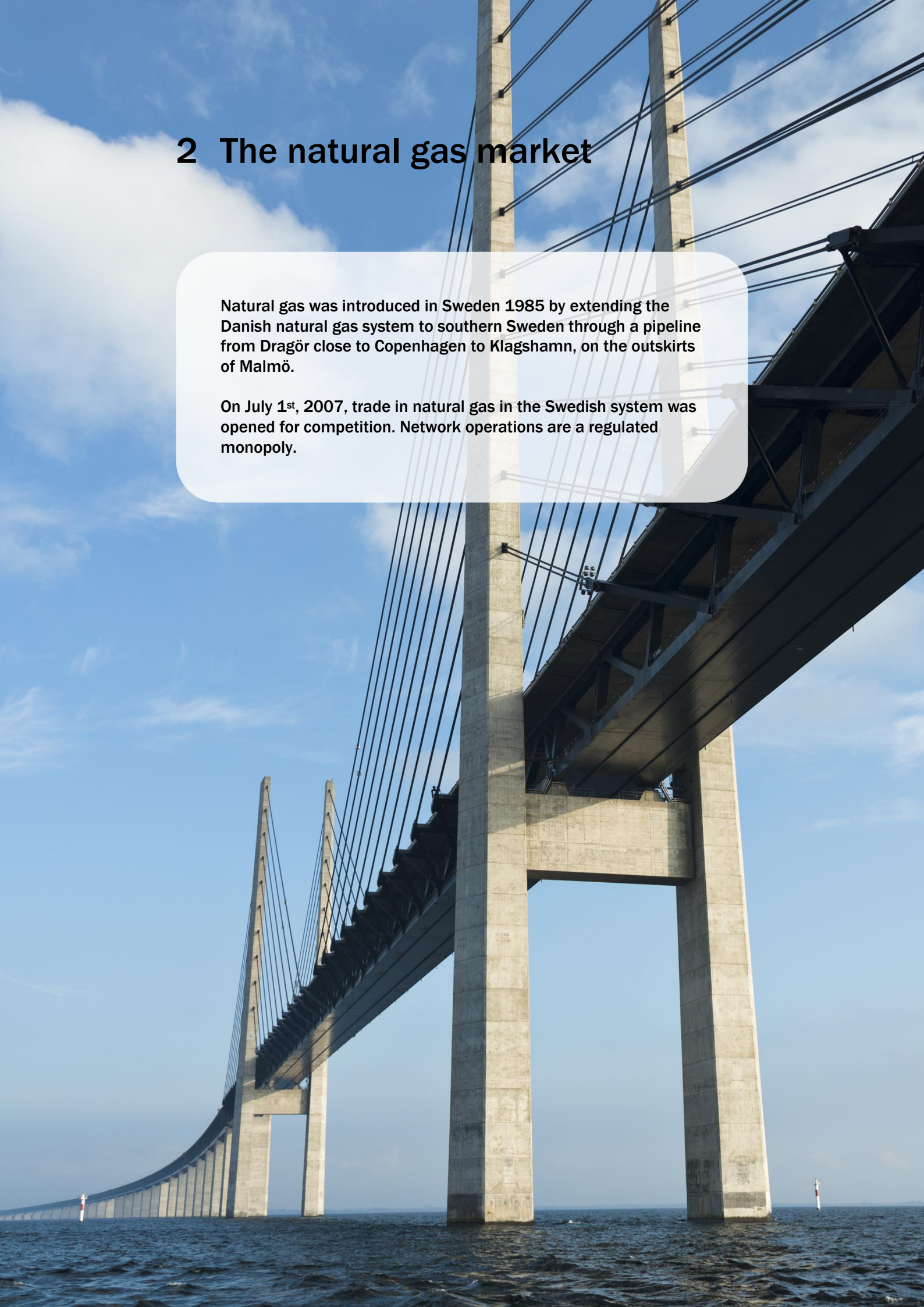
Under the government proposition, the capacity reserve must be made up of both production and consumption reductions. Environmental considerations must be made in the procurement of production resources. Activation of the production element of the capacity reserve is done by Svenska Kraftnät, while the owners of consumption reductions are free to trade their resources on Nord Pool.

[69] Under the Capacity Reserve Act (2003:436)
[70] Government bill 2015/2016:117 Capacity reserve 2020-2025

2 The natural gas market

Natural gas was introduced in Sweden 1985 by extending the Danish natural gas system to southern Sweden through a pipeline from Dragör close to Copenhagen to Klagshamn, on the outskirts of Malmö.

On July 1st, 2007, trade in natural gas in the Swedish system was opened for competition. Network operations are a regulated monopoly.



2.1 The gas network

Natural gas was introduced in Sweden 1985. The Western Sweden natural gas network consists of about 600 km of transmission pipeline and about 3000 km of distribution pipes. The natural gas network is divided into four operational areas: transmission, distribution, gasification and storage. The gas is transported long distances under high pressure in transmission pipelines. Pressure reduction is then carried out in metering and regulation stations before the gas is piped to consumers through the local distribution network.

The Western Sweden natural gas network is small in comparison with most other natural gas networks in Europe. The network extends from Trelleborg in the south to Stenungsund in the north and also branches off east towards Jönköping. Of Sweden's 290 municipalities, around 30 have access to natural gas. The gas arrives in Sweden via a pipeline from Dragör in Denmark.

The Western Sweden natural gas network consists of several different network types. In line with the terminology used for the major continental natural gas networks, the largest pipelines transporting gas under high pressure are called transmission pipelines. These pipelines have the capacity to transmit very large quantities of gas. In Sweden, the transmission network is owned and operated by Swedegas, which is also responsible for managing the system balance. A few very large users are connected directly to the transmission network.

There is also a town and vehicle gas network in the Stockholm area owned by Gasnätet Stockholm AB, which is responsible for development, operation and maintenance of the network. The city and vehicle gas networks comprise about 500 km and 40 km of pipelines, respectively. The town gas network covers large parts of central Stockholm as well as Solna and Sundbyberg. Production and input of gas to the town gas network is mainly done from a gasification plant in Stockholm, to which both biogas and LNG (liquefied natural gas) are delivered. The plant vaporises LNG into natural gas, which is then mixed with air in order to fit the devices used in the town gas network. Distribution occurs through pipelines, which are pressurised at special stations across the city.
The 40 km long vehicle gas network links biogas suppliers' gas production facilities in Stockholm with bus depots for bus refuelling and filling stations for vehicle gas.

There is also a number of small local gas networks in different parts of Sweden. Many of the small local networks are used principally to carry biogas of the vehicle gas type from production facilities to filling stations.

Neither the gas network in Stockholm nor the small local gas networks are connected to any transmission network. The networks covered by the Natural Gas Act are the network for western Sweden and the Stockholm gas network. In the Natural Gas Act, 'natural gas' refers to biogas as well, to the extent that it is technically feasible to use in natural gas systems.

Figure 22. Transmission pipelines in the West Sweden natural gas network

Source: Ei

Biogas in the natural gas network

The natural gas and biogas markets in Sweden are integrated to some extent, as the natural gas network can be used for distributing biogas. In most cases, biogas that is upgraded to natural gas quality can be included in the natural gas network without any technical consequences for natural gas users. Where problems do arise, these are normally because the chemical composition does not correspond to traditional natural gas. There are currently nine biogas producers connected to the west Sweden natural gas system, where two of the producers have connections that allow for input into the transmission network. Two biogas producers are connected to Gasnätet Stockhom AB's network as well.

In order to facilitate the co-distribution of natural gas and biogas in the same network, new tax regulations for co-distribution were introduced in 2011. In brief, the new rules meant that the contractual delivery was separated from the physical delivery. Under the previous regulations, all customers in the same network received the same quantity of biogas regardless of contract. With the amended regulations, the tax assessment is based on the contractual deliveries. This has enabled biogas producers to enter an agreement with a user to deliver one hundred percent biogas, even if the user in practice receives a mixture of biogas and natural gas. The concept is similar to the electricity market's system of electricity disclosure, whereby electricity users can buy wind-generated electricity regardless of where in the network they are located.

2.1.1 Functional distinction of natural gas companies

In order to prevent cross-subsidisation between companies operating different types of natural gas activities, functional distinction of companies is required.

This means that companies operating within the transmission, gasification and storage of natural gas are not allowed to trade. For a company that were previously involved in both trade and transmission for example, the unbundling regulation means that it has to be divided into two separate entities. Board members, managing directors or authorised signatories in a company that owns natural gas pipelines in a Swedish natural gas system may not occupy any of these posts in a company that trades in natural gas. However, there is no statutory requirement in Sweden that a gas network company may not be part of a group of companies that also conducts production of or trade in natural gas.

Under the Swedish Natural Gas Act, all companies involved in the in the transmission, storage or gasification of natural gas must establish a supervision plan and publish an annual report that gives an account of the measures they have implemented. The purpose of the supervision plan is to ensure that the companies act disinterestedly and do not unfairly favour any particular stakeholder in the market. The supervision plan must specify what measures the company is going to implement in order to prevent discriminatory behaviour towards other stakeholders in the market.

Certification of transmission system operators

Under the EU's Internal Market in Natural Gas directive[71], transmission system operators[72] must be certified. Ei made the decision to certify Swedegas AB as transmission system operator in July 2012. Ei may review a certification the decision if the system operator does not live up to the certification requirements. At the same time as Swedegas received certification, Svenska Kraftnät was also certified as transmission system operator.

Between 2010 and 2015, Swedegas was owned by EQT, a venture capital company. A change of ownership was announced in the spring of 2015, with Spanish Enágas and Belgian Fluxys becoming the new owners. The new owners are already transmission network operators in Spain, Belgium, Germany and Switzerland, among other countries.

2.1.2 The technical functioning of the natural gas network

Balancing of natural gas

As transmission network operator, Swedegas owns the West Sweden natural gas network and is responsible for its operation and maintenance. The role is comparable to that of Svenska Kraftnät in the electricity market, as they both own the pipeline network and are responsible for short-term balancing of the input and output of gas. On the June 1st, 2013, the government appointed Swedegas as the system balance authority for the West Sweden natural gas network, a role previously held by Svenska Kraftnät.

In order to guarantee balancing, Swedegas enters balancing contracts with operators in the gas market, known as balancing operators. The balancing operators take financial responsibility for ensuring that the customers'

[71] Directive 2009/73/EC of the European Parliament and of the Council of July 13th, 2009, concerning common rules for the internal market in natural gas. Article 10.
[72] The term 'transmission system operator' is synonymous with national grid operator and transmission network operator.

consumption is matched by supply. The West Sweden natural gas network provides ample possibilities storing gas in the pipelines (known as line pack) which facilitates balancing. Short-term imbalances can make up as much as 25 percent of consumption on a typical day in winter without jeopardising the network's technical function.

The system balancing operator may not enter contracts with individual gas balancing operators without approval by Ei of the contract's terms and conditions.

Quality control of the natural gas network

The gas network companies are responsible for ensuring that operation and maintenance of their facilities are secure, reliable and efficient so that they meet reasonable long-term requirements regarding transmission, storage and gasification of gas.

The West Sweden natural gas network is primarily made up of steel pipelines. The system's functions are regularly checked, and defective or worn out equipment are replaced. Operators estimate pipelines' life span to be 40 years at a minimum, while some equipment for monitoring, control and regulation has an expected life span of between 5 and 20 years.

The pipes in the transmission network are approved for a pressure of 80 bar, and Swedegas has set the minimum operating pressure at 45 bar. The transmission pipelines carry the natural gas to the distribution networks. These are connected to the transmission network by a regulation and gauging station. The regulation and gauging station measures the gas flow and reduces the pressure. The distribution networks transport the gas from the transmission network mainly to smaller industries, and further on to regulation stations which reduce the pressure before the gas is distributed to the consumers.

Distribution pipes are primarily made of polyethylene plastic. Steel pipes are used in certain cases, for customers who require a gas pressure greater than 4 bar. Guidelines for the design, operation, care, maintenance etc. of distribution networks for a maximum operating pressure of 4 bar are coordinated in the energy gas standards drawn up by the Swedish Gas Association.

The network owner collects metering values from border, output and input points. The metering values are then reported to the gas supplier, balance operator and system balancing operator. The metering values then form the basis for the settlement of input and output quantities of energy.

Billing for gas is based on the delivered energy. To calculate the energy amount the volume of gas, measured in m^3 is multiplied by the energy content per unit volume of gas, measured in kWh/m^3. Energy content per unit volume is usually called calorific value, and in the Swedish system, one calorific value is used for the entire system. The calorific value can be specified either as an upper or a lower calorific value depending on whether the combustion products (flue gases) had been cooled to the same temperature as the gas before combustion began. Thus, for a facility that has equipment capable of utilising the energy of the flue gases, the energy content of the gas per volume unit is higher.

Connecting to a natural gas pipeline

The owner of a natural gas pipeline is obliged, on reasonable terms, to connect it to natural gas pipelines, storage facilities and gasification facilities owned by others. When requested to make a connection, the owner of the pipeline must, within a reasonable time, provide written information about the fee and other terms and conditions for the connection. This responsibility does not apply if the pipeline lacks the necessary capacity.

Connecting to a storage and a gasification facility

The owner of a facility or pipeline for storage of natural gas, or of a gasification facility connected to the Swedish natural gas system must accept, on reasonable terms, natural gas owned by another party for storage or gasification. When requested to accept the input of gas, an owner of a storage or gasification facility must, within a reasonable time, provide written information about the fee and other terms and conditions for the input. This responsibility does not apply if the facility lacks the necessary capacity.

Examination of terms for connecting to a natural gas facility

Methods for establish agreements on connections to various types of natural gas facilities must be approved by Ei before being applied. The terms specified in the connection agreements must also be approved before they are implemented by the owners of the natural gas facilities.

2.1.3 Network charges for connection and transmission

Reviews of gas network charges

Ei supervises the gas network companies and must approve the methods the companies use to calculate their network charges. The supervision of network companies' tariffs includes companies that are connected to the Swedish natural gas system under the provisions of the Swedish Natural Gas Act. Until the end of 2014, these reviews were made retrospectively, but since January 2015 the revenues of network companies are regulated just as they are in the electricity market. This means that revenue is regulated before the revenue cap, and extends over a four-year period. This sets an upper limit for the total revenue that network companies may have for their natural gas operations.

In determining the charges for the transmission of natural gas, companies must consider the number of connected customers, their geographical location, and the quantity of transmitted energy, the contract costs of overlying pipelines, continuity of supply and the pressure in the pipes. As a consequence of the Internal Market in Natural Gas directive[73]a change came into force in 2012, which meant that Ei's supervision under the Swedish Natural Gas Act applies to tariffs for access to gasification plants. Access tariffs may not be applied before Ei has approved the methods used to calculate the tariffs.

[73] Article 41.6 a.

Ei's supervision of the methods determining tariffs is intended to ensure that the tariffs are objective and non-discriminatory, as laid down in the Swedish Natural Gas Act. Ei's supervisory decisions may be appealed within three weeks by the affected party. Appeals are considered by the administrative courts.

In June 2014, ahead of the first revenue cap period (2015-2018), the companies applied for revenue caps totalling SEK 7.3 billion. In October 2014, Ei decided to set revenue caps at a total of approximately SEK 6 billion. Four out of nine natural gas operators appealed Ei's decision to the Administrative Court in Linköping. The Administrative Court issued its rulings in February 2016. The court mainly supported Ei's decision regarding companies' revenues. However, the court ruled against Ei regarding depreciation periods and some aspects of the discount rate. Ei believes that the revenue caps are at a level that allows the companies to overcharge their customers. Both Ei and the companies appealed the judgements to the Administrative Court of Appeal in Jönköping later in 2016. In December 2016 the Administrative Court of Appeal issued its decision to reject Ei's request that a specialised economist be consulted in the matter.

Under the Swedish Natural Gas Act, gas network companies are required to prepare separate financial accounts for their transmission, distribution, storage and gasification operations, in the form of an annual report. This annual report must be submitted to Ei no later than seven months after the end of the fiscal year and must include complete income statements and balance sheets for each reporting unit. The annual report forms the basis of further supervision.

Regulated access to storage and gasification facilities

Parties who own storage facilities or have the capacity to store natural gas in pipelines are obliged to store natural gas on behalf of other parties, on reasonable terms. Parties who own gasification facilities are likewise obliged to distribute natural gas through natural gas pipelines. These obligations are void if the facilities or pipelines lack the required storage capacity.

2.1.4 Cross-border issues

Ei participates in cross-border cooperation with several international bodies. Despite being no formal cooperation with the other Nordic regulators regarding the gas sector, there is a continuous dialogue with the Danish supervising authority on how the common market can be developed and how security of supply can be improved. Furthermore, Ei cooperates with European supervising authorities in Germany, the Netherlands, Belgium, Luxembourg, France, Spain, the United Kingdom and Ireland.

Cooperation is intended to facilitate swift incorporation of European legislation. Via the cooperative body ACER and other channels, Ei has contributed to the production of framework guidelines for establish European regulations for the internal market in natural gas, and submitted comments on network codes to ENTSOG[74].

[74] European Network of Transmission System Operators for Gas

In 2016, Ei provided information to ACER about the Swedish balancing model, in connection with ACER's production of a report on member states' implementation of the balancing code.[75]

Projects of common interest

See section 1.1.4 for an introduction to projects of common interest (PCI).

The LNG terminal[76] in the Port of Gothenburg is currently the only PCI project for gas in Sweden. The terminal is expected to be completed and in operation in 2017-2018 and will primarily facilitate shipping, industry and heavy land transports by providing these with easier access to natural gas. The terminal's total capacity will be about 30,000 m^3. In the long term it will also be possible to use the terminal to distribute gas through the West Sweden natural gas network.

2.1.5 Compliance with the Swedish Natural Gas Act

Ei is the supervisory authority under the Swedish Natural Gas Act[77] and ensures compliance with the Act. Also, Ei monitors compliance with the regulation[78] on conditions for access to the natural gas networks. Ei's are instructed to fulfil its tasks, within its responsibilities, that follow from the Internal Market in Natural Gas directive[79].

Under the Internal Market in Electricity Directive, national supervisory authorities are to follow and implement the legally binding and relevant decisions taken by ACER and the European Commission. No specific legislation is required in order for this to apply in Sweden as the provision is of advisory nature. There is a requirement from other EU regulations what decisions are binding and relevant. To allow for Ei to abide by the Commission's decisions, provisions have been introduced to the Swedish Natural Gas Act[80] and in the Act on the Certification of Certain Natural Gas Companies[81]. These provisions mean that when Ei makes decisions that are affected by Article 43 of the Internal Market in Natural Gas directive, it must state that these decisions may be altered or annulled at the request of the European Commission.

Under the Swedish Natural Gas Act[82], Ei may issue such injunctions as are necessary to ensure compliance with the regulations and conditions within the scope of its supervision. Such injunctions may be associated with fines. The Act[83] also specifies that Ei is entitled to request and receive such information, and peruse

[75]http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Report%20on%20the%20implementation%20of%20the%20Balancing%20Network%20Code.pdf
[76]An LNG terminal is a facility for the reception and distribution of natural gas in liquid form, often transported by ship, truck or train. LNG terminals can also be connected to the natural gas networks.
[77] Swedish Natural Gas Act (2005:403), Ch. 1, Section 9.
[78]Regulation (EC) No 715/2009 of the European Parliament and of the Council of July 13th, 2009, on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005.
[79] Directive 2009/73/EC of the European Parliament and of the Council of July 13th, 2009, concerning common rules for the internal market in natural gas and repealing Directive 2003/53/EC.
[80] 2005:403, Ch. 10, Section 1 a
[81] Act on the Certification of Certain Natural Gas Companies (2011:711), Ch. 3, Section 4, and Ch. 4, Section 3.
[82] 2005:403, Ch. 10, Section 3.
[83] 2005:403, Ch. 10, Section 2.

such documents as it needs in order to carry out supervision. The supervisory authority may also issue injunctions that are necessary to ensure compliance with the regulations and conditions within the scope of its supervision.

2.2 The wholesale market for natural gas

Natural gas covers about 2 percent of Sweden's total energy needs, making it a relatively small source of energy. However, in municipalities where the natural gas network is well developed, it represents approximately 20 percent of final energy use, which is in line with the rest of Europe. The Swedish natural gas market is closely linked to the Danish market.

2.2.1 Surveillance of price trends, transparency and competition

Sweden does not produce any natural gas of its own; instead the supply comes from Denmark by a pipeline below the sea bed in Öresund (Dragör). The natural gas consumed in Sweden mainly comes from the Danish gas fields in the North Sea.

Due to the design of its network, the Swedish natural gas market is closely linked to the Danish market. The balancing operators in the Swedish natural gas system are active on the Danish gas market as well, particularly on the Gaspoint Nordic exchange, which since November 24th, 2016, is part of the pan-European gas exchange, PEGAS. Hence, [84]Competition, pricing and transparency in the market are largely dependent on developments in Denmark.

There is capacity to transport 22 TWh of natural gas annually in the existing transmission pipeline between Malmö and Göteborg. By using compressors to raise the operating pressure, this capacity can be increased to over 30 TWh/year.

Table 9. Transmission of natural gas, 2016[85]

	Total energy use (TWh)	Production	Import capacity, total (TWh)
2007	11.8	0	15
2008	10.3	0	15
2009	13.9	0	15
2010	18.7	0	22
2011	15.0	0	22
2012	12.9	0	22
2013	12.3	0	22
2014	10.4	0	22
2015	10.4	0	22
2016	10.6	0	22

Source: Swedegas

In Sweden, natural gas is primarily used by industries and combined heat and power plants, while only a few percent is used by households. There is a strong correlation between the weather, especially during the winter months, and natural gas consumption in Sweden. Natural gas consumption grew very marginally compared with 2014 and 2015, even though the annual mean temperature in 2016 was lower and the weather in January was unusually cold.

[84]http://www.gaspointnordic.com/1-news/successful-launch-of-danish-etf-contracts
[85]Expressed as gross calorific value.

Trade in natural gas

All trading on Gaspoint Nordic is done with physical delivery and operators must have an agreement with the Danish transmission network operator, Energinet.dk. On Gaspoint Nordic, an operator can buy gas for delivery the same day, for the day ahead, for the weekend and for the month ahead. Energinet.dk uses Gaspoint Nordic's intraday trading to manage balancing of the Danish natural gas network.

The price on Gaspoint Nordic is set according to supply and demand and also forms the basis for the so-called balancing base price used by Energinet.dk to offset imbalances between operators. Around twenty operators were active on Gaspoint Nordic during 2016.

Gaspoint Nordic's price index will be removed in 2017 and be replaced by a new index.

An operator needs to reserve capacity in the Dragör pipeline in order to transport natural gas to Sweden. Transmission capacity is auctioned at Energinet.dk's ordinary capacity auctions. Because of the low consumption in relation to the system's transmission capacity, there is no risk of transmission congestion with today's levels of consumption. Once in Sweden, the gas is sold to users such as industries and gas distributors. In the current situation (as of October 1st, 2016), there are five Swedish balancing operators that have agreements with transport operators in the Danish market and can reserve capacity from Energinet.dk.

2.3 The retail market

The final step in opening the natural gas retail market to competition was taken in July 2007, and all natural gas consumers have been free to use the natural gas supplier of their choice since.

In the West Sweden natural gas network, there are around 36,000 natural gas consumers, of which 34,500 are household customers and the rest are business customers. Stockholm's gas network has around 63,200 household customers and about 900 business customers, including 10 industries.

2.3.1 Monitoring of price trends, transparency and market competition

A small market

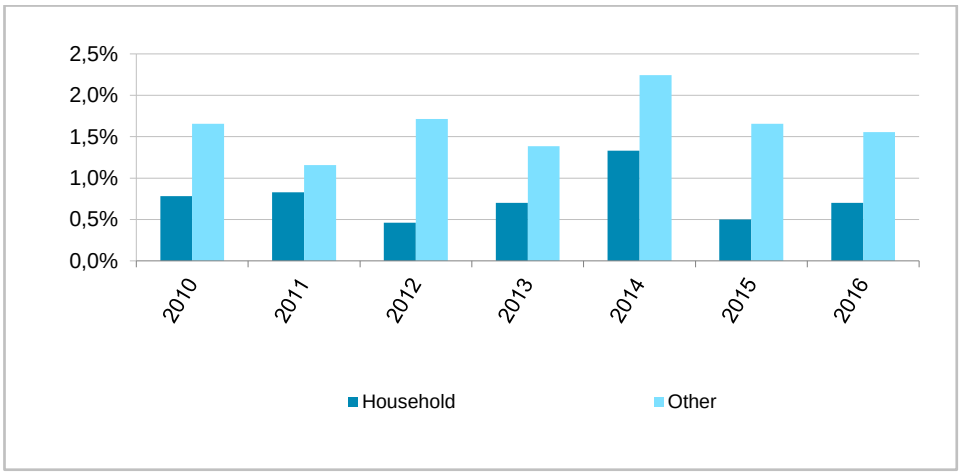
The west Sweden natural gas network has approximately 36,000 customers, of which the biggest are major industries and cogeneration power plants, while around 34,500 are household customers[86]. Stockholm's city and vehicle gas network has around 63,200 household customers and about 900 business customers, including 10 industries[87].

At the end of 2016 there were seven suppliers[88] in the Swedish retail market for natural gas, of which six in the West Sweden network and one in Stockholm's city and vehicle gas network.

Low consumer mobility in the natural gas market

In 2016, consumers switched suppliers in the Swedish natural gas market on 336 occasions, where 227 of these were made by household customers and 109 by companies. This corresponds to an average switching rate of 0.7 percent for household customers and of 1.6 percent for business customers, see Figure 23.

Figure 23. Customers changing natural gas suppliers, percent



Source: Statistics Sweden

[86]Source: Swedish Gas Association, www.energigas.se

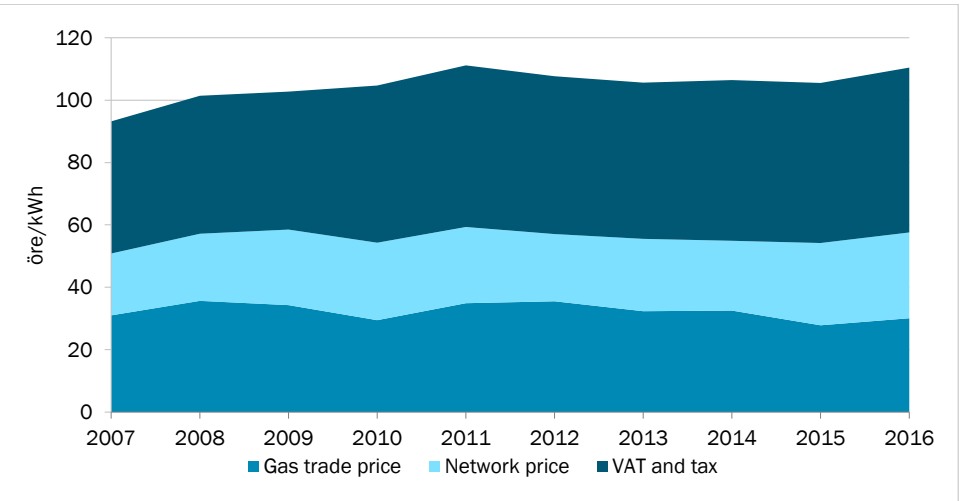
[87]Source: Gasnätet Stockholm AB, www.gasnatetstockholm.se

[88]ApportGas, E.ON Försäljning Sverige AB, Göteborg Energi, Kraftringen Energi AB, Varberg Energi, Öresundskraft, Stockholm Gas Handel

Tax and VAT represent the greater part of the total cost of natural gas

Consumers' total cost for gas has changed relatively little since the deregulation in 2007. The reason for this is that the gas trade price has remained relatively stable around 30-35 öre per KWh. Network charges have also remained relatively stable at approximately 20-27 öre per KWh. However, taxes on natural gas have increased by around 10 öre since 2007, see Figure 24.

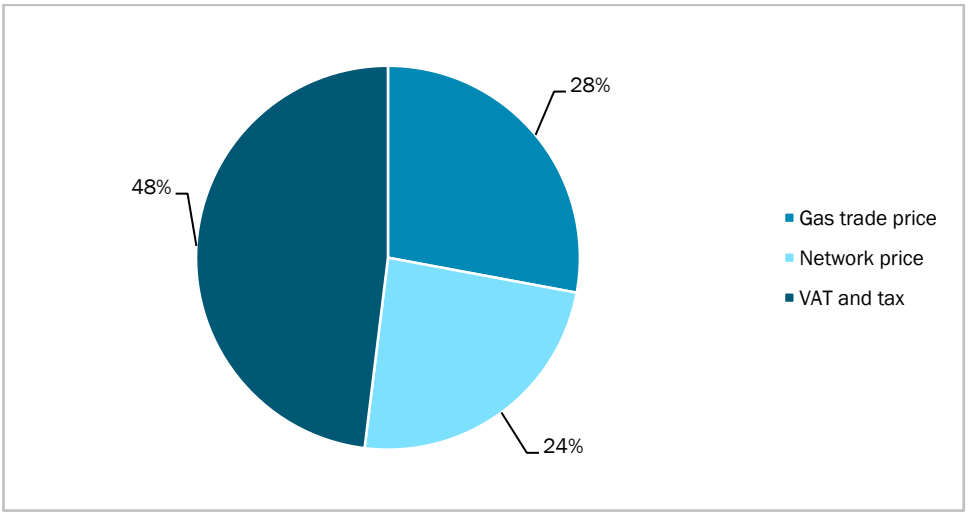
Figure 24. Change in the cost components of the gas price for households with gas heating, in real terms[89]



Source: Statistics Sweden

The single biggest cost component, at 48 percent of household customers' total gas costs, is made up of VAT and energy tax, see Figure 25.

Figure 25. Share of total gas cost[90]



Source: Statistics Sweden

[89]Prices for household customers who consume between 5,500 and 55,000 kWh/year (heating and household gas)

[90]Prices for household customers who consume between 5,500 and 55,000 kWh/year (heating and household gas)

Easy to compare prices of natural gas for households

Since 2014, the Swedish Consumer Energy Markets Bureau (Konsumenternas energimarknadsbyrå) runs Gaspriskollen.se, a website where household customers can compare natural gas prices from all natural gas suppliers in Sweden. The website also has information on how to switch gas supplier and information on the various cost components of the gas price.

2.4 Recommendations for natural gas prices and for studies and measures to promote competition

Ei cooperates with other government agencies in supervising the natural gas market to create a well-functioning natural gas market.

2.4.1 Ei monitors the natural gas market

Ei's monitors and analyses developments in the natural gas market, as well as proposing changes to regulations in order to improve the functioning of the market. The also includes working to promote effective competition in the natural gas market.

Increased transparency in the gas market

In 2015 the government commissioned Ei to monitor the EU's work regarding gas quality, and to propose technical regulations. One part of the commission involved monitoring the ongoing work in the EU concerning gas quality. The other part of the commission involved proposing regulations to achieve greater transparency for disclosure of technical regulations when connecting gas facilities from renewable energy sources[91].

The result of the commission is presented in the report *Villkor för biogas i naturgasnätet* (Conditions for biogas in the natural gas network)[92]. In the report Ei proposes a number of amendments to the Swedish Natural Gas Act in order to increase transparency for gas market operators. These proposals were a consequence of new regulatory frameworks for natural gas in the EU.

Current regulation does not affect the conditions for biogas

The government also commissioned Ei to investigate how the introduction of pre-regulation with revenue caps under the Swedish Natural Gas Act has affected the Swedish biogas market. The commission involved analysing how conditions for biogas, connected to or co-distributed with natural gas in a natural gas network, developed as a result of the new supervisory model, with revenue cap regulation, introduced for the natural gas sector.

This commission was also presented in the report *Villkor för biogas i naturgasnätet* (Conditions for biogas in the natural gas network)[93], in which Ei's assessment is that current regulation with revenue caps is not a decisive factor for biogas producers' conditions in the Swedish gas market, and have no effect on the establishment of biogas production.

Evaluation of the transfer of system balance responsibility

In 2014 the government commissioned Ei to evaluate how the transfer of responsibility from Svenska Kraftnät to Swedegas had affected the functioning of the gas market and to propose appropriate changes to settlement regulations where necessary. The commission was completed in October 2015. In the

[91]Article 16, paragraph 10 of the Directive 2009/28/EC91 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources.
[92]Ei R2016:06
[93]Ei R2016:06

commission report, *Utvärdering av systembalansansvaret på gasmarknaden* (Evaluation of the system balance responsibility in the gas market)[94], Ei reviews the reform of transferring system balance responsibility from Svenska Kraftnät to Swedegas, and notes that the reform mainly had a good outcome. Ei does not believe that there is a need for additional regulations on settlement under the authorisation provided by the Swedish Natural Gas Act at the moment.

Implementation of the balancing regulation

On April 1st, 2015, Ei decided[95] to grant the request by Swedegas to apply interim balancing measures. Ei also stipulated that Swedegas submit a report update to Ei every year until 2019, when the balancing regulation[96]is fully implemented.

Joint balancing zone between Sweden and Denmark

In 2016, Swedegas initiated a preliminary study together with Energinet.dk, the Danish transmission operator, of the implementation of a joint balancing zone between Sweden and Denmark. This preliminary study led to a decision to continue with the project, and a definitive decision on implementing a joint balancing zone between Sweden and Denmark is expected during 2017. A joint balancing zone could attract more operators to the gas market, contributing to increased competition.

2.4.2 Potentially increased competition in the natural gas market as a result of new LNG terminals

One problem faced by the Swedish market has been the lack of alternatives to the Dragör pipeline for the supply of natural gas. With the construction of the new LNG terminal in Gothenburg, an opportunity was opened up for the Swedish natural gas network to be supplied from a second point. However, the terminal will not be connected to the natural gas network in the initial phase, and it has not been decided when a connection will occur.

[94]Utvärdering av systembalansansvaret på gasmarknaden - Ei R2015:17

[95]http://www.ei.se/Documents/Publikationer/beslut/Beslut%20Rapport%20om%20interimistiska%20åtgärder%20för%20den%20kortfristiga%20grossitsmarknade%20för%20gas.pdf

[96]Commission Regulation (EU) No 312/2014 of March 26th, 2014, establishing a Network Code on Gas Balancing of Transmission Networks.

2.5 Security of supply - natural gas

Even though security of supply historically has been high, the Swedish natural gas market can be said to be vulnerable both in the short and the long term. The single point of supply, combined with the fact that Sweden does not have any natural gas production of its own, makes the Swedish natural gas market sensitive to external disruptions in the short term, particularly to production stops in the Danish natural gas fields. In a longer term, gas deliveries from Denmark will decrease as their natural gas fields are gradually drained.

2.5.1 Monitoring the balance between supply and demand

The Swedish Energy Agency is the supervisory authority under the Act on a secure supply of natural gas[97]. In accordance with the requirements of the regulation on the security of gas supply[98], a national preventative action plan and a national emergency plan for safeguarding the supply of natural gas were published in 2012. The preventive action plan was updated in 2014 with an updated risk assessment.

2.5.2 Expectations for future demand and delivery, and added capacity

In collaboration with stakeholders in the Gävle region, Swedegas has agreed to examine the possibilities of building a gas network between the Gävle area and Hofors. An initial study was carried out in 2014 to assess the environmental benefit and market potential of such a network. Also in 2014, consultations were held concerning a gas pipeline from Hofors via Sandviken to Gävle. In 2015 additional consultations begun on an alternative pipeline route between Norrsundet and Sandviken, and a terminal for liquid natural gas (LNG) in the port of Norrsundet.

Construction of an LNG terminal is currently in progress in the port of Gothenburg. The first stage is primarily intended to provide LNG for transportion, e.g. fuel for boats and vehicles.

The second stage will include an LNG regasification plant, which will distribute natural gas into the natural gas system. In 2016, Swedegas AB submitted an application for a concession on the LNG plant and the connection to the transmission network.

2.5.3 Measures to manage demand peaks or supply shortages

Peaks in consumption and insufficient deliveries from the system balancing parties are mitigated through the balancing space provided by varying pressure in the transmission network (line-pack). If additional measures are required, the system balancing party uses market mechanisms to manage imbalances, wherever possible. The Swedish Energy Agency may order network owners to limit or cut off supplies of natural gas to their industrial customers. When this is done, the supply to consumers must be secured.

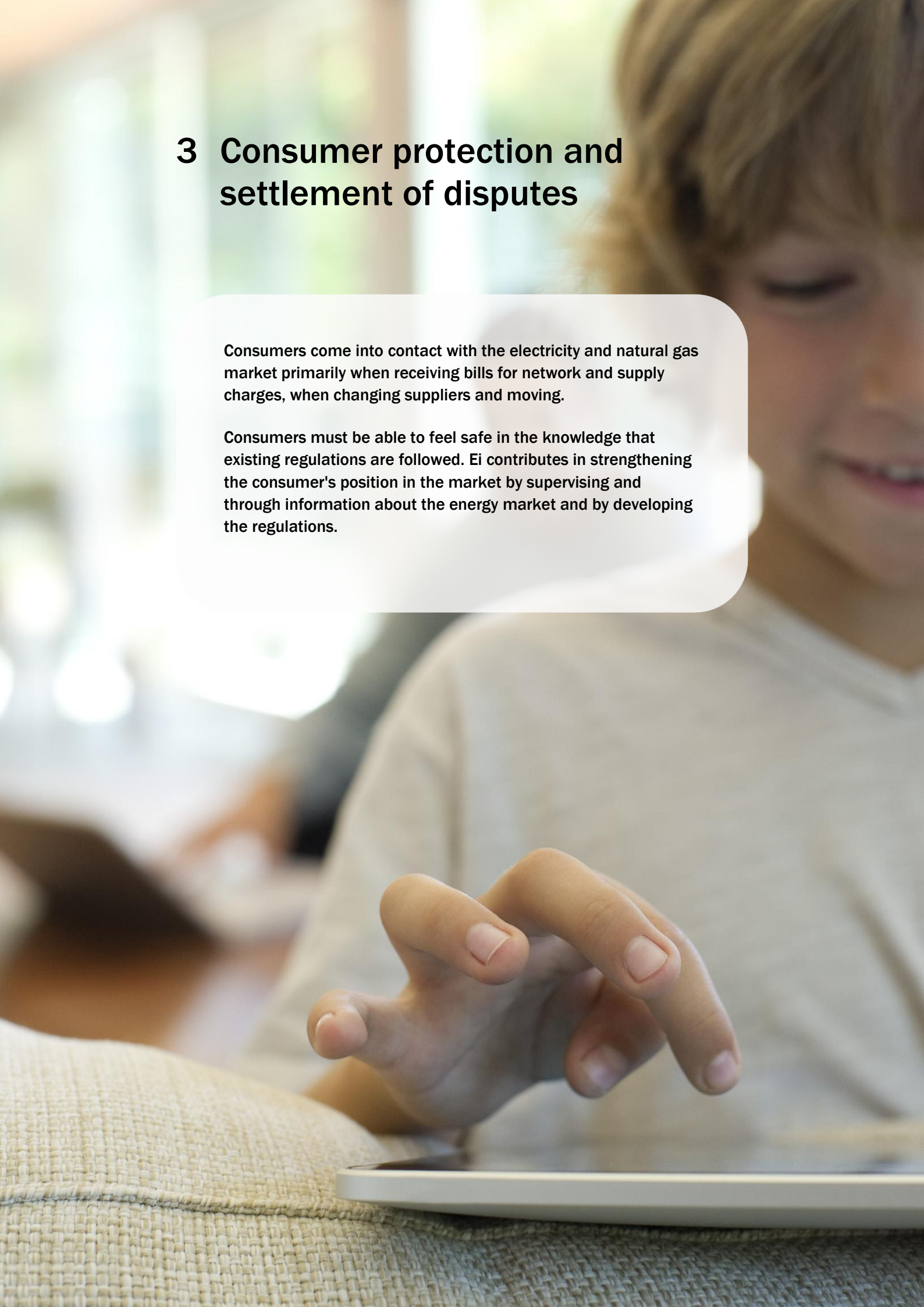
[97]Lag (2012:273) om trygg naturgasförsörjning.
[98]Regulation (EU) No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC.

Implementation of safety measures

Owners of natural gas pipelines, storage or gasification plants must have plans on how to manage the operation and safety of their facilities in an emergency situation.[99] The owners must establish an emergency action plan, and ensure that the plan is distributed throughout their organisation. They must also inform the authorities and other relevant stakeholders of their plans.

[99]Regulations are included in the Swedish Energy Agency's regulations and general advice on company plans and on the obligation to provide information on natural gas supplies, STEMFS 2012:4.

3 Consumer protection and settlement of disputes



Consumers come into contact with the electricity and natural gas market primarily when receiving bills for network and supply charges, when changing suppliers and moving.

Consumers must be able to feel safe in the knowledge that existing regulations are followed. Ei contributes in strengthening the consumer's position in the market by supervising and through information about the energy market and by developing the regulations.

3.1 Consumer protection

As a consequence of EU's third energy package for the internal market in electricity and gas, a number of consumer provisions were implemented in the Swedish Electricity and Natural Gas Acts in 2011. As supervisory authority, Ei has to work together with other relevant government agencies to contribute to the implementation and effectiveness of consumer protection measures.

Ei further has to inform customers in matters such as how to change electricity or natural gas suppliers, the cost of connecting to a network, and how they can report the chosen supplier or

Ei's monitoring of the quality of supply in electricity networks

Since 2010, Ei has access to detailed statistics on power cuts for all electricity network consumers in Sweden. This has enabled monitoring on the sections of the electricity networks that need to be improved. Deficiencies in the quality of supply cause substantial inconvenience for customers and leads to high costs for society. Power cuts cost society around SEK 1 billion every year. Variations in voltage quality can also inflict considerable costs. A reliable electricity supply is crucial for the functioning and development of society.

For this reason, Ei carried out a supervisory review in 2016 that covered continuity of supply, voltage quality and the quality of the reports on power cuts that electricity companies submit annually to Ei. The objective of the review was to verify that the network companies implement measures to promote the quality of supply in the electricity network in the short as well as the long term.

Ei reviewed annual power cut reports for those network companies that during 2014[100] reported power cuts lasting more than 24 hours, customers who had more than 11 power cuts and other indications of quality issues in the power cut reports. 36 electricity network companies were selected for review. Together, these 36 companies have about 4 165 000 low voltage customers, which is roughly 77 percent of all low voltage customers in Sweden.

Those companies for which Ei found deficiencies in the quality of supply were ordered to present what actions they intended to apply in order to correct the deficiencies.

Elpriskollen - with clearer indications of contracts with electricity disclosure

In order to strengthen consumers' position in the electricity market, Ei provides a website for price comparisons, elpriskollen.se, where consumers can compare prices, terms and conditions between the most common contract types from all electricity suppliers.

A new version of elpriskollen.se was launched early 2016. The possibility of comparing prices, and other factors that may affect their choice of electricity supplier is crucial if customers are going to make active and informed choices. To make things easier for the consumers, the new version included an improved search function and clearer indications of contracts with electricity disclosure and

[100] Rapport om leveranssäkerhet i Sveriges elnät 2014 (Report on the continuity of supply in Sweden's electricity networks, 2014) R2016:07

of discount contracts. Earlier versions of elpriskollen.se included certain information in a number of different languages. However, in the new version full price comparisons can be read in 13 different languages.

Ei carries out weekly checks on the prices submitted to elpriskollen.se, along with the associated terms and conditions in order to ensure that the electricity suppliers submit correct information. During the autumn of 2016 a wide-ranging review of electricity suppliers' contract terms and conditions was carried out, and for some suppliers deficiencies were identified. This led to supervisory proceedings by Ei against those electricity suppliers.

Konsumentkontakt and the KundO question forum

In order to coordinate all customer enquiries and complaints, Ei created a consumer contact function, Konsumentkontakt. All written enquiries and complaints made to Ei, which are relevant to consumers, are referred to Konsumentkontakt. Enquiries and complaints from traders are included if they are considered to have some relevance for consumers. Apart from answering questions and receiving complaints about operators in the energy markets, this also provides a basis for further development of regulations and supervision within other departments of Ei.

Konsumentkontakt receives enquiries and complaints thorough email, telephone, social media and via KundO, an online question forum. KundO allows consumers to post questions or search for answers to previous asked questions online. The aim of this working method is to maintain a high level of service, with short response times and answers that are relevant to consumers.

Around 1 600 costumers contacted Ei during 2016. The enquiries concerned electricity networks, electricity supply, elpriskollen.se, district heating, gas networks and gas supply. Over half of all contacts were enquiries, and the remainder were complaints. The subjects can be about electricity network charges, differences in charges between different areas or the flexible parts of the charge. Consumer contacts about electricity supply are primarily about dissatisfaction with telemarketing and with unclear contract terms or lack of information.

Reporting to Ei

In addition to asking questions about the electricity markets, consumers have the possibility of reporting a company which is not complying with the provisions in the Electricity Act or the Natural Gas Act. As supervisory authority, Ei can choose to investigate whether the company is in breach of its statutory obligations.

Ei received a total of 25 reports in 2016, a reduction from the 32 reports received in 2015. 22 reports concerned the electricity network companies' obligations under the Electricity Act and three concerned the electricity suppliers' obligations under the same act. No reports were received concerning the gas companies' obligations under the Natural Gas Act.

Changes to the Natural Gas Act is beneficial for the gas consumer

On June 1st, 2013, the Natural Gas Act was amended as of 2015, Ei regulates the total revenues that natural gas companies earn from their customers in advance rather than retroactively. The aim of the amendment was to ensure that consumers

in the natural gas market pay reasonable fees. Additionally, the regulation contributes to the security of supply of gas networks. As a result of the amendment, gas network companies are now regulated in a manner similar to that of the electricity network companies, which is also in line with European directives on the regulation of monopolies.

Vulnerable customers

The definition of vulnerable customers is set out in Ei's instructions, which states that *"vulnerable customers are persons who lack the ability to pay for the electricity or natural gas which is transmitted or delivered to them for purposes which fall outside of the scope of business activities"*. This category of consumer is protected in the Swedish electricity and gas markets by social legislation in that the consumer has the right to receive financial assistance to cover their electricity and natural gas needs. Ei has previously estimated that around 20,000 consumers are included in the Swedish definition of the term.

There are also provisions in both the Electricity Act and the Natural Gas Act that protect consumers who are at risk of being disconnected from the electricity or natural gas networks as a result of unpaid bills or other significant breaches of contract. These provisions mean that the company carrying out the disconnection must first follow a specific statutory procedure. This includes the consumer's right to accurate information from the company, the opportunity for the consumer to rectify the situation without being disconnected, and also the company's obligation to give notice of the disconnection to the social services in the municipality where the consumer lives before any disconnection can proceed.

The Swedish Consumer Energy Markets Bureau as the national contact point

In 2016 Ei has continued its work as one of the principals of the Swedish Consumer Energy Markets Bureau (Konsumenternas Energimarknadsbyrå, or KE). KE is an independent bureau that provides information and guidance to consumers on issues relating to the electricity and natural gas markets. Guidance to consumers is provided free of charge. There is an existing agreement between Ei and KE under which KE is the national contact point for the electricity and natural gas markets. Hence, the specified requirements in the EU's electricity and gas market directives are fulfilled. About 50 000 consumers visited KE's website in 2016, and over 1 500 consumers contacted KE directly through telephone or email. This is roughly the same number as in 2015. The number complaints grew slightly since previous year. In the remaining direct contacts, consumers requested information about contracts, for example. Many consumers requested price statistics, and KE's sense is that Ei's elpriskollen.se and KE's own service, Gaspriskollen, as well other statistics on its website, have contributed to the growing number of people who can get answers to price-related questions without having to call or email. There were few questions regarding own electricity production in 2016. Similar to previous years, most of the complaints were about electricity price contracts. Most of these concerned switching electricity suppliers, so-called release fees and the automatic extension of electricity price contracts. A large part of the complaints related to problems that had arisen following sales visits by electricity suppliers.

KE received many complaints about a specific electricity supply company that carried out changes without consumers' prior agreement. Another common complaint during the year was about the release fees, including automatic

extensions of electricity price contracts. There are instances of companies considering consumers to be in breach of contract, despite the consumer contesting the claim that they initiated a switch to some other electricity supplier.
In addition, some companies impose fees for breach of contract that contravene the general terms and conditions for electricity, which have been agreed by the Swedish Consumer Agency and the electricity trade. The number of complaints against brokers decreased. Complaints mostly concerned consumers who did not regard themselves as having signed an agreement to switch to a different electricity supplier. KE continued to receive complaints about companies that demand illegitimate payments from consumers, or charge them unreasonable costs.

Complaints in the area of electricity networks was mostly related to increased electricity network charges and compensation following power cuts, among other things.

In many cases, KE's contact with the companies led to the companies' acceptance of the consumer's objections, e g by stopping an incorrect switch or withdrawing a claim.

There were few complaints in the area of gas. These mainly related to dissatisfaction with costs and a lack of possibilities for switching supplier. Complaints and questions concerning the natural gas market mainly involved gas network charges and the lack of possibilities for customers living in apartments to switch gas supplier.

Other consumer guidance

Among the other agencies with a responsibility towards electricity and gas consumers, the Swedish Consumer Agency (Konsumentverket, or KO) should also be special mentioned. KO examines whether companies have used misleading or aggressive marketing or if they have applied unfair contractual terms or provided insufficient price information.

KO runs a central consumer information service under the name Hallå Konsument (Hello Consumer).[101]Hallå Konsument covers all consumer markets, not just the energy markets. Consumers can turn to Hallå Konsument with questions about purchases, contractual terms and complaints for example.

Other government agencies, including Ei, are obliged to collaborate with KO in the development of Hallå Konsument. The Consumer Energy Markets Bureau is responsible for answering relevant questions on the website Hallå Konsument, as well as provide certain information on Hallå Konsument's website.

Electricity and natural gas consumers can also turn their municipality for guidance and advice on various issues. Municipal consumer advisers can provide advice before signing a contract, and provide guidance in the event of disputes. Budget and debt consultants can offer advice and support in the event of payment

[101]www.hallakonsument.se

problems, while energy and climate consultants can provide analyses of energy consumption and advice when choosing a new source of heating.

3.2 Dispute settlement

Electricity suppliers, electricity network companies, gas suppliers and gas network companies must provide clear information on their websites, the consumer invoices, about the consumers' rights as well as about how to submit a complaint and where to turn for more information or dispute settlement.

For information and guidance, consumers can contact the Consumer Energy Markets Bureau or a municipal consumer advisor.

Ei settles some disputes

Ei monitors whether the companies in the electricity and natural gas markets are complying with legislation, and can in some cases also settle disputes between consumers and companies. This concerns disputes relating to the obligation of electricity network companies to connect a facility to the electricity network, the cost for metering and calculating electricity, and compensation for input of electricity and network tariffs for smaller production facilities.

Under the provisions of the Electricity Act, the connection charge must be reasonable. If a consumer considers the cost to be too high, he/she can contact Ei for a review. If Ei consider the connection charge is too high, the electricity network company must refund the difference to the consumer. Ei's decision on the reasonable cost of the connection may be appealed where the courts are the final arbiters. There is no cost involved in requesting a review by Ei or in appealing Ei's decision.

Assistance in settling disputes by the National Board for Consumer Disputes

Electricity and natural gas consumers may report disputes with companies to the National Board for Consumer Disputes (Allmänna reklamationsnämnden, ARN). This can be described as a quick and simple, yet still legally secure, alternative to using the courts. ARN is a government agency that examines disputes between customers and companies, including the electricity and natural gas markets, at no cost. ARN does not carry out its own investigation, instead it relies on the parties involved to submit and present documentation and evidence for it to consider. ARN bases its assessment of a dispute on applicable legislation and legal precedent. ARN's decisions include a proposal for settlement of the dispute. In order for a consumer to report a dispute to ARN, the company must have rejected the consumer's claim or not given the consumer any answer. The complaint must be submitted within 6 months of the day the company rejected the consumer's claim and finally the consumer's claim must have a value exceeding SEK 2,000.

Consumers normally wait for about six months for a decision from ARN. Consumers can also turn to the general courts to resolve a dispute with an electricity or natural gas company.

Energimarknadsinspektionen
Kungsgatan 43
Box 155
631 03 Eskilstuna
Tel 016-16 27 00
www.ei.se