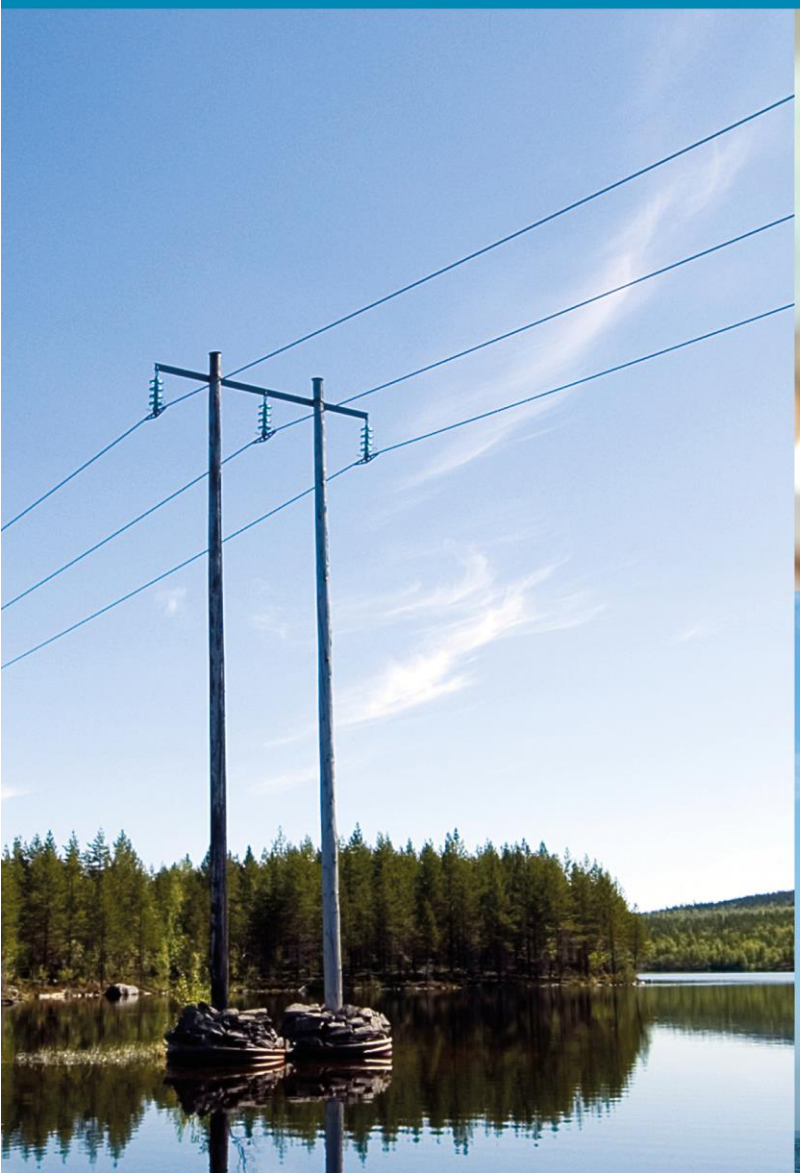
Energimarknadsinspektionen
Swedish Energy Markets Inspectorate

Ei R2023:13

Sweden's electricity and natural gas market, 2022



The Swedish Energy Markets Inspectorate (Ei) is a government agency tasked with working for well-functioning energy markets.

The overall purpose of our work is for Sweden to have well-functioning distribution of and trade in electricity, district heating and district cooling, as well as natural gas. We shall also safeguard our customers' interests and strengthen their position in the markets.

In concrete terms, this means that we supervise that the companies comply with the regulations. We are also responsible for developing the ground rules and informing customers about what applies. We regulate the conditions for the monopoly companies that operate electricity and natural gas networks and supervise them in the competitive energy markets.

Energy markets need ground rules – we make sure they are followed.

The Swedish Energy Markets Inspectorate
Box 155, 631 03 Eskilstuna
The Swedish Energy Markets Inspectorate R2023:12
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The report is available on www.ei.se

Foreword

The Swedish Energy Markets Inspectorate (Ei) is the supervisory authority for the markets for electricity, natural gas, district heating and district cooling and continuously monitors developments in these markets. The purpose of this report is to describe developments in the electricity and natural gas markets in 2022.

According to Ei's instructions, the agency is to perform tasks arising from Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (Electricity Market Directive) and Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 on common rules for the internal market for natural gas and repealing Directive 2003/55/EC (Natural Gas Market Directive). This includes the preparation of an annual report in accordance with the reporting requirements that follow from the directives. Reporting covers regulatory, competition and security of supply issues.

The report is based on the content agreed between the European supervisory authorities and the European Commission. This report, together with all the Member States' national reports, will be available in Swedish and English on the CEER (Council of European Energy Regulators) website: www.ceer.eu.

Eskilstuna, June 2023

Ulrika Hesslow
Director General

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Summary

The Swedish electricity and natural gas markets are part of the integrated European energy markets, and trade is competitive. The electricity and natural gas network operations are regulated monopolies, as it would be both socioeconomically and environmentally inappropriate to build parallel networks throughout the country.

In its role as the supervisory authority, Ei shall continuously monitor and analyse developments in the electricity and gas markets and make proposals for regulatory changes or other measures to promote the functioning of the markets.

2022 – a special year

In the autumn of 2021 and throughout 2022, energy prices rose to significantly higher levels than had previously occurred. As a result of Russia's war against Ukraine, gas supplies from Russia decreased, which was a strong contributor to increased natural gas prices, which in turn had an impact on electricity prices. Natural gas prices in Europe in 2022 have been significantly higher than prices before the Covid-19 pandemic. The EU took action to reduce dependence on Russian gas and issued sanctions against Russia. At the same time, gas stocks in Europe had low replenishment rates and there was great concern that the flow of Russian gas would stop before European gas stocks were replenished for winter 2022/2023. Demand for natural gas increased, due, among other things, to the economic recovery after the Covid-19 pandemic, and as a result, the price of emission rights also increased. Since the Swedish electricity system is interconnected with the European system, Swedish electricity prices were affected by the European price development.

The high electricity prices have resulted in the Government taking a number of measures in 2022 and early 2023, mainly through electricity and gas price support for households and industries. In addition to sanctions against Russia, the European Commission has introduced measures aimed at mitigating the negative impact of high electricity and gas prices on society. The Commission has also discussed whether the current electricity market design may need to be changed in order to make EU energy markets more efficient and resilient in times of crisis.

The electricity market

The Swedish electricity grid

The Swedish electricity grid can be divided into three levels: transmission grid, regional grid and local grid. The transmission grid transports electricity over long distances at high voltage levels. The regional grids transport electricity from the transmission grid to the local grids and in some cases directly to larger electricity users. The local grids connect to the regional grids and transport electricity to households and other end customers. The electricity grid consists of 58,900 km of cable, approximately 43,000 km of which is underground cable and 16,000 km is overhead.

Svenska Kraftnät is a state-owned enterprise with responsibility for managing and developing the Swedish transmission grid. Svenska Kraftnät is also responsible for maintaining the power balance in the short term and the reliability of the Swedish electricity grid. Svenska Kraftnät is certified as a system operator by the Swedish Energy Markets Inspectorate (Ei). Ei supervises several parts of Svenska Kraftnät's operations.

Local and regional grid operators are responsible for ensuring that the level of maintenance of their own grid is sufficient to ensure that security of supply is maintained.

The Swedish electricity grids are operated as regulated monopolies and Ei decides how much the electricity grid companies may charge their customers over a four-year period by establishing revenue frameworks. Between 2021 and 2022, fees increased on average by 0.1 per cent for apartment customers, 1.4 per cent for house-owning customers with a 16 A fuse and by 1.7 per cent for house-owning customers with a 20 A fuse.[1] In Swedish kronor, this corresponded to an increase of approximately SEK 2, SEK 50 and SEK 123 respectively over the year. In 2021, a new law on special investment scope for electricity grid operations (SFS 2021:311) was also introduced, where grid companies can apply for special investment allocations.

The wholesale market for electricity

In 2022, electricity prices increased compared with the previous year in all Swedish electricity areas (bidding zones), especially in the second half of the year. On average, the system price[2] in the Nordic countries during the year was EUR 136 EUR/MWh, which was an increase of 118 per cent compared to the previous year. In the SE4 zone of Sweden, the annual average price was 152 EUR/MWh, while in

[1] Real values at 2022 prices, not weighted.
[2] The system price serves as a reference price for financial electricity trading. The system price is calculated without taking into account where the electricity is produced and where it is to be consumed.

SE3 it was slightly lower at 129 EUR/MWh. In SE1 and SE2, the corresponding price was around 60 EUR/MWh.

In 2013–2018, the average annual spot price was around 20–40 EUR/MWh in all bidding zones. Compared with 2022, this corresponded to an increase in the annual average spot price of 33 per cent in SE1, 40 per cent in SE2, 190 per cent in SE3 and 228 per cent in SE4.

Nord Pool's day-ahead market is the marketplace for most of the physical trade in electricity in the Nordic and Baltic countries. In 2022, Nordic stakeholders raded about 696 TWh on Nord Pool's day-ahead market and about 47 TWh on EPEX spot. Some of the trading also takes place via bilateral contracts and on the intraday market.

In 2022, 169.9 TWh of electricity was produced in Sweden, which was 2.7 per cent more than the previous year. It is the production from wind power and also to some extent solar power that has increased, see Table 4. In 2022, wind power produced 33 TWh, which is an increase of 21 per cent compared to 2021. Net exports of electricity amounted to 33 TWh in 2022, which was an increase of 32 per cent compared to the previous year. Sweden was also one of the largest exporters of electricity in the EU. At certain times, however, Sweden is dependent on imports to cope with the electricity supply; during the winter of 2022/2023, electricity was imported for 147 hours.[3]

The retail market for electricity

In 2022, there were about 140 electricity trading companies on Ei's comparison site elpriskollen.se. At the end of 2022, the three largest electricity trading companies had a combined market share of approximately 51 per cent based on the number of customers, which is an increase of 6 percentage points from 2021.

In 2022, the largest part of the electricity cost, 55 per cent, consisted of the electricity trading price. VAT and tax accounted for 33 per cent of the electricity consumer's total cost of electricity, while transmission in the grid accounted for 13 per cent.

A trend that has been going on for a number of years is that more customers, both household and business customers, are choosing variable contract forms. In 2022, this trend seems to have accelerated, probably largely due to the high electricity prices on fixed-price contracts that prevailed during the year. In December 2022,

3 A winter of tough conditions and electricity-saving Swedes | Svenska Kraftnät (svk.se)

57.6 per cent of Swedish customers had signed variable price agreements, which is an increase of 4.8 percentage points compared to December 2021.

The natural gas market

The Swedish natural gas network

The natural gas network in western Sweden consists of 600 km of transmission pipeline and about 3,000 km of distribution pipeline.

The natural gas network is connected to the Danish transmission network via an interconnection in Dragör and in Sweden the network extends along the west coast from Trelleborg to Stenungssund, with an eastward stretch towards Jönköping.

In the Stockholm area there is a city gas network and a vehicle gas network comprising approximately 500 and 40 km of pipeline, respectively.

Ei is the supervisory authority for the networks covered by the provisions of the Natural Gas Act (2005:403), which are the western Swedish gas network and the gas network in Stockholm. In the Natural Gas Act, the term natural gas also refers to biogas to the extent that it is technically possible to use the gas in a natural gas system. There are currently nine biogas producers connected to the natural gas system in western Sweden, two of which are connected so that feed can take place directly into the transmission network. Two more biogas producers are connected to the city and vehicle gas network in the Stockholm area.

As with electricity market rules, Ei sets revenue frameworks or gas network operators over a period of four years. This framework sets an upper limit on the total revenues companies are allowed to withdraw from their natural gas operations.

The wholesale market for natural gas

In 2022, 6.5 TWh of natural gas was used in the natural gas network in western Sweden. Due to the design of the western Swedish network, the Swedish natural gas market is closely linked to the Danish market. In autumn 2021 and throughout 2022, energy prices rose to significantly higher levels than had previously occurred. Natural gas prices in the EU in 2022 have been many times higher than prices before the pandemic. The price of gas peaked in August 2022, at EUR 339/MWh.

Since 2020, natural gas has mainly been traded on the European Energy Exchange (EEX), in which the former Danish trading platform ETF PEGAS is integrated. Competition, price trends and transparency in the Swedish natural gas market are largely dependent on developments in Denmark.

The retail market for natural gas

The natural gas network in western Sweden has about 27,000 household customers and about 4,200 other customers, such as large industries.

Stockholm's city and vehicle gas network has approximately 50,000 customers, most of which are household customers. In addition, there are also a number of small gas networks around Sweden. The small networks are mainly used to transport biogas of the vehicle gas type from a production plant to filling stations. What the gas network in Stockholm and the small local gas networks around the country have in common is that they are not connected to any transmission network.

At the end of 2022, there were a total of seven operators offering gas contracts to end customers, six of which were in the western Swedish natural gas network and one in Stockholm's city and vehicle gas networks.

Consumer protection and disputes

Ei checks that companies in the electricity and natural gas markets comply with national energy legislation and the EU regulatory framework for the internal market for electricity and gas.

Among the rules that Ei monitors are, for example, rules on the quality that customers should have in their electricity deliveries, since poor delivery quality causes great inconvenience to customers and results in high costs for society. Every year, power interruptions cost Swedish society around one billion kronor. Deficiencies in the voltage quality in the electricity grid can also cause large costs. A well-functioning electricity supply is of great importance for the functioning and development of society.

Consumers have the opportunity to report a company that does not comply with the provisions of the Electricity Act (1997:857) and the Natural Gas Act. As the supervisory authority, Ei can then investigate whether the company is in breach of its legal obligations. In 2022, Ei was in contact with more than 3,000 consumers and business practitioners. Most of the questions and complaints received by Ei are about electricity grids and electricity trading.

To strengthen the position of consumers in the electricity market, Ei offers a website for comparing electricity contracts: elpriskollen.se. The website offers consumers the opportunity to compare the prices and terms of the most common contracts from all electricity supply companies. The ability to compare prices and other factors that may influence the choice of electricity supplier is a prerequisite for having active customers. In 2022, Ei has worked on a new launch of the site where the goal has been for elpriskollen.se to be more user-friendly for the visitor. The new comparison site was launched on 1 June 2023.

Ei works with the Swedish Consumer Agency on Hallå Konsument, which is a web-based service in which consumers can get information about their rights in a number of markets, including the energy markets. Ei provides knowledge and information on energy market issues.

The electricity market

1 2022 – a special year

In 2022, a number of events have occurred abroad and in Sweden that in various ways affected the energy markets in the EU and Sweden. Among other things, these have come in the form of disruptions in energy supply and high electricity and gas prices. The section below is intended to provide an overview of some important events that have affected the energy markets and measures taken in 2022 that have been considered relevant by the Swedish Energy Markets Inspectorate.

1.1 Events in the natural gas market

In connection with Russia's war against Ukraine and the imposition of EU sanctions on Russia, Russia periodically shut down the Nord Stream 1 pipeline for maintenance and eventually the pipeline was permanently closed. The reduced availability of Russian gas caused widespread concern on the natural gas market and a natural gas price record of 339 EUR/MWh was reached in August 2022; this in turn affected electricity prices. Later, a number of explosions also caused large pressure drops on the Nord Stream 1 and 2 pipelines due to the leaks that occurred. The cause of the explosions is not clear, but it has been established that it was not due to a technical fault. Nord Stream 2 has never been operational for various reasons, but it was also damaged by explosions. At the time of the leaks, the pipelines were not operational and therefore gas prices were not significantly affected. As a result of Russia's war against Ukraine, the use of LNG (liquefied natural gas) increased in the EU and in 2022 the use of natural gas decreased by 13 per cent.

The EU's natural gas storage levels in 2022 were significantly above the average storage levels of the previous year, and at the end of the year the natural gas stores were 96 per cent full. See the section on Price development in the gas market in 2022 under the section 3.2.1 Monitoring price developments, transparency and competition.

1.2 Weather conditions and nuclear power

In 2022, electricity prices increased compared with the previous year in all Swedish electricity areas (bidding zones), especially in the second half of the year. On average, the system price during 2022 was EUR 136/MWh, which was an increase of 118 per cent compared to the previous year. In the SE4 bidding zone, the annual average price was EUR 152/MWh, while in SE3 it was slightly lower at EUR 129/MWh. The corresponding price in SE1 and SE2 was around EUR 60/MWh.

Weather-dependent factors, such as natural gas prices, also had an impact on the price of electricity in Europe. The dry weather resulted in lower levels in water reservoirs in both the Nordic countries as a whole and Sweden. The hydrological balance in the Nordic region was below normal for most of 2022. The deficit peaked at 20 TWh during the autumn. During November, the hydrological balance recovered somewhat and then weakened again in December. Both in the Nordic region and in parts of Europe, wind power had periodically produced little electricity in relation to installed capacity, in spite of increased production compared to 2021. This created volatile prices from day to day as the price was pushed upwards during periods with little wind. The icing-up of rivers also reduced the capacity for hydropower and occurred during the same period as the Oskarshamn 3 and Ringhals 4 nuclear power plants were out of operation, which also affected the price of electricity.

In Finland, the start-up date of the Olkiluoto 3 nuclear power plant was postponed until spring 2023. Nuclear power in France has also been limited during the summer period of 2022 due to maintenance works and high temperatures in the rivers that are used to cool the reactors. See the section on High electricity prices in 2022 under the section 2.2.3 Price trends and transmission restrictions for more information.

1.3 Measures and reduction in demand

Energy price increases affected households, industry and businesses across the EU. Against this background, Council Regulation (EU) 2022/1854 of 6 October 2022 on an emergency intervention to address high energy prices (the 'Emergency Regulation') was drafted and adopted in 2022; this aimed to complement existing EU initiatives and laws that had been adopted to secure the EU's energy supply and to address and reduce the impact of high energy prices. The emergency regulation contained three main measures to reduce energy prices. The first measure aimed to reduce electricity consumption and provided voluntary measures to reduce total electricity consumption in the EU by the end of March 2023 by 10 per cent. It also included an obligation for EU countries to reduce consumption by at least 5 per cent during the peak demand hours, as well as allowing member states to choose measures to reduce electricity consumption.

The second measure Introduced a cap on electricity producers' revenue and was aimed at electricity producers which have not used gas for their electricity production, which can result in significant economic gains. The purpose of the market revenue cap was to allow for a redistribution of surplus revenues to those affected by high electricity prices. The third measure was to ensure so-called solidarity contributions from companies active in the crude petroleum, natural gas, coal and refinery sectors in order to contribute to affordable energy prices for households and businesses.

In addition to this, it was also clarified that bottleneck incomes (capacity charges)[4] could be used to support end customers.

1.3.1 Reduced electricity consumption

In 2022, the Swedish Energy Agency launched the campaign "Every kilowatt hour counts". The purpose of the campaign was to draw the public's attention to reducing electricity consumption and becoming more energy efficient in order to reduce electricity costs, reduce the risk of electricity shortages and show solidarity with other Swedish citizens and our neighbouring countries. According to the Swedish Energy Agency, electricity consumption throughout Sweden decreased by 5 per cent for the full year 2022 compared to 2021.[5]

1.3.2 Measures in the field of natural gas

On 27 June, the EU Council of Ministers decided on amendments to the Gas Security of Supply Regulation setting required gas storage levels starting in winter 2022/2023 to ensure security of supply in the EU. On 5 August 2022, the EU Council of Ministers also decided on a voluntary 15 per cent reduction in natural gas demand for winter 2022/23. In addition, it was decided that a market correction mechanism for gas would be introduced on 22 December 2022. The market correction mechanism imposes, subject to certain conditions, a cap on the price of gas of 180 EUR/MWh. The EU Council of Ministers also decided on the general approach of the so-called gas market package on 28 March 2023 (see section 3.2.1). Legislative work will continue in 2023 with a view to reaching an agreement between the Council of Ministers and the European Parliament.

1.3.3 Electricity price support

In August 2022, the Government commissioned Svenska Kraftnät to apply to the Swedish Energy Markets Inspectorate to use revenues from bottleneck income to fund electricity price support for households (private individuals), businesses and legal entities in bidding zones SE3 and SE4. The electricity price support for all groups referred to the period 1 October 2021 to 30 September 2022 and the compensation level was 0.50 SEK per kWh consumed in bidding zone SE3 and 0.79 SEK per kWh consumed in bidding zone SE4. In total, approximately 4.3 million households benefited from the electricity price support.

[4] When cross-zonal transmission capacity is insufficient, prices in the areas will differ. When electricity is transferred from low-price areas to high-price areas, a financial surplus is generated by the electricity exchange that accrues to the transmission system operator or the company that transmits the electricity between the two bidding zones. This is called capacity income, which is sometimes also referred to as bottleneck income.

[5] Årskrönika Energimarknaderna 2022 (Annual Energy Markets Chronicle 2022) (energimyndigheten.se)

At the beginning of January 2023, another electricity price support for households (private individuals) was decided, which this time would cover the whole of Sweden, i.e. bidding zones SE1, SE2, SE3 and SE4.

This electricity price support referred to the period November and December 2022 and covered approximately 5 million households. In February 2023, the Government also decided to provide electricity price support to electricity-intensive companies for the period October to December 2022.

1.3.4 Gas price support

In early December 2022, the Government announced they would introduce a gas price support for households connected to the western Swedish gas network. The support referred to the period October 2021 to September 2022 and amounted to 0.79 SEK per metered kWh.

1.3.5 Development of the regulatory framework in the field of electricity markets

Ever since autumn 2021, discussions have been ongoing at the EU-level on how the design of the electricity market could possibly be changed to become more efficient and mitigate the consequences for electricity customers during times of crisis. Among other things, the European Commission tasked the EU Agency for the Cooperation of Energy Regulators (ACER) with developing proposals for changes to the present electricity market model in the longer term. ACER presented its final report in spring 2022 and noted that improvements can be made by making long-term energy markets more efficient and increasing flexibility in the electricity system.[6] Work on the electricity market design will continue in 2023. See also section 2 The electricity market on various directives and regulations.

[6] ACER publishes its Final Assessment of the EU Wholesale Electricity Market Design | www.acer.europa.eu

2 The electricity market

About a third of Sweden's energy consumption comes from electricity and, in line with the climate transition, electricity consumption is expected to increase to cover the reduced use of fossil fuels[7]. To handle the climate transition and the increased demand for electricity, more carbon-free electricity production and new electricity grids will need to be built, while customers need to become more flexible in their use of electricity. In addition to new construction, we will therefore also need a greater degree of flexibility in electricity use to handle more varied energy flows in the electricity grids over time.

In well-functioning electricity and gas markets, it is price signals that inform market participants where new investments are most needed. Such an efficient electricity market is therefore central to ensuring that society and consumers receive electricity without unnecessarily high costs.

The Swedish Energy Markets Inspectorate (Ei) works for well-functioning electricity and gas markets in which participants follow the rules that will enable a safe, efficient, flexible and integrated electricity system. Ei's tasks include supervising that companies comply with their obligations under both national and EU law. Ei supervises electricity network operators and monitors the participants in the wholesale market. In addition, Ei inspects the actions of electricity supply companies towards end customers.

Ei cooperates with other national energy regulators and ACER and interacts with the regulators in CEER (Council of European Energy Regulators). Ei also cooperates regionally with the Nordic regulators within NordREG and with the regulators in the capacity calculation regions[8] that Sweden is part of, i.e. the capacity calculation area Nordics, Baltics and Hansa. Cross-border cooperation aims to coordinate cases, coordinate the rapid incorporation of European legislation and identify areas for development.

In 2018, the European Parliament and the European Council decided on a package of rules aimed at enabling the EU to deliver on its commitments under the Paris Agreement and make the EU a leader in the transition to clean energy.

[7] Framtidens elektrifierade samhälle Analys för en hållbar elektrifiering, ER 2021:28 (The electrified society of the future Analysis for sustainable electrification, ER 2021:28)

[8] Capacity calculation region means the geographical area in which coordinated capacity calculation is applied.

This is called the Clean Energy Package and contains new rules for the electricity market in the EU, including Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (Electricity Market Directive) and Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (Electricity Market Regulation). Since Ei is a national regulatory authority, it is responsible, among other things, for tasks specified in the Electricity Market Regulation and the Electricity Market Directive.

In spring 2023, the European Commission has also presented proposals for a revised Electricity Market Directive, Electricity Market Regulation, Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators(Agency Regulation) and Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency (REMIT Regulation).

In addition to the Electricity Market Regulation and the Electricity Market Directive, how electricity markets are organised is regulated in a number of European Commission regulations, which are directly applicable in Sweden.

Type	Abbreviation	Full name	Affected area
Connection Regulation	RfG	Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators	Connection of production facilities
Connection Regulation	DCC	Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection	Connection of consumers
Connection Regulation	HVDC	Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules	Connection of high voltage direct current systems and direct current-connected power park modules (e.g. wind farms).
Market Regulation	CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management	Common day-ahead and intraday market with capacity allocation for a functioning market connection. Correct bidding zone division etc.
Market Regulation	FCA	Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation	Price hedging opportunities and forward allocation of transmission capacity between bidding zones.

Type	Abbreviation	Full name	Affected area
Market Regulation	EB	Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing	Well-functioning and integrated balancing market.
Operation Regulation	SO	Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation	Pperation of electricity transmission systems, reliability of supply and frequency management.
Operation Regulation	ER	Commission Regulation (EU) No 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration	Transmission grid operators' handling of emergency operating permits, grid breakdowns and restoration permits.

Ei also has a mission to monitor the wholesale electricity market and, through this monitoring, maintain confidence and good conditions for the creation of correct pricing. The rules supervised by Ei are REMIT, which prohibits insider dealing and market manipulation in European wholesale energy markets and obliges market participants to promptly publish inside information. Ei also exercises supervision under Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council (Transparency Regulation).

2.1 The electricity grid

The Swedish electricity grid consists of 58,900 km of cable, approximately 43,000 km of which is underground cable and 16,000 km is overhead. The electricity grid can be divided into three levels: transmission grid, regional grid and local grid. The transmission grid transports electricity over long distances at high voltage levels. The regional grids transport electricity from the transmission grid to the local grids and in some cases directly to larger electricity users. The local grids connect to the regional grids and transport electricity to households and other end customers.

Sweden's transmission grid is directly connected to Denmark, Norway, Finland, Germany, Poland and Lithuania and indirectly to virtually the whole of Europe. The Swedish electricity transmission grid consists of approximately 16,000 km of power lines, more than 175 transformer and switching stations and international connections with both alternating and direct current.

Figure 1. The Swedish electricity transmission grid and other connections abroad

Source: Svenska Kraftnät

2.1.1 Bidding zones

Since 2011, Sweden has been one of the few EU countries divided into so-called bidding zones. Sweden has four bidding zones: SE1, SE2, SE3 and SE4. The division is based on where the largest limitations on transmission capacity in the transmission grid were at the time of the division. The power system is changing, and in 2020 a European review of bidding zones within the EU was initiated in accordance with the Electricity Market Regulation. The transmission system operator (TSO) in Sweden, the public service company Svenska Kraftnät, is responsible for presenting proposals for the review and for investigating and analysing alternative divisions.

Svenska Kraftnät and Europe's other electricity transmission system operators (TSOs) have one year to make their assessment of the proposals and a consultation with electricity market participants is currently being held, which is expected to

end in mid-July 2023. A proposal to change or maintain current bidding zones can be expected to be submitted to the Government in February 2024 and, if it is decided to change bidding zones in Sweden, this can be implemented in 2027 at the earliest.[9]

2.1.2 The role of the grid companies

Transmission system operator

Svenska Kraftnät, which operates and manages the Swedish transmission grid, is also the authority responsible[10] for the Swedish transmission system. Svenska Kraftnät's mandate is to manage, operate and develop a cost-effective, reliable and environmentally adapted power transmission system in a commercial way. It must also provide transmission capacity, and Ei, as regulatory authority, has the task of scrutinising and ensuring that Svenska Kraftnät complies with the rules for transmission system operators in the internal electricity market.[11]

The Electricity Market Directive requires transmission system operators to be certified; detailed rules on this can be found in national legislation[12]. Ei decided, in July 2012, to certify Svenska Kraftnät as system operator for the Swedish electricity transmission grid. The certification is valid until further notice but can be reviewed by Ei if the system operator does not meet the requirements of the certification.

The distribution grids

The Swedish regional and local grids are operated by a large number of electricity grid companies. The regional and local grid companies are system operators for the distribution system in Sweden, which means that they are responsible for operation and maintenance, expansion of the distribution system and its interconnections within a certain area, as well as ensuring that the system can meet reasonable requirements for the distribution of electricity in the long term.[13] Each electricity grid company has a local monopoly, i.e. the exclusive right to distribute electricity. Ei decides on exclusive rights in the form of permits (grid concessions).

In order to ensure that the electricity grid companies that have exclusive rights do not exploit their monopoly position, Ei decides on the companies' income through the revenue framework, see section 2.1.8 Electricity grid charges and the revenue cap for

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[9] Elområdesöversyn (Bidding zone review) | Svenska Kraftnät (svk.se)

[10] Svenska Kraftnät is the authority responsible for the system according to the Electricity Act (1997:857) and thus has the overall responsibility for ensuring that electrical installations interact reliably so that a balance is maintained in the short term between production and consumption of electricity in all or parts of the country.

[11] In Sweden there is no independent system operator. Therefore, the provisions that specifically cover supervision of independent system operators are not applicable to Ei.

[12] The Act (2011:710) on Certification of Transmission System Companies for Electricity contains provisions on certification of transmission system companies.

[13] 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.

electricity grid companies. It is also possible to apply to Ei for a review of charges for connection to the electricity grid.

Legal, reporting and functional separation of electricity companies

Since electricity grid companies operate as regulated monopolies, while electricity supply companies and electricity generation operate in a competitive market, it is important that these activities are separated when they occur within the same group of companies. In order to prevent cross-subsidisation[14], grid operations in Sweden may not be conducted in the same legal entity that is engaged in the production of or trade in electricity. This means that electricity grid operations must be legally separate from companies that are engaged in the production of or trade in electricity. However, an electricity grid operator may produce electricity if production occurs temporarily to compensate for lost electricity in the event of a power cut. Grid activities must also be financially reported separately from all other activities and thus be separate from other activities that may be carried out in the same legal entity as the grid business. With effect from July 2022, a grid company may not engage in any activity other than grid activities, with a few exceptions.[15]

Grid operators must submit a specific annual report on grid activities to Ei no later than seven months after the end of the financial year. The data reported to Ei in the annual reports forms an important basis for the calculation of the revenue frameworks as well as a basis for further supervisory work and economic analysis. In November 2022, Ei decided on updated regulations on financial reporting for electricity grid operations (EIFS 2022:10). The regulation entered into force on 1 February 2023 and will be applied in the submission of companies' annual reports by 31 July 2023. An amendment to the financial reporting regulations in autumn 2022 has made it possible to handle all incoming annual reports digitally. Ei has therefore updated its regulations so that submission of annual reports and auditors' certificates can be done completely digitally.

There is also a requirement for certain electricity grid companies to be functionally separate from companies engaged in the production of or trade in electricity.[16]

Functional separation means, among other things, that a person who is a director, CEO or authorised signatory of a legal entity that is engaged in grid activities may not at the same time be a director, CEO or authorised signatory of a legal entity

[14] When companies strategically use revenue from one part of the business to finance another part of the business.
[15] In addition to electricity grid operations, grid companies may also manage or operate networks other than electricity grids, produce electricity if produced on a temporary basis to replace lost electricity in the event of a power cut, and repair and maintain the grid of another company.
[16] 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.

that is engaged in the production of electricity or trading in electricity. The functional separation applies to those companies that conduct grid operations and that are part of a group whose entire electricity grid has at least 100,000 electricity users, which only applies to seven of Sweden's more than 170 electricity grid companies.

A distribution grid company[17] that is part of the same group as a company engaged in the production of or trading in electricity must formulate a monitoring plan, in accordance with the Electricity Act (1997:857)[18]. Companies must publish an annual report describing the measures they have implemented in accordance with the plan. The purpose of the monitoring plan is to ensure that companies act objectively and do not unduly favour any market participant. The monitoring plan must set out the measures the company intends to implement to prevent discriminatory behaviour towards other market participants.

2.1.3 Non-concessionary grids

In some cases, electricity lines are exempted from the requirement for a grid concession and may be built and used without a permit, so-called non-concessionary grids (abbreviated to IKN in Swedish). The exemptions from the requirement for a grid concession can be found in the Ordinance (2007:215) on exemptions from the requirement for a grid concession under the Electricity Act (1997:857). In case of uncertainty as to whether a line or a power grid is exempted from the requirement for a grid concession or not, it is possible to request a binding notification from Ei.

Questions about IKNs and requests for binding notifications have increased during the ongoing energy transition. These include lines used to take advantage of electricity that comes from renewable energy sources, either locally close to the producer or from production facilities where all the produced electricity is fed into the regular transmission grid, as well as lines that transmit electricity for vehicles' electricity needs.

The inflow of cases accelerated sharply when new and amended rules came into force on 1 January 2022. The new possibilities for sharing locally produced electricity and transmission of electricity from energy storage have meant that Ei has had to provide more information and has issued a number of binding notifications. The trend is that interest in IKNs remains high and the inflow of questions and cases continues to be high.

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[17] A distribution grid company is defined in the Electricity Act (1997:857) as a grid company that owns a local or regional grid and, with the support of a grid concession, makes a high-voltage line available for the transmission of electricity on behalf of someone else and takes the necessary measures for the transmission.

[18] Chapter 3 Section 24.

Although the IKN Regulation underwent changes in January 2022, Ei considered in the report *Closed distribution systems and internal grids*[19] that there is a further need for changes. With regard to the proposals in the report for amendments to the IKN Regulation, Ei proposes to extend the transmission of electricity on behalf of third parties to grids within public and private institutions, to exempt lines for the electricity needs of ships from the requirement for a grid concession and to extend the exemption for generating installations with regard to the feeding of electricity into the public grid to, under specified conditions, also include energy storage facilities, installations for the consumption of electricity or installations for the conversion of electricity into another energy carrier. In addition, where transmission on behalf of others may already take place, the requirement that an internal grid in its entirety must have originally been used for the transmission of electricity exclusively for in-house consumption is removed. A significant amendment proposed for the Electricity Act is to extend the right to change electricity supplier so that holders of grids without a grid concession are also obliged to make their internal grids available in order for electricity users to be able to change electricity supplier. The report was submitted to the Government in December 2022. In order to meet the increased need for information about IKNs, the work that had begun in 2021 to produce completely new information for the agency's external website was intensified during 2022.

During the second quarter of 2023, updated information about IKNs has been published on Ei's website so as to provide clearer guidance and provide more answers. New binding notifications in untested situations will in the future provide guidance for similar situations. All in all, this will create the conditions for reducing the number of binding notifications and shorten the lead times in cases concerning IKNs.

2.1.4 Expansion of the electricity grid

The Swedish distribution and transmission grid is in a period of extensive expansion. This is driven by increasing electrification in society so as to achieve net zero emissions in the transport sector and industry. The grid is being strengthened to enable new electricity production, further market integration with the rest of the world, contribute to the creation of a common European electricity market and, not least, to meet the greatly increased demand that electrification entails. At the same time, there is a significant need for reinvestment.

Shorter lead times for grid expansion

In order to meet the greatly increased demand that electrification entails, measures need to be taken both to use and produce electricity in an efficient way and to

[19] Slutna distributionssystem och interna nät (Closed distribution systems and internal grids) (Ei R2022:12)

strengthen the opportunities for transmitting electricity. A prerequisite for the latter is more efficient permit processes and shorter lead times for electricity grid expansion. In September 2021, Ei, together with Lantmäteriet (the Swedish Mapping, Cadastral and Land Registration Authority) and the county administrative boards, was commissioned by the Government to develop and test new working methods for a coordinated process for managing the permits and rights required to expand or strengthen the Swedish electricity grid. In 2022, a number of measures have been identified by both government agencies and grid owners.

These have since been tested in five ongoing grid development projects and the results show that lead times could be significantly shortened. The final results will be reported to the Government Offices of Sweden in spring 2023. Some of the measures proposed were that grid owners contact the Swedish Armed Forces, landowners and relevant agencies at an early stage, plan early for biodiversity surveys and bring forward pylon planning.

Grid development projects

In 2021, Svenska Kraftnät published an updated system development plan[20] for the period 2022 to 2031. It describes, among other things, Svenska Kraftnät's grid development plan, which includes a number of different planned grid investments. Examples of these are the West Coast Programme, which consists of several projects to eliminate bottleneck problems on the West Coast, and the North-South programme, which contains some 50 different projects aimed at increasing capacity between the SE2 and SE3 bidding areas, also known as section 2. In addition, there are a large number of projects relating to new connections, system reinforcements and reinvestments in the national grid.

North-South is a comprehensive investment package that is planned to extend over more than 20 years. As previously mentioned, the aim is to increase capacity in section 2, which will result in a more future-proof transmission network that can meet the need for increased transmission from north to south. The transmission capacity across the section is expected to increase from 7,300 MW to 10,000 MW. This is done by reinvesting, renewing and strengthening six of the eleven existing power lines that cross the section.

The package is mainly divided into four north-south corridors, referred to by Svenska Kraftnät as Uppsalabenet, Västeråsbenet, Karlstadbenet and Hallsbergbenet. The first two parts are planned to be operational in 2033-2035. Svenska Kraftnät plans to start investigations for the last two projects in 2025.

[20] Systemutvecklingsplan 2022-2031 – Vägen mot en dubblerad elanvändning (System development plan 2022-2031 – The road towards doubling electricity consumption) | Svenska Kraftnät (svk.se)

Other projects within Sweden

During the year, Vattenfall was granted line concessions for two 130 kV power lines between Hedenlunda and Oxelösund. These are new connection lines to SSAB's steelmaking plant in Oxelösund. The reason is a greater need for electrical energy to produce steel using the so-called HYBRIT technology. According to SSAB, the result will be the world's first fossil-free steelmaking technology. According to the HYBRIT project, this connection will reduce Sweden's carbon dioxide emissions by 10 per cent.

In addition, there are a number of projects underway to strengthen the electricity grids in the metropolitan regions and the transmission capacity between the Swedish bidding areas.

Examples of these are a number of projects in the so-called West Coast Programme that will contribute to securing the electricity supply in Västra Götaland. Another is the Stockholms Ström[21] project, which aims to strengthen and renew the electricity grid in the Stockholm region to meet future needs for reliable electricity supplies. Svenska Kraftnät, together with the regional and local grid owners Vattenfall and Ellevio, has proposed a completely new structure for the region's electricity grid, which is now being implemented in some fifty projects.

Projects of common interest

Increasing the reliability and security of supply of electricity and gas in the EU is an important issue for the Member States. To achieve this, a number of infrastructure projects are listed as Projects of Common Interest (PCIs). These projects have a special regulatory framework that aims to simplify and coordinate not only permit processes between the countries, but also rules that allow project owners to apply for special EU funds to facilitate financing. For the period 2021–2027, there is EUR 42.3 billion in the so-called CEF (Connecting Europe Facility) fund[22] that project owners can apply for. The projects are intended to contribute to market integration and increase competition, improve security of supply and reduce carbon dioxide emissions.

In 2022, the EU regulation[23] regulating the processes and obligations within the framework of the PCI rules was revised. Among other things, the possibility to apply for PCI status has been extended to more infrastructure categories in addition to those already existing, including, among others, energy infrastructure for offshore renewable

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[21] Stockholms Ström | (stockholmsstrom.net)

[22] Connecting Europe Facility.

[23] Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013.

electricity, smart electricity grids and gas networks and hydrogen infrastructure. The new regulation also introduced a new concept which extends its scope to third countries to a certain extent. This is referred to in the regulation as projects of mutual interest (PMIs).

Ei has several tasks according to the rules, including participating in the evaluation of the projects applying to become PCI projects, reporting on the progress of the projects and deciding how to distribute the cross border cost allocation (CBCA).

Sweden currently has two PCI projects for electricity, one of which consists of the 400 kV Ekhyddan–Nybro–Hemsjö power line, divided into two individual concessions that are preliminarily estimated to be operational in 2025.

The concessions for the power lines have been granted, but one of the concessions has been appealed against and has therefore not yet become final. This project aims to increase the reliability of the transmission and regional grids and to secure the electricity supply to the NordBalt DC connection between Sweden and Lithuania. The project also contributes to increasing transmission capacity between the Swedish bidding zones SE3 and SE4 and to reducing transmission losses in the Swedish grid by approximately 275 GWh per year, which in turn leads to reduced environmental impact in the integrated European electrical energy system.

The second PCI project for electricity is the Aurora power line, which consists of a 400 kV cable from Messaure in the northern part of Sweden to Keminmaa in Finland. The Aurora power line lies between the Messaure station in the municipality of Jokkmokk and the Finnish border at the Torne River at Risudden in the municipality of Övertorneå, which is a distance of approximately 180 kilometres. In total, the entire overhead line is expected to be 380 kilometres long and will run parallel to the existing transmission grid line on the same stretch. As this is a foreign connection, Ei does not decide on a concession but has stated in a statement to the Government that the concession can be granted. The project has been planned by Svenska Kraftnät together with Finland's transmission system operator Fingrid and is scheduled to be in operation by the end of 2025.[24] The planned power line between Sweden and Finland is intended to result in great benefits for the entire Nordic electricity market, increase reliability of supply in Finland, further integrate Sweden into the Nordic electricity system and meet future needs for secure electricity supplies.

[24] https://www.svk.se/utveckling-av-kraftsystemet/transmissionsnatet/transmissionsnatsprojekt/aurora-line/

2.1.5 Cross-border issues and transmission restrictions

Under the EU rules, a transmission system operator has an obligation to transmit electricity on equal terms and transmission to and from neighbouring countries must not be restricted so as to prioritise domestic customers.

In general terms, the Swedish transmission grid is able to transmit electricity within Sweden and to our neighbouring countries, although there are sometimes some transmission restrictions in the electricity grid.

Svenska Kraftnät will use so-called remedial measures, counter-trading or re-dispatch, to manage transmission restrictions. This means that Svenska Kraftnät pays for increased electricity production in the deficit area and a corresponding amount of reduced electricity production in the surplus area. A prerequisite for being able to counter-trade is that there are production and/or flexibility resources in the deficit area in question.

The 70 per cent rule

The Electricity Market Regulation requires that at least 70 per cent of the capacity of the restricting grid element must be available for trade between bidding zones. The transmission system operator in Sweden, Svenska Kraftnät, may only restrict the transmission capacity of an interconnection in order to keep the restricting grid element below 70 per cent. This is a prerequisite for the effective functioning of the European integrated market.

In the event of problems with overloading in the grid, the overload must be remedied by means of measures such as counter-trading and re-dispatch so as not to go below 70 per cent of the transmission capacity of the restricting network element.

However, if necessary, and on the grounds of operational reliability, the regulatory authority (Ei) may allow exemptions from the requirement to keep 70 per cent of transmission capacity available. Exemptions may be granted for a maximum of one year at a time, or up to a maximum of two years, provided that the extent of the exemption decreases significantly after the first year.

Due to issues with the electricity grid, including the west coast section, as described below, Svenska Kraftnät has therefore applied to Ei for an exemption from the 70 per cent rule in 2020 and 2021. For the years 2020 and 2021, Svenska Kraftnät has been granted exemptions from the 70 per cent rule for six different interconnections (SE3–NO1, DK1–SE3, DK2–SE4, DE/LU–SE4, PL–SE4 and LT–SE4) in order to maintain operational reliability.[25] The occurrence of situations where restrictions have had to take place has been calculated using the

[25] See cases 2019-102946 and 2020-102975.

methodology recommended by ACER[26] and the results show that the restrictions have decreased significantly in 2020. In 2021, situations with high flows in the west coast section have been observed very rarely.

In 2021, Svenska Kraftnät applied for an exemption[27] from the 70 per cent rule for 2022 for transmission lines affected by increasing east-west flows; see description of the problem below. Ei assessed that Svenska Kraftnät should be granted an exemption from the 70 per cent rule for the east-west flow, i.e. for the bidding zone boundaries FI-SE3, but also SE3-DK1 and SE3-NO1. Since the Danish and Finnish regulators had opposed an exemption, ACER examined the issue and concluded that no exemption could be granted. ACER justifies its decision by stating that the requested exemption was not necessary to maintain operational security and that Svenska Kraftnät has not provided sufficient reasons or evidence to the contrary. ACER further justified its decision by stating that Svenska Kraftnät had not explained in its application how it would ensure that the scope of the exemption would not extend beyond what would be necessary to maintain operational reliability.

Finally, ACER found in its decision that Svenska Kraftnät had not sufficiently explained in its application how it would ensure that the requested exemption would not lead to discrimination between internal and cross-border exchanges. For these reasons, ACER chose not to grant Svenska Kraftnät an exemption from the 70 per cent rule for 2022.[28]

West Coast section

The West Coast section is a cross-section in the Swedish transmission network located in western Sweden within bidding zone SE3 and consists of a number of critical network elements[29] that in certain flow situations in the Nordic grid affect how much transmission capacity can be allocated to the market if operational reliability is to be maintained.

Problems with overloading in the west coast section arise, according to information from Svenska Kraftnät, during periods of northbound flow in the Swedish transmission grid. The general maximum capacity of about 2,300 MW is then not enough to handle the northbound flow.

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[26] ACER and NRAs practical note MACZT - Copy.docx (europa.eu)
[27] Ei's case 2021-102881
[28] ACER has decided not to grant the Swedish TSO a derogation from the 70% requirement | www.acer.europa.eu
[29] The term "critical network elements" (in Swedish "kritiska linjesegment") derives from the English term "critical network elements with contingencies (CNEC)". This is also in accordance with the Swedish translation of the Electricity Market Regulation. An alternative Swedish translation used by Svenska Kraftnät among others, is "kritiska nätelement".

East-west flow

Sweden acts as a transit country for electricity within the Nordic region and is interconnected with Norway, Finland and Denmark, as well as with the neighbouring countries Poland, Germany and Lithuania. The transmission grid is primarily built for flows that go from northern Sweden to southern Sweden. Ei has requested information from Svenska Kraftnät regarding the cross-border transmission in the transmission grid.[30] Reporting from Svenska Kraftnät started in 2021 and has continued on an ongoing basis.

In 2021, however, the east-west flow of electricity through the transmission grid has increased, mainly in bidding zone SE3.[31] The flow has arisen as a consequence of the Nordic electricity system undergoing several changes. For example, two of the reactors at the Ringhals nuclear power plant were taken out of operation in 2020 and 2021. At the end of 2020, the interconnection between Norway (bidding zone NO2) and Germany/Luxembourg was also put into operation. At the end of 2021, an interconnection between Norway (bidding zone NO2) and the United Kingdom was also put into operation. These events generally contribute to a higher energy flow from east to west.

Since the grid is not fully adapted for large flows in this direction, Svenska Kraftnät has taken measures to avoid overloading the electricity grid, which has resulted in transmission restrictions.

2.1.6 Capacity issues in the grid

The energy transition, urbanisation and an ageing grid infrastructure have led to a strained capacity situation in parts of Sweden's electricity grid. In several regions, this has meant that grid companies have had to deny new connections to the local electricity grid. This inhibits both growth and transformation to a more sustainable society. In 2020, Ei was commissioned by the Government to publish the report *Capacity Issues in the Electricity Grid*[32]. In this, Ei presented an action plan with measures to remedy the short- and long-term capacity shortages in the electricity grid.

Smart electricity networks

To enable the transition of the energy system, the electricity grids need to have the functionality needed to transmit electricity in the new energy system. “Smart electricity networks” is often used as a collective term to describe the electricity grids of the future. The concept is about new technology, new services and new conditions for regulation and market design in order to enable the energy transition. Smart electricity networks are not an end in themselves, but should be seen as a tool to create benefits for electricity customers and for society as a whole.

[30] Ei’s case 2021–100460
[31] Ei’s case 2021–102559
[32] Kapacitetsutmaningen i elnäten (Capacity Issues in the Electricity Grid) (EiR2020:06).

Smart electricity networks can contribute to the integration of renewable energy, increased energy efficiency and a more resilient and reliable electricity grid.

Article 59.1 of the Electricity Market Directive requires Ei to monitor and evaluate the development of Smart electricity networks on the basis of a limited set of indicators. In 2021, Ei published the report *Indicators for the development of smart electricity networks*[33] in which Ei presents a number of selected indicators that will provide a picture of the development of smart electricity networks in Sweden. Ei has now finalised regulations[34] on the data that electricity grid companies must report in order for Ei to be able to monitor the development of smart electricity networks. The regulations entered into force on 1 October 2022. Electricity grid operators will start reporting this data to Ei in 2024.

In 2021, Ei presented the report *Evaluation of costs and benefits of smart electricity networks*.[35] In the report, Ei, on behalf of the Government, developed both strategic and operational work on smart electricity networks . In the report, Ei evaluates the socioeconomic costs and benefits of smart electricity networks compared to other alternatives.

The evaluation includes different scenarios for the composition of electricity production in the Nordic power system and increased electrification in society.

Network development plans for distribution grid companies

Article 32.3 of the Electricity Market Directive requires the development of distribution systems to be based on a grid development plan. The purpose of grid development plans is to ensure long-term and transparent planning by distribution network operators and enhanced cooperation between distribution and transmission system operators and other relevant system users.

The grid development plan must describe the planned investments of the grid company over the next 5 to 10 years, with particular emphasis on the main distribution infrastructure required to connect new production capacity and new consumers, including recharging points for electric vehicles. It must also address the need for resources that can be used as an alternative to grid expansion, such as flexibility services.

A grid development plan must be developed through a consultation procedure. Each distribution grid company must consult with transmission grid companies and relevant system users when preparing their grid development plan. In the

[33] Indikatorer för utvecklingen av smarta elnät (Indicators for the development of smart electricity networks) (EiR2021:07).
[34] The Swedish Energy Markets Inspectorate's regulations and general advice EIFS 2022: 5 on the obligation to report data on the development of smart electricity networks
[35] Utvärdering av kostnader och nyttor av smarta elnät (Evaluation of costs and benefits of smart electricity networks) (EiR2021:06).

future, grid development will therefore be permeated by greater transparency and a holistic approach.

The rules regarding grid development plans entered into force in Sweden in July 2022. Since then, all distribution grid operators are obligated to submit a grid development plan to Ei.

Ei may issue regulations on which information is to be contained in the plans and how they are to be prepared, as well as the manner in which the grid development plans are to be published and the information that must be published together with the plan. Ei is currently in the proceess of drafting the regulations for the network development plans.

Demand flexibility

In a future electricity market with a higher proportion of variable electricity production, it will be important to take advantage of all resources, both production and flexibility, in the electricity system. Flexibility can be defined in different ways in different contexts, but what characterises flexibility resources is that they are flexible in their input or withdrawal of energy or power, such as heat pumps, electric car chargers etc. The flexibility resources that allow customers to vary their consumption over time are called demand flexibility or demand response. In order to incentivise electricity customers to be demand-flexible, price signals where the price of electricity and the network charges vary with supply and demand are effective. For example, customers can be given signals to reduce their electricity consumption when the electricity grid is under heavy load, or to increase their consumption when the price of electricity is low, as is the case, for example, with good access to electricity production from wind power. Demand flexibility enables a more efficient use of resources and can facilitate frequency maintenance in the electricity system. Demand flexibility can also help in power shortage situations and with local grid problems.

According to the Electricity Act (1997:857), electricity grid companies may not impose technical requirements or other conditions that make it difficult for market participants to provide services for demand flexibility, unless the condition is justified with regard to the safe, reliable and efficient operation of the electricity grid.

Ei has an overall responsibility to promote demand flexibility in the electricity market in Sweden, as stated in the Government's Ordinance (2016:742) with instructions for Ei. To guide the promotional work, Ei developed a Strategy[36] for Flexibility 2020 consisting of three strategic areas: effective price signals, efficient grid utilisation and the customer's contribution to flexibility. In practice, the

[36] Ei:s strategi för flexibilitet i elsystemet (EI's strategy for flexibility in the electricity system)

promotional work takes place in various ways, for example through the so-called Effect Dialogue, which is a Ei-led forum for dialogue with market participants on flexibility issues. Ei shall also annually compile and publish the technical requirements and other conditions for the provision of services in the form of changes in electricity consumption. The survey for 2022 indicates, as in previous years, that electricity grid operators do not impose technical requirements and conditions that are not justified by the safe, reliable and efficient operation of the electricity grid.

2.1.7 Quality of supply

Rules on continuity of supply, voltage quality and interruption compensation

The Swedish Electricity Act stipulates that the transmission and distribution of electricity must be of good quality. The so-called functional requirement in the Electricity Act means that an electricity outage may not exceed 24 hours. In addition to the functional requirement of the Electricity Act, Ei has drawn up regulations on what other requirements must be met in order for the transmission and distribution of electricity to be of good quality. The regulations contain requirements for voltage quality, treeproofing of regional grid power lines, the number of outages at customer level and functional requirements for higher load levels. A revision of the regulation is currently underway, in which Ei plans, among other things, to introduce an exemption from the 24-hour requirement of the Electricity Act. The present plan is for the new updated regulation to enter into force from 2024.

Grid companies are obliged to perform risk and vulnerability analyses and to draw up action plans that show how the reliability of supply in their own grids is to be improved. The purpose of the provisions is that grid operators reduce vulnerability in the electricity grid by means of preventive work and to contribute to meeting the functional requirement of the Electricity Act that power cuts must not exceed 24 hours. Ei has decided on regulations on the annual reporting of risk and vulnerability analyses in the electricity grids, which also includes the submission of a report based on the risk and vulnerability analysis and the action plan to Ei.

Electricity users with outages of electricity that last at least 12 hours is entitled to compensation from the grid company to which it is connected, so-called outage compensation. The requirement applies to outages that fall within the control responsibility[37]of the grid operator. The compensation is flat-rate and must be paid automatically. Ei has issued regulations on how a grid operator is to inform its customers about the rules for outage compensation. The Electricity Act also

[37] Events within the control responsibility are events that the company can reasonably foresee and for which the grid company can be expected to dimension the design and operation of the grid.

contains provisions on the right to compensation from grid companies in the event of personal injury or damage to property.

Ei assesses the continuity of supply in the electricity grid based on outage reporting

A well-functioning electricity supply is of great importance for the functioning and development of society. Since 2011 (regarding outages in 2010), grid operators annually report detailed data on customer-level outages, both for short and for long outages. Based on this data, Ei measures and analyses the continiuity of supply in the Swedish electricity grids, which is largely done by monitoring various indicators. Grid operators must also report long-term and extensive power outages to Ei on an ongoing basis.

One of the purposes of the reporting is also to enable Ei to assess the quality of supply in electricity grids and to intervene if the measures implemented by the grid companies are insufficient. The assessment of the quality of supply also has an impact on the size of the revenue cap, i.e. the amount of profit that the grid operator may have during a regulatory period. The principle is that quality poorer than a predetermined norm reduces the size of the revenue cap, while higher quality can instead give a higher revenue cap. Learn more about the revenue in 2.1.8 Electricity grid charges and the revenue cap for electricity grid companies.

Table 1 shows power outages in local grids in 2010–2021 (companies submit outage data per calendar year based on the previous year).[38] The figures indicate average values per customer and are divided into unannounced and announced outages. Announced outages are outages that the customer has been notified of well in advance of the outage. These outages may be justified for electrical safety reasons or for operational reasons, for example due to repairs and preventive maintenance in order to maintain good operational reliability and continuity of supply. According to the Electricity Act, the announced outage may not last longer than the measure requires.

[38] For more outage statistics, see Ei's annual report on reliability of supply in Sweden's electricity grid, Ei R2022:11

Table 1. Power outages in local grids due to faults in own local grid, average values per customer[39]

Year	SAIFI, announced outages (outages/year)	SAIFI, unannounced outages (outages/year)	SAIDI, announced outages (minutes/year)	SAIDI, unannounced outages (minutes/year)
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
2016	0.15	0.85	18	61
2017	0.14	0.82	16	52
2018	0.13	1.01	15	73
2019	0.15	0.96	17	120
2020	0.17	0.83	17	65
2021	0.21	0.80	17	53

Statistics for 2022 will be completed in summer 2023. Source: Ei

Customers connected to electricity grids in rural areas suffer on average from both more outages and longer outage times than customers connected to electricity grids in urban areas. Rural grids are generally more exposed to weather-related disturbances, partly because these grids often have a higher proportion of uninsulated overhead lines and a lower proportion of underground cables compared to urban networks. In order to reduce the vulnerability of electricity grids to extreme weather, the proportion of underground cables in local grids has increased. However, underground cables may suffer from non-weather-dependent disturbances, such as outages caused by cable rupture due to excavation work or ageing components. With regard to overhead lines, insulated overhead lines are more robust than uninsulated overhead lines. Approximately 99 per cent of the total power line length of local grids in the low-voltage grid is insulated. At the medium and high voltage levels of local grids, about 84 per cent of the power lines are insulated.[40]

2.1.8 Electricity grid charges and the revenue cap for electricity grid companies

As mentioned above, electricity grid companies have a monopoly to operate electricity grids and are therefore not subject to competition. In order to ensure that grid operators do not exploit their position and make unreasonably high charges to their customers, Ei supervises electricity grid operators.

[39] SAIFI=System Average Interruption Frequency Index (average number of outages per customer per year).
SAIFI=System Average Interruption Duration Index (average outage time per customer per year).
[40] The figures are for 2021. Statistics for 2022 will be completed in autumn 2023.

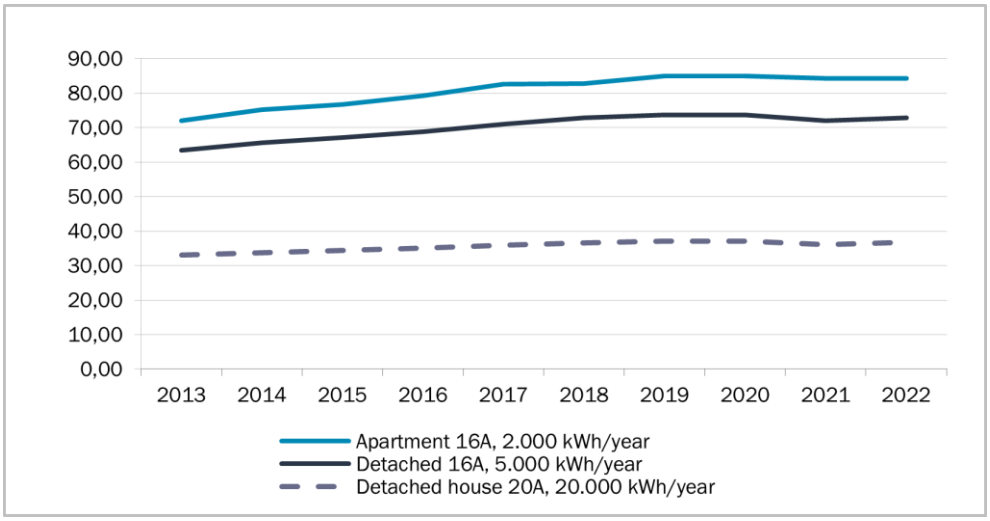
Electricity grid charges

According to the Electricity Act, the electricity grid charges paid by each customer must be objective and non-discriminatory, as well as compatible with the efficient use of the electricity grid.

Objective means that the company's total charges for a category of customers must reflect the costs that the grid company has for that particular category. Companies may therefore have different charges for different categories of customers, such as detached house customers and apartment customers. Non-discriminatory means that companies may not favour one category of customers over another category of customers. The electricity grid charge often consists of a fixed part (subscription charge) and a variable part (electricity transmission charge). The fixed part varies with the size of the fuse or the subscribed power. The variable part varies based on the customer's consumption.

Every year, grid companies report data on their electricity grid charges to Ei, which Ei then compiles and publishes. In order to compare the electricity grid charges of different electricity grid operators, Ei collects data from the companies for 15 different types of customer groups. Figure 2 shows how grid charges for different types of household customers have developed over the past ten years. Between 2021 and 2022, charges increased on average by 0.1 per cent for apartment customers, 1.4 per cent for house-owning customers with a 16 A fuse and by 1.7 per cent for house-owning customers with a 20 A fuse[41]. In Swedish kronor, this corresponded to an increase of approximately SEK 2, SEK 50 and SEK 123 respectively over the year.

Figure 2. Real development of grid charges for household customers[42]



Source: Ei

[41] Real values at 2022 prices, not weighted.
[42] Average value calculated at 2022 price level, not weighted.

Customers with low electricity consumption usually have fewer options than customers with high electricity consumption. Most electricity grid companies offer only one type of tariff, a so-called single tariff, to customers with low consumption. Single tariff means that the customer pays the same amount regardless of when during the day the electricity is consumed.

An alternative to a single tariff is some form of time-differentiated tariff in which the customer pays different amounts per kilowatt hour depending on when during the day or year the consumption takes place. A number of electricity grid operators have also introduced output-based tariffs for household customers. Both of these tariffs consist of a smaller, fixed charge linked to the fuse size, which determines the maximum power output. In addition, the time tariff also includes a charge per kilowatt hour – a so-called variable price that depends on how much electricity is consumed. This variable price may differ at different hours of the day and/or different seasons. A power-based tariff, on the other hand, is instead based on power; it contains a charge that is made on the power used by the customer. This power price can be based on the household's previously measured maximum hourly or part-hourly average power consumption[43]. However, the power charge can also be time-differentiated like the time tariff and be different at different times of the day and/or year.

In 2018, Ei was authorised to prescribe the design of tariffs. Since then, a project has been underway at the agency to design grid tariffs that promote efficient grid utilisation. In March 2022, the new regulations (EIFS 2022:1[44]) were adopted, which aim to contribute to a more efficient use of the electricity grid and thus contribute to society's electricity needs being met at as low of a cost as possible. The new regulations entered into force in July 2022 and will start to apply from January 2027 at the latest.

The new regulations state that grid tariffs need to contain four cost-effective elements in order for them to be considered to promote efficient grid utilisation. The first component, the energy charge, shall be levied as a charge per kilowatt hour and shall be based on the marginal costs of electricity transmission. It may also vary over time depending on how costs vary in the grid. The second component is the power charge, which shall be based on the forward-looking costs and levied as a metered power charge (SEK/kW). According to the regulation, the power charge must be time-differentiated, i.e. vary in some way over the day and/or year. The third component is the customer-specific charge and this must correspond to the costs that the grid company has for a specific customer or customer group, in the form of metering, reporting etc. This is charged as a fixed charge. The fourth and final component is the tariff component, which must

[43] More information about tariffs can be found in the memorandum Elnätstariffer för ett effektivt nätutnyttjande - Principiella val för utformningen av nättariffer (Electricity grid tariffs for efficient grid utilisation - Fundamental choices for the design of grid tariffs) (Ei PM2020:06).
[44] The Swedish Energy Markets Inspectorate's regulations and general advice for the design of grid tariffs for efficient use of the electricity grid EIFS 2022:1.

correspond to the other costs of the business that have not already been covered by the other parts (so-called residual costs). This component shall be charged to customers as a subscription charge, either as a fuse subscription or as a power subscription. Customers should, as far as possible, also perceive this cost as fixed.

Ei's decision on income from electricity grid charges for distribution companies

The revenues of electricity grid operators have been determined by means off Ei establishing a framework in advance for the revenues of every network operator for a period of four years. This is known as revenue framework. After the regulatory period, Ei checks the company's revenue framework with the actual outcome.

The purpose of the revenue framework is to ensure that electricity grid operators work efficiently at low costs and that they receive a reasonable return. The revenue framework is intended to ensure that the customer pays a reasonable price for the transmission of electricity and to contribute to providing customers with good, long-term reliability of supply.

As previously reported, the revenue framework shall cover reasonable costs of operating grid activities during the regulatory period and provide a reasonable return on the capital required to conduct the business, the capital base. Costs of the effective and efficient operation of grid activities under similar objective conditions shall be considered as reasonable costs of operating the network activity. When determining the revenue framework, the quality of the way in which electricity grid operators work shall be taken into account.

When calculating the revenue frameworks, the age of the installations is taken into account when assessing the company's capital costs. In addition, the economic lifetime of the installations, the so-called depreciation period, is indicated. As a direct consequence of the Energy Efficiency Directive[45] a provision has also been introduced in the Electricity Act stating that when assessing the revenue framework, Ei must also take into account the extent to which grid operations are conducted in a way that is compatible with or contributes to the efficient use of the electricity grid.

If an electricity grid operator's income deviates from the revenue framework, this affects the revenue framework for the subsequent regulatory period. If the company's income has been lower than the framework allows, this means that the revenue framework for the coming period is increased by the corresponding amount. If, on the other hand, the network company has exceeded the framework,

[45] 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.

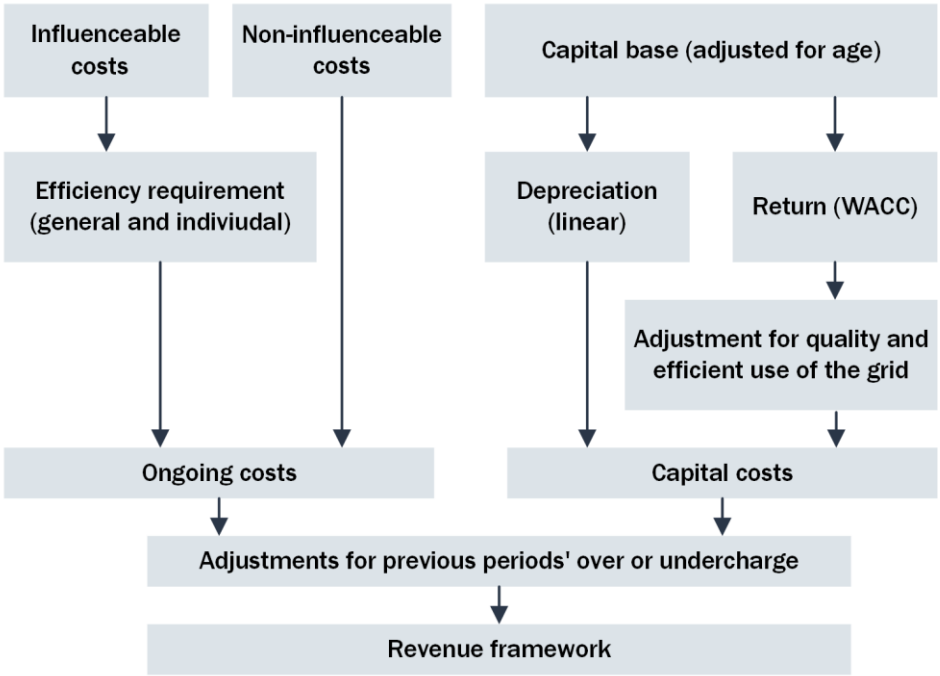
the revenue framework for the coming period decreases and, if the infringement exceeds five per cent, an overcharge surcharge is added, which further reduces the revenue framework. The Electricity Act also contains rules on reviewing the revenue framework during and after the regulatory period.

Regulation model for the regulatory period 2020–2023

The reasonable costs to be covered by the revenue framework are divided into capital costs and influenceable and non-influenceable running costs. How the different components of the revenue framework are calculated is shown in Figure 3.

The capital cost is the cost of using capital. The basis for calculating the cost of capital is the capital base. The capital base includes fixed assets, such as power lines and substations, that an electricity grid company uses to conduct grid operations. The cost consists of two parts: the cost of erosion of capital (depreciation) and the cost of capital tie-up (return). The capital base is valued for the period 2020–2023 on the basis of current acquisition value and the return is calculated using a real calculation rate before tax.[46] When calculating the cost of capital, Ei takes into account investments made during the respective regulatory period.

Figure 3. Elements of the revenue framework for the regulatory period 2020–2023



[46] In court proceedings, Ei has admitted a calculation rate of 2.35 per cent for the regulatory period 2020–2023.

The amount of return is also affected partly by the quality of grid operations and partly by how efficiently the grid is utilised. The quality is assessed on the basis of interruptions in transmission. Crucial in assessing efficiency are grid losses and the load on the grid. Together, these incentives may increase or decrease the regulatory return by a maximum of one third per year.

Non-influenceable costs include costs of grid losses, subscriptions to superordinate and adjacent grids, connection to superordinate and adjacent grids and costs of government fees. Companies are fully covered for non-influenceable costs.

Examples of influenceable costs are costs of operation and maintenance as well as customer-specific costs for metering, calculation and reporting, for example. For the 2020-2023 regulatory period, Ei used companies' historical costs as a basis for determining non-influenceable costs for the regulatory period. In order for customers to benefit from expected productivity increases, the regulation includes a requirement for efficiency improvements. The efficiency requirement means an annual reduction in influenceable costs between 1 and 1.82 per cent depending on the efficiency of the company. Work to review the regulation of electricity grid companies is underway at Ei and decisions for the next regulatory period 2024–2027 will be made by 31 October 2023.

In April 2021, the Government decided on the Act (2021:311) on special investment scope for electricity grid operations. The purpose of the act is to try to create special incentives for electricity grid companies to make investments that increase the capacity of the electricity grid. In practice, the act means that companies that have unused capacity left over from the 2012–2015 regulatory period may use this capacity to compensate for investments during the 2020–2023 regulatory period. However, companies are required to apply to use this capacity.

By the end of March 2023, 88 applications for an investment amount had been received and Ei has made decisions in 75 of these cases. After the Judgment of the Court (Fourth Chamber) of 2 September 2021 in Case C-718/18, European Commission v Federal Republic of Germany, EU:C:2021:662, also known as Commission v Germany or C-718/18, was handed down, Ei has not made any more decisions. However, Ei is currently investigating whether the regulations surrounding the law on investment capacity can be applied at all.

Court proceedings during the regulatory period

In 2019, Ei made 179 decisions on revenue frameworks for the 2020-2023 regulatory period. Approximately 120 decisions were appealed to the Administrative Court. The main issues in the companies' appeals were whether Ei was allowed to apply the Revenue Framework Regulation[47] when determining the electricity grid

[47] Ordinance (2018:1520) on revenue frameworks for electricity grid operations.

companies' revenue framework and whether the provisions on the calculation rate in the Revenue Framework Regulation were contrary to the Electricity Act or the Electricity Market Directive as regards Ei's independence from public and private operators and the legislator, and thus could not be applied. This issue is relevant to a great deal of the calculation of the revenue framework. At the end of February 2021, the Administrative Court announced that the provisions on the interest rate in the Revenue Framework Regulation could not be used and referred the cases back to Ei. Ei appealed the Administrative Court's judgments to the Administrative Court of Appeal in Jönköping.

In June 2022, the Administrative Court of Appeal in Jönköping handed down judgments in the cases concerning the electricity grid companies' revenue frameworks for the period 2020–2023.[48] The judgments of the Administrative Court of Appeal mean that the Revenue Framework Ordinance and previous court decisions do not apply when calculating the electricity grid companies' returns. Instead, Ei should work from the framework set by EU law, in particular the Electricity Market Directive[49], when determining returns. The judgment emphasises Ei's role as an independent regulatory authority with exclusive authorisation. The judgment was appealed to the Supreme Administrative Court (HFD) by 120 electricity grid companies. On 12 January 2023, the Supreme Administrative Court announced that leave to appeal would not be granted in the case and thus the judgment of the Administrative Court of Appeal also gained legal force.

Revenue frameworks applied for and decided

The level of the revenue frameworks in Table 2 shows which revenue frameworks were applied for by electricity grid operators, Ei's decided revenue frameworks and the revenue frameworks established after judicial review for the regulatory periods 2012–2015 and 2016–2019.[50] When comparing the different regulatory periods, it should be noted that the amounts for the regulatory periods are expressed in different years' price levels.

[48] Case: 1103--1222-21. National provisions for calculating electricity grid companies' returns are contrary to EU law - Administrative Court of Appeal in Jönköping (domstol.se)
[49] Directive 2009/72 of the European Parliament and of the Council of 13 July 2009.
[50] Svenska Kraftnät's revenue framework is not included in the table.

Table 2. Revenue frameworks

Revenue frameworks, SEK billion	Amounts applied for	Decided frameworks	Frameworks following review by the courts
2012–2015 (2010 price level)	183	160[51]	196[52]
2016–2019 (2014 price level)	176	164[53]	173[54]
2020–2023 (2018 price level)	-[55]	168	-[56]

Source: Ei

Application of the provisions on revenue frameworks following judgments from the Court of Justice of the European Union and the Administrative Court of Appeal in Jönköping

Following the decisions on the revenue frameworks for the period 2020-2023 made by Ei in 2019, the Court of Justice of the European Union has issued a judgment in the case concerning whether Germany has correctly incorporated parts of the Electricity and Natural Gas Market Directive. The judgment has come to be known as the Commission v Germany (C-718/18). The European Commission considered that this had not been the case, and was also vindicated by the Court of Justice of the European Union. Similar issues have also been addressed in the proceedings (mentioned in the section above on court proceedings during the regulatory period) concerning the Swedish revenue frameworks for electricity grids. The Administrative Court of Appeal handed down a judgment on 16 June 2022 in the electricity grid cases 2020–2023. In some key parts, the judgment is based on the German ruling, which means that provisions in the Swedish regulatory framework that are detailed may not be applied because the provisions restrict Ei's independence from the Government and parliament.

The legal situation means that the detailed rules on the calculation of the revenue frameworks are contrary to EU law and therefore cannot be applied. Instead, within the limits of its exclusive authorisation, it is necessary for Ei to determine

[51] Ei admitted in the court proceedings that the transitional method used was modified in some respects. The consequence was, among other things, that the revenue frameworks then increased from approximately SEK 150 billion to SEK 160 billion.
[52] The SEK 196 billion corresponds to approximately SEK 201 billion after reconciliation and at the 2014 price level.
[53] Ei allowed the calculation rate to be changed from 4.53 to 4.56 per cent in the court process and the revenue frameworks then increased from 163 to 164 billion.
[54] On the companies' application for a correction of capital base, Ei reviewed a number of revenue frameworks during the 2016-2019 regulatory period. The revised revenue frameworks led to an increase in the revenue frameworks from 172 to 173 billion.
[55] With effect from the 2020–2023 regulatory period, companies will not apply for amounts. All companies receive a revenue framework based on what the calculation allows and Ei adjusts the calculation after the period based on the actual conditions.
[56] Decisions on the revenue frameworks have been referred back to Ei for reconsideration. Ei will therefore redefine the revenue frameworks for the period 2020-2023, but now based on the goals and criteria of the Electricity Market Directive.

independently the methods to be used in decisions for determining the revenue frameworks, as set out in the Commission v Germany (C-718/18).

The regulations issued by Ei have largely been issued on the basis of provisions established in the Revenue Framework Regulation (2018:1520). As these can no longer be applied, Ei decided on 11 November 2022 to repeal a number of regulations, including those that regulate the data that grid companies must report to Ei by 31 March 2023. Ei has therefore instead issued a specific request for information from all electricity grid companies by 20 April 2023. This information will be used to determine the revenue frameworks for the regulatory period 2024-2027. The decisions must be taken by 31 October 2023.

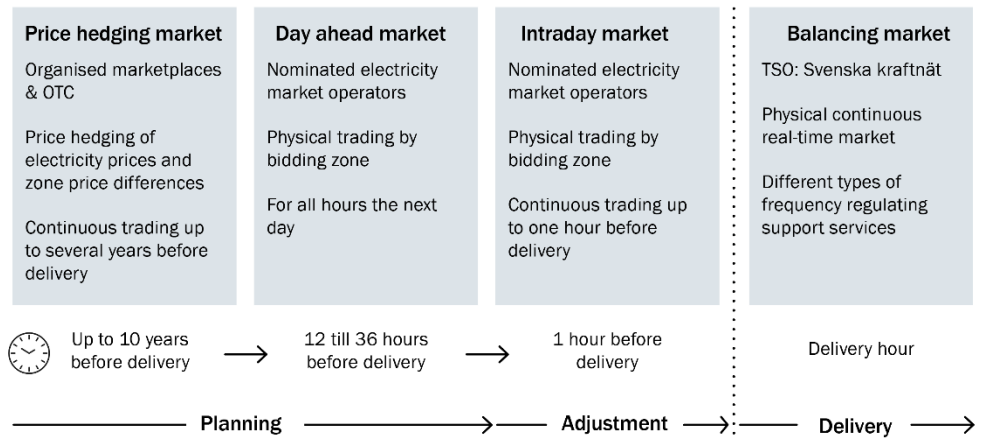
2.2 The wholesale market for electricity

The price of electricity varies with supply and demand for each hour. The electricity market is special in that at any given time as much electricity must be produced as is consumed in order for the system to be in balance and operation to be secure. In order to allow electricity to be traded with different time horizons, the market has been divided into different sub-markets.

2.2.1 The electricity trading system

The electricity trading system can be divided into four sub-markets where electricity is traded at different times in relation to supply: the price hedging market, the day-ahead market, the intraday market and finally the balancing market; see Figure 4.

Figure 4. The electricity trading system



Source: Ei (OTC = bilateral trade - over the counter)

There are organised marketplaces for trading in the various sub-markets. In addition to trading in these marketplaces, it is possible to trade electricity bilaterally between parties. Prices on organised markets serve as reference prices for bilateral trade.

The day-ahead, intraday, balancing and hedging markets are governed by EU-regulations. The day-ahead and intraday markets are regulated in CACM, while the balancing market and hedging market are governed by rules in EB and the Commission regulation FCA[57]respectively.

Electricity trading venues

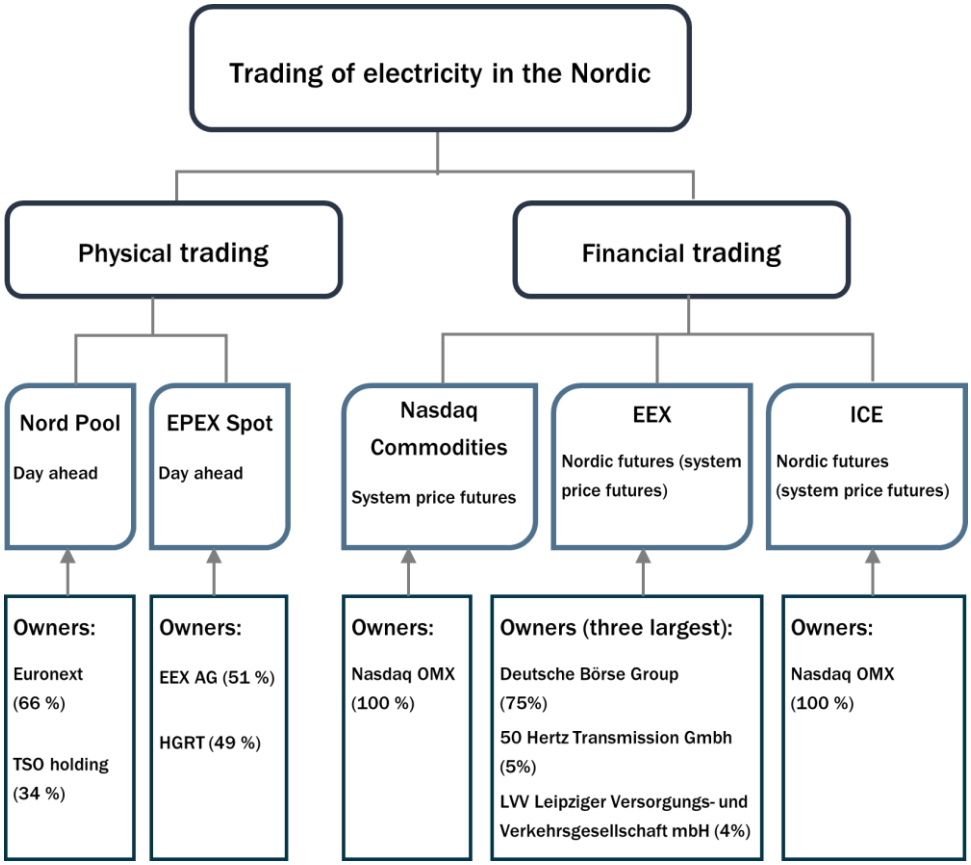
According to CACM, an electricity exchange needs a permit to conduct electricity exchange operations in a bidding zone. Nord Pool and EPEX Spot[58] have permits to act as nominated electricity market operators (NEMOs[59]) and may conduct electricity exchange operations on the day-ahead market and intraday market in Sweden. Nasdaq Spot has a permit to conduct electricity exchange operations on the day-ahead market. At present, only Nord Pool and EPEX Spot have established operations.

Nord Pool's day-ahead market is the marketplace for most of the physical trade in electricity in the Nordic and Baltic countries. In 2022, Nordic and Baltic players traded about 696 TWh on Nord Pool's day-ahead market and about 47 TWh on EPEX spot. The majority of all electricity traded in the Nordic countries is traded on the day-ahead the market.

In Sweden and the Nordic region, both Nasdaq Commodities and EEX organise trading in and settlement of financial contracts; see more below under the heading Price hedging market.

[57] Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation.
[58] The EEX group operates both EPEX spot and EEX. EPEX's focus is spot markets and EEX's focus is financial products.
[59] *Nominated Electricity Market Operator* (NEMO): A company that wishes to offer its services on the European day-ahead and intraday markets must be designated as a nominated electricity market operator and continuously comply with the criteria.

Figure 5. Trading venues for electricity in the Nordic-Baltic market



Source: Nord Pool[60], EPEX Spot, Nasdaq Commodities and EEX.

Price hedging market

Electricity prices may vary over time and between bidding zones. There are several ways in which operators can manage the risks arising from the variation in prices in the electricity market. The price hedging market for transmission between bidding zones is governed by the rules of the FCA regulations. The rules aim to ensure that market participants are in a sufficient position to manage the economic risks that exist in electricity markets.

In the Nordic countries, combinations of different financial contracts are mainly used for price hedging, and in the rest of the EU, financial contracts are mainly used for price hedging over time (e.g. German futures contracts) and long-term transmission rights for price hedging of transmission between bidding zones. The main difference is that long-term transmission rights are issued by transmission system operators, while financial contracts in the Nordic countries can be bought and sold freely and continuously by market participants on trading venues or bilaterally.

[60] The Nordic system operators together with the Lithuanian (Litgrid) own a total of 34 per cent of Nord Pool through a joint holding company, TSO holding.

In Sweden and the other Nordic countries, price hedging is most commonly done by parties trading in system price contracts, which in some cases are combined with so-called EPAD (Electricity Price Area Differentials) contracts. A system price contract is linked to a reference price, the so-called system price.[61] The remaining price risk, i.e. the difference between the price in a specific bidding zone and the system price, is hedged by means of EPAD contracts. If market participants expect the price in a bidding zone to be the same as the system price, there is no need to supplement system price contracts with EPAD contracts.

System price contracts and EPAD contracts are derivative instruments that can be traded bilaterally by parties, either through brokers or on trading venues. In the Nordic region, Nasdaq Commodities, ICE and EEX organise trading in, and settlement of, financial contracts. Contracts traded bilaterally are generally settled by a clearing house.[62] The settlement means that the parties have the clearing house as a counterparty. In this way, the clearing house assumes the counterparty risk. At present, it is possible in Sweden to hedge the price of your electricity production or consumption up to several years in advance. Trading takes place continuously and is priced according to pay-as-bid pricing.[63] Participation in the financial market is voluntary, and participants therefore choose which contracts are appropriate to use to manage their risk. Ei does not monitor the type of hedging policy applied by different parties. Exchanges are free to develop and offer the market various derivative instruments.

Sufficient liquidity in the derivatives market is a prerequisite for efficient trading. The higher the liquidity in the market, the smaller the price spread between purchase and sale bids, i.e. the more effective the price signals. The purpose of system price contracts is to generate sufficient liquidity. Liquidity for system price contracts is a result of trading in Sweden, Norway, Denmark and Finland, which constitute a common bidding zone (since the capacity between these is set as infinite in the calculation). In recent years, liquidity in system price contracts has decreased and thus also in EPAD contracts (especially EPAD SE3). Increased bilateral trade (e.g. in the form of so-called power purchase agreements, PPAs) and electricity supply companies' reduced need for hedging as a result of fewer fixed-price contracts with customers may partly explain why liquidity has decreased in system price contracts and EPAD contracts.

The day-ahead market

The day-ahead market, often referred to as the spot market, is the main market for planning the next day's electricity supplies. The design of the day-ahead market is

[61] *The system price* is the price that would prevail in the Nordic trade area if there were no transmission restrictions.
[62] A clearing house is a party that acts as a neutral intermediary in bilateral trading in financial products.
[63] Pay-as-bid pricing means purchase and sale bids that are accepted are settled at the price the party has given on the market.

regulated in the CACM Regulation. CACM exists to achieve a common internal market for electricity within the EU. CACM contains provisions that regulate, among other things, that available transmission capacity is calculated and allocated to the market in a coordinated manner. It is also to ensure that the correct bidding zones are established within the Union, that nominated electricity market operators (NEMOs) in the EU can compete with each other on a levelled playing field, and that the costs arising from the development and operation of the market connections are shared between stakeholders and Member States in a cost-effective manner.

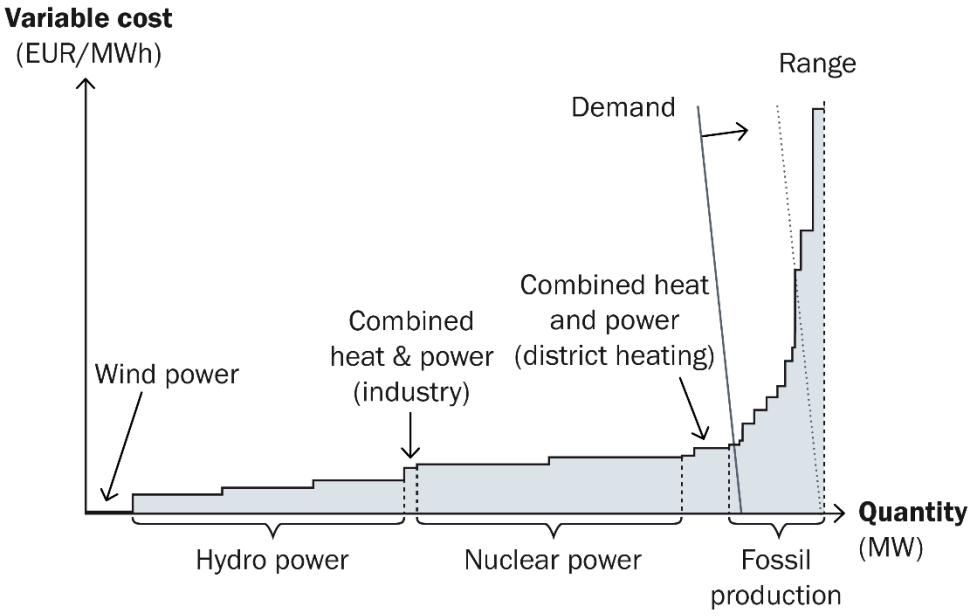
Trading on the European day-ahead markets takes place in such a way that participants submit their purchase and sale bids to the electricity exchange no later than 12.00. The bids are valid for the following day and are submitted for each full hour. The bids specify how much the party wants to buy or sell, at what prices and in which bidding zones. In the next step, when all bids have been received, the electricity exchanges summarise all bids in a buy ladder and a sell ladder for each hour. Where purchase and sale bids match, the market price and the volume that will be bought and sold are established. All sale bids lower than the established price may produce and sell their electricity on the market in the hour in question and all purchase bids above the established price may buy electricity in the hour in question. This matching process means that plants that are prepared to sell at low prices or regardless of price are used first and that more expensive bids are then taken up as needed. No later than 13.00, the nominated market operators will publish the prices for the following day.

On the day-ahead market, marginal pricing is applied, which means that all participants who make a transaction are allowed to trade at the established market price, regardless of their initial bids. No distinction is made between different production technologies. Thus, the bids compete on equal terms regardless of the type of production invited into the market.

The price of electricity is set where the supply curve intersects the demand curve. Figure 6 presents a fundamental picture of price formation on the spot market and the order in which different types of power are affected in relation to supply and demand. Wind power generally has the lowest variable cost, followed by hydropower. It is worth noting that hydropower producers normally submit bids at several different price levels. This is because a hydropower producer, which has access to reservoir capacity, has the opportunity to choose between production today and production at a later date, depending on how much it is paid for its capacity. If the producer expects a higher price in the future, it is likely to refrain from producing electricity and instead save water in the reservoirs.

In the event of an increase in demand, the demand curve moves to the right in Figure 6. In the example, this means that more fossil production is needed to meet demand, which means higher costs and thus a higher price. Another essential feature of the supply curve is the possibility of imports, which vary in both volume and price from hour to hour. The possibility of exports comes in on the demand side and is therefore represented in the demand curve in the figure. Electricity flows freely within the interconnected countries of Europe and it is supply, demand and transmission capacity that affect imports and exports.

Figure 6. Price formation in Sweden



Source Ei

Today, nominated electricity market operators (NEMOs) in Europe work together to calculate market prices and trading volumes for day-ahead trading, this is called market coupling. The rules for market coupling have been proposed by the nominated electricity market operators (NEMOs) and approved by the relevant regulators and ACER. In order to calculate a price cross, where supply and demand meet, for each bidding zone, supply and demand need to be taken into account throughout the EU's integrated electricity market, as well as the possibilities for transmitting electricity between bidding zones. The calculation method, the price coupling algorithm, used by the electricity exchanges is developed jointly by the electricity exchanges and the exchanges take turns making the market coupling. How the EUPHEMIA[64] algorithm works is public and can be read about on the electricity exchanges' respective websites. The fact that the electricity exchanges calculate exchange prices jointly means that they calculate

[64] Acronym for Pan-European Hybrid Electricity Market Integration Algorithm

flows over larger areas so that available production and transmission capacity are used in the best way.

The exchanges take turns calculating the prices so that only one electricity exchange at a time calculates the prices for the common area. To deal with transmission restrictions, the electricity market is divided into bidding zones; see section 2.2.3 for more information. Trading on the day-ahead market constitutes a large part of physical trade and price formation in the Nordic countries and thus Sweden. The market is thus considered to be central to the participants' earning capacity.

Central to a functioning market coupling is that available transmission capacities in the electricity grid are calculated and allocated in an efficient manner. Currently, a method for capacity calculation is used in Sweden and the other Nordic countries where the net transfer capacity (NTC) is calculated. The calculation is made based on a forecast of how the flows will go in the transmission network and how much transmission an interconnector can handle within the framework of operational reliability. It is the transmission network operator who makes the forecast and capacity calculation. In 2024, the Nordic transmission network operators intend to switch to a new method that is flow-based. With the flow-based method, the calculation will be done via a regional coordination centre (RCC). With the aid of a common grid model (CGM), a flow-based approach will allow taking better account of the system as a whole, thus producing a more accurate forecast that maximises the total transmission capacity that can be allocated to the market in the region. In 2022, continued work has taken place among the Nordic transmission network operators to prepare for the introduction of the flow-based method.

Intraday market

The design of the intraday market is regulated by the CACM commission regulation just as with the day-ahead market. The intraday market is an adjustment market that allows traders to trade in balance up to one hour before the operating hour if conditions have changed after the day-ahead market closed. For example, the weather may have deviated from the forecast, which may affect both production, in the form of wind and solar power, and consumption, for example via heating needs.

The intraday market is mainly used by balancers, i.e. those companies that have undertaken to take financial responsibility for market imbalances, although participation in the intraday market is not a requirement to be a balancer. Trading on the intraday market opens at 14.00 the day before and closes one hour before the delivery hour. The bids are matched continuously when a counterparty is found, which means that the trade takes place between two parties and without price impact on other transactions.

The volumes traded on the trading platforms that offer intraday markets in the Nordic region are small compared to the day-ahead market.

In other European marketplaces, the intraday market plays a greater role than in the Nordic region. For the intraday market too, it is crucial that capacities in the electricity grid are calculated and allocated in an efficient way, so that the market coupling in turn becomes effective. Currently, the NTC method is also used in Sweden and the rest of the Nordic region for the intraday market. The intraday market will also move to a flow-based approach to capacity calculation.

Nominated electricity market operators (NEMOs) and transmission system operators (TSOs) are working to introduce EU-wide intraday auctions (IDAs), which were supposed to be in place in January 2023 but have been delayed until Q1 2024. Intraday auctions are an implicit form of auction that will be conducted at pan-European level to allocate available inter-zonal transmission capacity on the intraday market using the same algorithm and market coupling mechanism used on the EU-wide day-ahead market. The idea is that it will be possible to organise three different auctions for the delivery date concerned. These auctions shall then follow this chronological order:

- First IDA: One day before delivery (D-1) at 15:00 for each hour of delivery day D.
- Second IDA: One day before delivery (D-1) at 22:00 for each hour of delivery day D.
- Third IDA: Delivery day D at 10:00 for hours 12-24 of delivery day D.

Balancing market

The electricity system needs to be in balance at all times by supplying as much electricity as is consumed. In Sweden, Svenska Kraftnät is responsible for maintaining the balance in the electricity system. This balance is largely achieved by the participants completing their buy and sell contact from the physical trading, as described above, but imbalances at minute and second level as well as unforeseen events mean that it needs to be possible to balance the electricity system within the hour, in real time. To do this, balancing services are used, which consist of production or consumption. The balancing services are purchased by Svenska Kraftnät and the services can be offered by electricity producers or electricity users against payment.

Currently, a change in the Swedish balancing market is underway due to adaptation to Commission Regulation EB, which entered into force on 18 December 2017. EB sets the framework for a common and well-functioning

European balancing market. Broadly speaking, the balancing market today operates as follows.

The balancing services consist of products procured by Svenska Kraftnät in two sub-markets, the automatic and manual reserve markets. In order to be able to offer services in the two markets, stakeholder facilities need to meet certain requirements. The automatic reserves need to be activated within a few minutes to keep the system in balance. The participants offering the automatic reserves receive a payment at the procurement stage to be available with their capacity during the operating hour; this is called capacity payment. Depending on the product, automatic reserves will receive payment according to bid pricing or marginal pricing, but in future all automatic reserves will receive payment according to marginal pricing. For example, frequency recovery reserves for automatic activation, aFRR, received marginal pricing in May 2022 and by 1 February 2024, frequency containment reserve (FCR) will also have marginal pricing. Some automatic products are also paid for the energy supplied, but often the volume of energy is small.

The manual reserves have a slower minimum activation time of 15 minutes and are traded on the Nordic balancing power market. Voluntary bids for up and down regulation are submitted to the regulating power market starting at 13:00 the day before the start of the delivery day and until 45 minutes before the delivery hour. Only balancers submit bids.

In the balancing power market, marginal pricing is applied. This means that the cheapest bids are activated first and all activated bids will receive the same price as the most expensive activated bid. Operators thus have an incentive, just as on the day-ahead market, to bid their production at variable cost/alternative cost. This means good conditions for a cost-effective allocation of balancing resources.

Sometimes there are transmission restrictions in the electricity grid and sometimes it can take time before a control object is fully activated. Deviations from the principle of "lowest bid first" may then be relevant and this procedure is referred to as special regulation. The bids called for in the special regulation do not become price-setting on the balancing power market and are settled according to bid pricing.

The prices for up and down adjustment are used in the subsequent balance settlement when the balancers have to pay, or receive compensation, for the imbalances they have had. There is a common settlement function for Sweden, Denmark, Finland and Norway. However, this is done while retaining responsibility for each national transmission system operator. In 2021, a price was introduced in the balance settlement which means that balancers face the same imbalance price regardless of the direction of their imbalance in relation to the

system's total imbalance; previously there have been two different prices depending on the direction of the imbalance.

In recent years, Ei and the other relevant regulatory authorities have decided on a number of new methods and conditions for the balancing market in accordance with EU rules.[65] The Nordic TSOs also have an ongoing project "Nordic Balancing Model" which aims to implement the new methods and conditions but also other changes to the Nordic balancing market. The aim of the project is to enable the Nordic TSOs to join the European balancing platforms MARI[66] and PICASSO,[67], which relate to the mFRR and aFRR support services respectively. The new methods and conditions will be implemented in the coming years and fundamentally change the current Swedish balancing market. The connection to MARI and PICASSO is also a requirement under EB and was scheduled to take place by 24 July 2022. However, Ei decided in August 2022 to grant Svenska Kraftnät's application for exemption from connecting to MARI and PICASSO during the defined timeline. According to the decision, Svenska Kraftnät must connect to the platforms by 24 July 2024 at the latest.[68]

2.2.2 Development of the wholesale electricity market

Ei works actively on the development of the wholesale electricity market in Sweden and the Nordic countries and regularly submits proposals for changes in various reports. This includes work to increase integration in the European electricity market. Ei works together with the other European regulators by actively participating in various ACER and CEER working groups. Ei also works actively on wholesale market issues within the cooperation body for the Nordic regulatory authorities, NordREG, and with other regulatory authorities in the capacity calculation regions that Ei is part of.

Follow-up of implementation plan with timetable for improving the functioning of the electricity market

On behalf of the Government, in 2020 Ei prepared a proposal for an implementation plan[69] for Sweden in accordance with Article 20.3 of the Electricity Market Regulation. In the draft implementation plan, Ei has identified three main areas for improvement, the balancing market, policy instruments and demand flexibility. In 2020, the Ei found that there were conditions in the balancing market that constituted barriers to entry and to effective price formation. This makes it

[65] A full list of the methods and conditions decided on can be found on www.ei.se.
[66] Acronym for Manually Activated Reserves Initiative
[67] Acronym for Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
[68] For more information, read the decision file with reference numbers 2022–100136 and 2022–100137 for MARI and PICASSO respectively.
[69] Implementation plan with timetable for improving the functioning of the electricity market - Ei R2020:09 - Swedish Energy Markets Inspectorate

more difficult for innovative products and services, such as energy storage or demand flexibility, to enter the market.

Ei also considered it important that both existing and new national instruments are appropriately designed and do not unduly affect the functioning of the electricity market. Ei also considered that in order to improve the functioning of the electricity market, there was also a need for ongoing active work to remove barriers to demand flexibility. In June 2022, Ei was commissioned by the Government to follow up nine of the measures proposed in the 2020 report. The 2022 follow-up, *Follow-up of implementation plan with timetable for improving the functioning of the electricity market* (Ei R2022:09)[70], shows which measures have been implemented, how work is progressing on the remaining measures and whether there are any obstacles to their implementation. Ei will monitor the implementation of the measures annually, until 2025. The situation in the electricity market has changed in several respects since Ei recommended the measures in the implementation plan. The measures are still relevant and Ei therefore wishes to highlight the importance of implementing the measures that have not yet been implemented as soon as possible in order to achieve a better functioning electricity market.

Opportunities for hedging

The FCA Regulation (EU regulation establishing guidelines on forward allocation of capacity) aims to ensure that market participants have sufficient capacity to manage the financial risks of transmission between bidding zones and requires an evaluation of hedging opportunities to be carried out at least every four years. In 2021, Ei evaluated the[71], hedging opportunities, and commissioned a consultancy report[72] to examine alternatives for improving hedging opportunities in Sweden. Ei concludes from the evaluation that liquidity in the hedging market has deteriorated since the last evaluation in 2017, but the evaluation in 2021 does not show that hedging opportunities are insufficient. According to the FCA Regulation, action needs to be taken if any of the Member States on one side of a border does not consider the hedging opportunities to be sufficient. Among other things, ACER decided in September 2022 that long-term hedging products other than transmission rights should be made available between Sweden and Finland to support the functions of wholesale markets. The aim is to improve hedging opportunities between the Swedish and Finnish bidding zones in accordance with the FCA Regulation. Svenska Kraftnät and its Finnish counterpart Fingrid are

[70] Follow-up of implementation plan with timetable for improving the functioning of the electricity market- Ei R2022:09-
[71] Utvärdering av risksäkringsmöjligheter på den svenska elmarknaden – för samråd enligt FCA-förordningen (Evaluation of hedging opportunities in the Swedish electricity market – for consultation according to the FCA Regulation) (2021)
[72] Measures to improve risk hedging opportunities on the electricity market in Sweden - a report to the Swedish energy markets inspectorate (2022)

tasked with drawing up by October 2023 the necessary methods and conditions for making long-term hedging products[73] other than transmission rights available. In parallel with this, the dialogue with the regulatory authorities in the countries bordering Sweden continued in 2022.

Demand flexibility and flexibility markets

Demand flexibility is highlighted in the Electricity Market Directive as an important tool for coping with future issues in the electricity system. At Ei, we have a promotion mission in our instructions that concerns demand flexibility. In August 2022, Ei, together with Svenska Kraftnät, the Swedish Energy Agency and SWEDAC (Sweden's national accreditation body), was commissioned by the Government to develop conditions for realising the potential for flexibility in the electricity system.[74] The assignment is divided into five parts and Ei is responsible for sub-assignments 2 and 3 and has a coordination responsibility for sub-assignment 5. Sub-assignment 2 examines measures to promote flexibility, including implicit flexibility, in the retail market. The third sub-assignment aims to promote flexibility at the local distribution grid level where it will be socioeconomically effective in the short or long term. Sub-assignment 5 coordinated between the agencies which together will make a joint summary of what is being done to promote flexibility, an analysis of whether additional measures are required to realise the potential for flexibility and submit proposals for an action plan for the implementation of any additional measures. The proposed measures are to be based on the users' needs and ensure that it is easy and profitable for users to contribute to flexibility. Ei coordinates the reporting of the fifth sub-assignment. Sub-assignments 2 and 3 and a partial delivery of sub-assignment 5 were reported to the Government Offices of Sweden on 6 April 2023.[75] The final report of the fifth sub-assignment will be submitted on 15 December 2023.

In 2021 and 2022, Ei has also participated in the development of the so-called framework guidelines[76] for demand flexibility at the EU-level through ACER. The framework guidelines, which were presented to the European Commission at the end of December, are the core principles that will form the basis for new and binding EU rules for demand flexibility in the electricity sector and that will apply to all Member States. The new EU rules that are to be developed aim to make it

[73] ACER har fattat beslut om risksäkringsprodukter mellan elområden i Finland och Sverige - (ACER has made a decision on hedging products between bidding zones in Finland and Sweden -) Swedish Energy Markets Inspectorate (ei.se)

[74] https://www.regeringen.se/regeringsuppdrag/2022/08/uppdrag-att-framja-ett-mer-flexibelt-elsystem/

[75] Consumers and demand flexibility – sub-assignment 2 (Ei R2023:04), Flexibility in distribution grids – sub-assignment 3 (Ei R2023:05) and Promotion of a more flexible electricity system – sub-assignment 5 (Ei R2023:06).

[76] The list of framework guidelines is published on ACER's website and can be accessed via this link: ACER submitted the framework guideline on demand response to the European Commission – first step towards binding EU rules | www.acer.europa.eu (2022)

easier for parties to participate in the market through their demand flexibility, for example in the form of storage or moving electricity consumption to another point in time. The new rules will also facilitate market-based procurement of flexibility services for electricity grid operators, including transmission system operators.

An example of market-based procurement of flexibility is so-called local flexibility markets where grid companies can purchase flexibility. A number of pilot projects have been tested in Sweden, such as in the Stockholm region, Skåne and Gothenburg[77]among others. Two of these, Sthlmflex and CoordiNet, were reviewed in a consultancy study by Sweco in 2021 on behalf of Ei.[78] The consultancy study shows that local flexibility markets can contribute to cost optimisation and enable more connections, primarily by reducing the risk of over-extraction and outages. However, it requires more flexibility providers to participate in the market and to take into account identified barriers and challenges, including low profitability, lack of standards and insufficient price information.

The Electricity Market Directive also introduces so-called aggregators, which are special players in the electricity market that gather together several flexible resources and packages these into larger units that in turn can be sold in the different submarkets of the electricity market. To ensure that aggregators participate in the market effectively, and on an equal footing with other players, the EU has adopted some common rules for aggregators to act in the electricity market. According to the Electricity Market Directive, an aggregator must have access to all markets in a non-discriminatory manner without needing the consent of the customer's existing electricity supplier (electricity trading company) or other market participants, i.e. the aggregator must be able to operate independently. A customer should thus be able to choose an aggregator independently of their existing electricity supplier. The directive also requires an aggregator to be financially liable for its imbalances, i.e. for the imbalances that aggregation may cause to other market participants.

In spring 2021, Ei submitted the report *Oberoende aggregatorer - Förslag till nya regler för att genomföra elmarknadsdirektivet* (Independent aggregators - Proposal for new rules to implement the Electricity Market Directive) (Ei R2021:03) to the Government with recommendations on how the EU regulatory framework on independent aggregation should be implemented in Sweden. The report includes proposals that enable aggregators to act independently, while taking financial responsibility for the imbalances they may cause in the system. Parliament decided

[77] In Gothenburg, the local flexibility market Effekthandel Väst was established in 2022.
[78] Konsultstudie om lokala flexibilitetsmarknader (Consultancy study on local flexibility markets) Swedish Energy Markets Inspectorate (ei.se)

to approve the amendments on 26 April 2023 and they entered into force on 1 June 2023.

Continued work towards greater European harmonisation

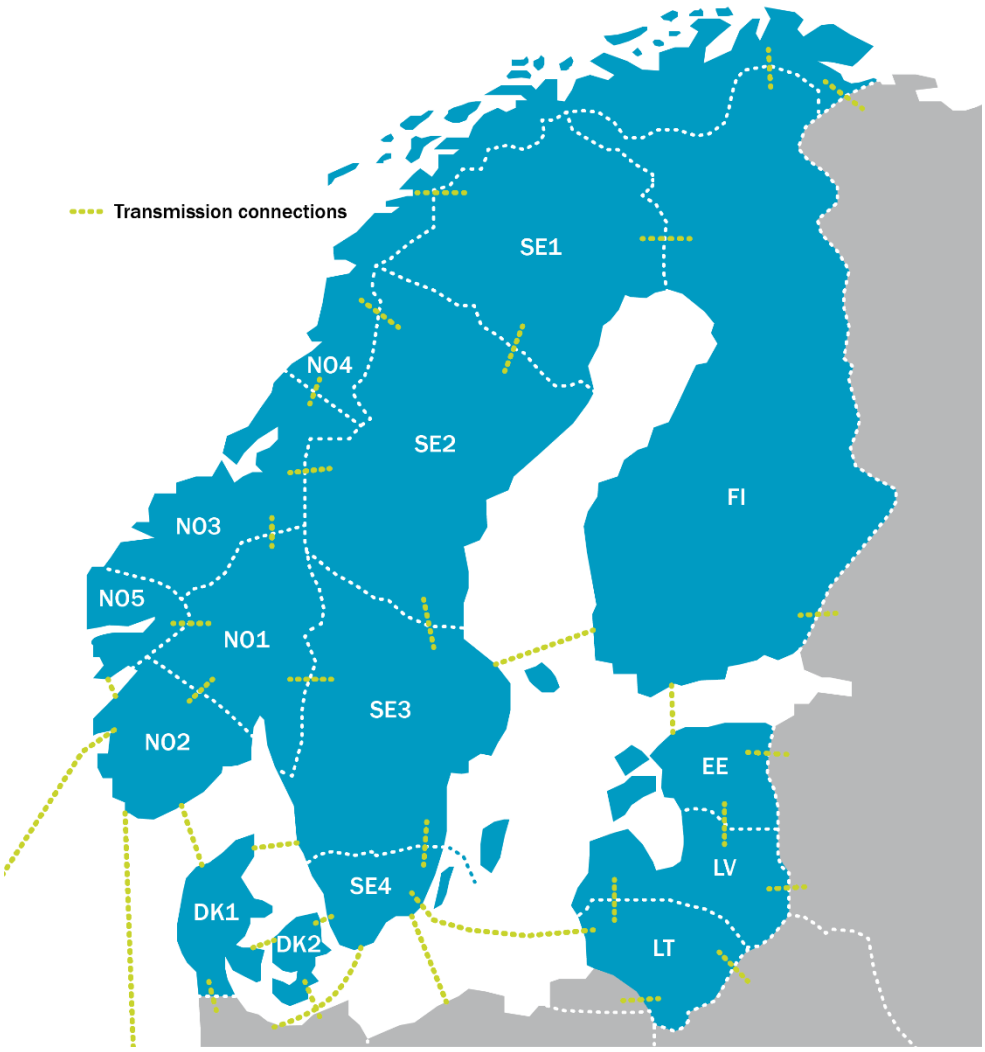
Ei is actively working to implement various elements of the Clean Energy Package that promote the integrated European electricity market. Within the European cooperation organisations for regulatory authorities ACER and CEER, as well as the Nordic collaboration body NordREG, Ei works to ensure that EU rules are interpreted in a harmonised way, so that the objectives of the Clean Energy Package can be achieved. Ei is also positive to and supports the development of internal rules and practices towards greater harmonisation in the Nordic countries.

2.2.3 Price trends and transmission restrictions

Sweden is divided into four so-called bidding zones (also called spot price areas or electricity areas); see Figure 7. Prices in the individual zones are determined by production and consumption in each zone as well as by the transmission of power to and from adjacent zones. When it is not possible to transfer all the power demanded between two bidding zones, they will have different prices. Read more about transmission restrictions under section 2.1.5 Cross-border issues and transmission restrictions.

There are many different factors that affect the price of electricity, which often varies hour by hour depending on demand and supply in the system.

Figure 7 The Nordic-Baltic bidding zones



Source: Ei

High electricity prices in 2022

In 2022, electricity prices increased compared with the previous year in all Swedish electricity areas (bidding zones), especially in the second half of the year. On average, the system price[79] in the Nordic countries during the year was EUR 136/MWh; see Table 3. In the SE4 zone of Sweden, the annual average price was EUR 152/MWh, while in SE3 it was slightly lower at EUR 129/MWh. In SE1 and SE2, the corresponding price was around EUR 60/MWh. By comparison, Germany, which is more dependent on natural gas, had an annual average price of EUR 235 MWh[80]. In 2013–2018, the average annual spot price was around EUR 20–40/MWh in all bidding zones. Compared with 2022, this corresponded to an increase in the annual average spot price of 33 per cent in SE1, 40 per cent in SE2,

[79] The system price serves as a reference price for financial electricity trading. The system price is calculated without taking into account where the electricity is produced and where it is to be consumed.
[80] Nordpool (2022), day-ahead prices (Nordpool, day-ahead prices). In 2022, EUR 1 was traded on average at SEK 10.63, which means that EUR/MWh corresponds to 1.063 öre/kWh).

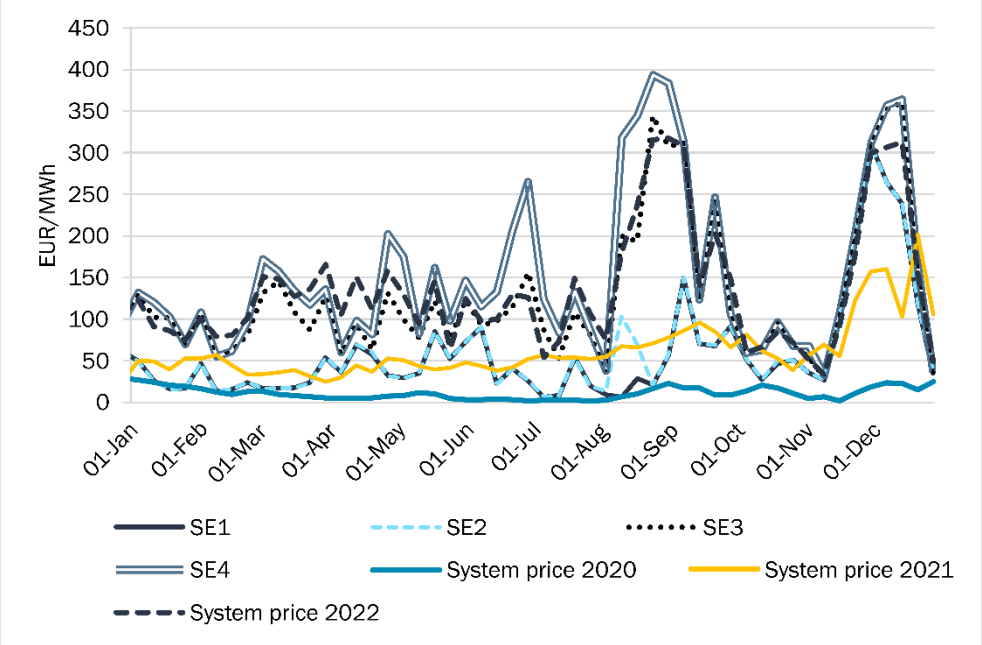
190 per cent in SE3 and 228 per cent in SE4. Table 3 presents the average annual price, the highest and lowest daily average price for each bidding area and the system price between 2018 and 2022.

Table 3: Average annual price and the highest and lowest daily average price for each bidding area, as well as the system price. EUR/MWh (date)

	System price	SE1	SE2	SE3	SE4
2022	135.86	59.06	61.95	129.21	152.10
2021	62.32	42.56	42.56	66.01	80.52
2020	10.93	14.39	14.39	21.19	21.19
2019	38.94	37.94	37.94	38.36	39.80
2018	43.99	44.23	44.23	44.54	46.36
Max 2022	462.1 (30/08/2022)	443.74 (14/12/2022)	443.74 (14/12/2022)	485.82 (23/08/2022)	542.23 (22/08/2022)
Min 2022	2 (11/11/2022)	1.18 (16/07/2022)	1.18 (16/07/2022)	1.95 (11/11/2022 and 12/11/2022)	1.95 (11/11/2022 and 12/11/2022)

Source: SKM Syspower

Figure 8. Average weekly prices on the day-ahead market EUR/MWh



Source: SKM Syspower

As shown in Figure 8, average spot prices have been unusually high and volatile, especially in southern Sweden during the second half of 2022. It is important to note that the price on an hourly basis has greater variation than shown in Figure 8. For example, the difference between the highest and lowest price for a single hour has been extremely large, with a maximum price for a single hour of 800 EUR/MWh in SE3 and SE4 and 590 EUR/MWh in SE1 and SE2. The lowest hourly price, -2 EUR/MWh, occurred in November for all bidding zones. The highest daily average prices in SE3 and SE4 occurred in August, while the highest prices in SE1 and SE2 occurred in December.

It is not only in Sweden that electricity prices have been higher in 2022 than in previous years. The whole of Europe has had high electricity prices in 2022 and the main explanation is the increase in the price of natural gas, which is an important fuel for producing electricity in many parts of Europe. The price of natural gas already started to increase in 2021, since when the price has been volatile due to the uncertain supply situation as a result of the war in Ukraine. At the end of August, the price of natural gas was 339 EUR/MWh, which is the highest price ever. For more information on the high gas prices, see section 3.2 The wholesale market for natural gas.

Weather conditions have also affected price formation in 2022. As in 2021, there have been low levels in water reservoirs throughout the Nordic region in 2022, especially during the summer period. At the same time, wind power production has been relatively low due to intermittent wind, although more than in 2021. These factors have further pushed up the price of electricity. In addition, economic activity rebounded again after the Covid-19 pandemic, boosting demand for electricity. Problems with nuclear power, especially in France, have also raised prices in the Nordic countries as well as in Europe. In December 2022, demand for electricity in Sweden increased as a result of low temperatures, while the availability of nuclear power was low. In addition, the annual formation occurred in several rivers at the same time, which reduced production capacity. Wind power production was periodically low and also had problems with ice formation in some places. In summary, this resulted in high price levels throughout the country; see section 1 for more information.

Price differences and restricted transmission between bidding zones

When there are no transmission restrictions between two adjacent bidding zones, they receive the same price and form one price area. It is not uncommon for all four of Sweden's bidding zones to form a joint price area, especially during hours with lower demand. Price areas can also extend across national borders where interconnections exist. This means, for example, that SE4 has had the same price as Denmark and Germany at certain hours.

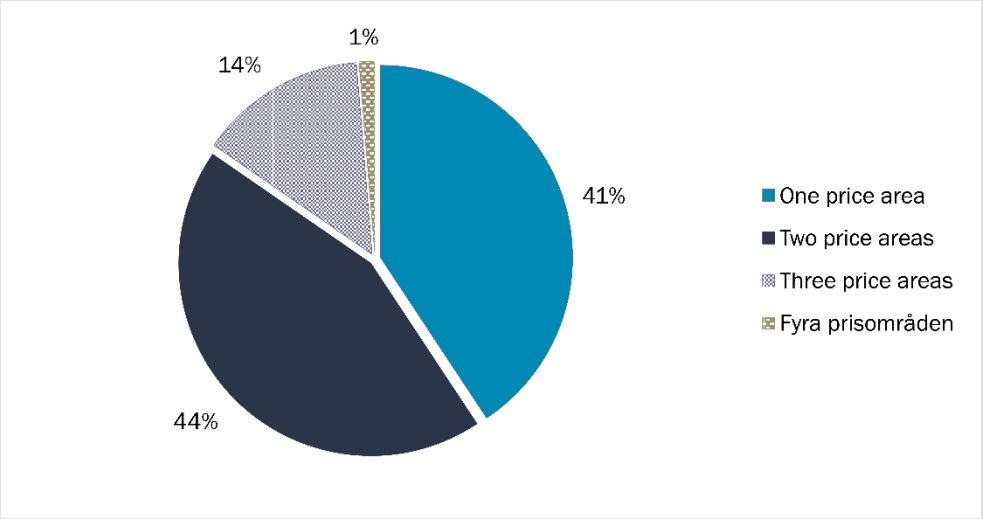
When cross-zonal transmission capacity is not sufficient, prices in the areas will differ. When electricity is transferred from low-price areas to high-price areas, a financial surplus is generated by the electricity exchange that accrues to the transmission system operator or the company that transmits the electricity between the two bidding zones. This is called capacity incomes, which is sometimes also referred to as bottleneck incomes. This is earmarked for measures aimed at increasing cross-zonal transmission capacity, for example by strengthening the transmission grid, which will even out prices in the long run.

The large differences in price between the bidding areas in northern and southern Sweden in 2022 have been due, among other things, to the fact that there has not been enough capacity to transfer all the power requested from SE1 and SE2 to SE3 and SE4. Nuclear power has a major impact on the transmission capacity of the grid. Planned outages at the Oskarshamn 3 and Ringhals 4 nuclear power plants in 2022 have therefore further affected the available transmission capacity since the closure of Ringhals 1 (2020) and 2 (2019). Periodically, a lack of wind has also reduced electricity production in southern Sweden and increased the need for transmission of electricity to southern Sweden from the north. The coupling of SE4 with Denmark and Germany, combined with high gas prices and adverse weather conditions, has also led to an increase in flows from low-price to high-price areas. Under these conditions, existing power lines have not always been sufficient to transmit as much electricity as requested, and there have been price differences between bidding zones. The rules for how the actual market coupling and pricing takes place follow from the EU rules in the commission regulation CACM.

Sweden's different price areas 2022

In 2022, electricity price differences within Sweden have been large, with southern Sweden having much higher prices than the northern part. In 2022, Sweden was one common price area 41 per cent of the time, in 2021 this corresponded to 33 per cent of the time (see Figure 9 below). Furthermore, in 2022, Sweden was divided into two different price areas for 44 per cent of the time, which is an increase of two percentage points since Sweden was divided into two price areas 42 per cent of the time in 2021. Either SE1 and SE2 formed one price area together and SE3 and SE4 another, or SE1, SE2 and SE3 formed one price area together and SE4 had its own price. As mentioned in section 2.1.1, the design of the price areas is under investigation.

Figure 9. Percentage of time in 2022 Sweden was divided into 1–4 price areas



Source: SKM Syspower

2.2.4 Production and consumption

Electricity production and use

In 2022, 169.9 TWh of electricity was produced in Sweden, which was 2.7 per cent more than the previous year. It is the production from wind power and also to some extent solar power that has increased, see Table 4. In 2022, wind power produced 33 TWh, which is an increase of 21 per cent compared to 2021. This is partly due to the fact that on average there has been more wind in 2022 compared to 2021, and partly because the installed production capacity has increased (see section 2.4.1 Monitoring of electricity production capacity). Despite the increase in wind and solar power, the high price of gas has pushed up electricity prices. Net exports of electricity amounted to 33 TWh in 2022, which was an increase of 32 per cent compared to the previous year. The largest electricity exports were to Finland at just over 15 TWh, followed by Denmark (8.6 TWh) and Lithuania (4.9 TWh). Table 4 below gives a summary of Sweden's energy balance during the years 2018–2022 and Table 5 shows Sweden’s import and export of electricity in 2022.

Table 4. Sweden's electricity balance 2018–2022, TWh (percentage of total domestic production); negative values indicate exports.

	2018	2019	2020	2021	2022
Total production	158.5	164.9	159.6	165.5	169.9
Wind power	16.6 (10%)	19.9 (12%)	27.6 (17%)	27.4 (17%)	33.1 (19%)
Solar power	0.4 (0.2%)	0.7 (0.4%)	1.0 (0.6%)	1.2 (1%)	1.9 (1%)
Hydropower	61.0 (38%)	64.6 (39%)	71.2 (45%)	70.6 (43%)	69.9 (41%)
Nuclear power	65.8 (42%)	64.3 (39%)	47.3 (30%)	51.0 (31%)	50.1 (29%)
Combined heat & power	15.0 (9%)	15.6 (9%)	12.7 (8%)	15.5 (9%)	15.3 (9%)
Electricity use within the country	141.3	138.7	134.6	143.6[81]	136.8
Grid losses	11.0	8.7	9.3	9.9	10.2
Net yield	-17.2	-26.2	-25.0	-25.6	33.2

Source: Swedish Energy Agency and Statistics Sweden

Table 5. Sweden's import and export of electricity in 2022 in TWh.

Country	Export	Import	Net
Finland	15.3	0.07	15.23
Denmark	8.6	1	7.6
Lithuania	4.9	0.04	4.86
Norway	3.5	4.9	-1.4
Poland	3.9	0.1	3.8
Germany	3.2	0.09	3.11
Total	**39.4**	**6.2**	**33.2**

Source: Svenska Kraftnät

The total use of electricity in Sweden, including losses in transmission, was approximately 137 TWh in 2022, which is a decrease of approximately 5 per cent compared to 2021. The decrease can mainly be explained by warmer weather in the autumn and at the end of the year, as well as the fact that companies and private individuals reduced their electricity consumption as a result of high electricity prices. In the autumn of 2022, the Swedish Energy Agency also urged electricity customers to reduce their electricity consumption through the campaign "Every kilowatt hour (kWh) counts". The campaign aimed to keep electricity costs and thus electricity prices down.

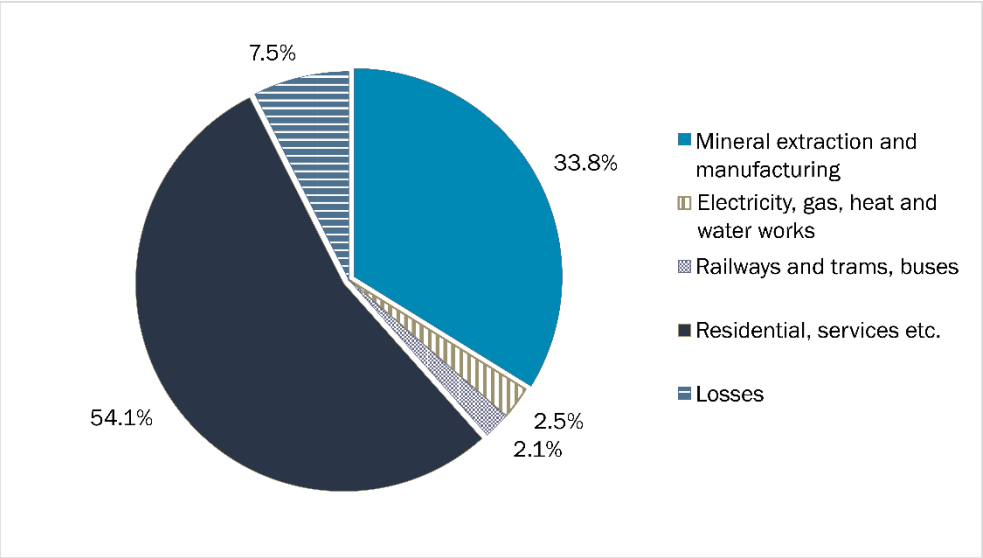
Electricity consumption by sector is presented in Figure 10 below. More than half of the electricity, 74 TWh, was used in the housing and services sectors etc.[82] In

[81] In Sweden's electricity and natural gas market in 2021, the figure was stated as 140 TWh, which has now been corrected.

[82] Source Statistics Sweden, the category Housing, Services etc. constitutes a residual item in the calculation of electricity consumption by sector, thus including the electricity use that does not fall under any of the other categories.

2022, industrial electricity consumption amounted to just over 46 TWh and accounted for about a third of total electricity consumption.

Figure 10. Electricity consumption in 2022 by area of use



Source: Statistics Sweden

The highest electricity consumption in 2022 occurred between 09.00 and 10.00 on 16 December when the consumption amounted to 23,900 MW. In the previous year, the highest consumption of electricity was 25,660 MW. Sweden's highest electricity consumption to date was recorded on 5 February 2001, when consumption amounted to 27,000 MW. The highest net export was 7,815 MW and occurred on 29 October between 03.00 - 04.00. The highest net import occurred during 08.00 - 09.00 on 16 December and amounted to 3,237 MW.

Competition in the wholesale market

Swedish domestic electricity production is dominated by a few major players. Vattenfall alone accounts for just over 37 per cent of production and together the three largest players (Vattenfall, Fortum and Uniper[83]) account for 63 per cent; the corresponding figure for 2021 was 67 per cent[84]. The three largest players in different constellations own the majority of Swedish nuclear power.

In any assessment of competition in the electricity market, it must be taken into account that individual Swedish bidding zones rarely form isolated price areas. As a rule, a price area extends across several national borders, which means that an isolated study of competition in the Swedish bidding zones risks missing how the electricity market works in practice.

[83] Since 31 December 2020, Fortum has owned 76.1 per cent of Uniper's shares.
[84] https://www.energiforetagen.se/globalassets/energiforetagen/statistik/energiaret/2022/energiaret-2022_tabeller.pdf

Ei's 2014 bidding zone subdivision report concluded that the conditions for competition in the wholesale market were good[85]. In essence, it is Ei's opinion that the conditions described also apply to 2022. For large parts of the year, the price is the same in several of Sweden's bidding areas and Ei's analysis is that the risk of individual players being able to exercise market power[86] in the day-ahead and intraday markets is small. During periods of transmission restrictions when bidding zones become separate price areas, individual operators in bidding zone SE1 in the far north and single operators in bidding zone SE4 in the far south may be given a position that provides the opportunity to exercise market power in one of the electricity market submarkets. In SE1 there is one producer whose production dominates the area, however, SE1 and SE2 to a very large extent form a common price area, which limits the individual producer's ability to exercise market power. In SE4, the situation is similar with only one major producer. However, Ei considers that the competitive situation is acceptable as SE4 often forms a common price area with adjacent Swedish and Danish bidding zones, which reduces the market power of individual players in the day-ahead and intraday markets. As described in section 2.1.1, there is an ongoing review of the bidding zones. In spring 2023, the Swedish Competition Authority published a report on energy markets in times of crisis, which aims to describe the competitive conditions of the electricity market.

2.2.5 Ei works to promote competition in the wholesale electricity market

Several government agencies and bodies cooperate in the supervision of the Swedish and Nordic electricity markets with the aim of using various measures to create a well-functioning electricity market and prevent the exercise of market power.

Responsibilities in electricity market supervision

Ei is the national energy regulator in Sweden. In addition to carrying out supervision, Ei continuously monitors and analyses developments in the electricity and gas markets and makes proposals for changes in regulations or other measures to promote the functioning of the markets.

In the marketplaces operated by Nord Pool, Epex and Nasdaq, trading and the companies' actions are monitored by Ei, among others. Ei supervises that the operators who have permits and are nominated electricity market operators (NEMOs) in Swedish bidding zones comply with the rules that apply to nominated electricity market operators. The Nord Pool marketplace, which is based in

[85] Evaluation of the effects of bidding zone division (Ei R2014:08)

[86] Market power can be described as a company's ability to influence the prices at which a product is traded on the market. The ultimate form of market power exists when one operator has a monopoly position and is thus alone in a given market and can act without competition from other players.

Norway, is also supervised by the Norwegian Energy Regulatory Authority (NVE) and the financial regulator Finanstilsynet.

The Swedish Competition Authority is the authority that monitors that companies in the Swedish electricity market do not violate the prohibitions on anti-competitive collaboration and abuse of a dominant position under the Treaty on the Functioning of the European Union (TFEU) and the Competition Act (2008:579). The Competition Act also prohibits anti-competitive public sales activities. The Swedish Competition Authority may, on its own initiative or following notifications from companies and the general public, actively intervene against the above restrictions of competition. The Competition Act also contains rules on merger control. The Swedish Competition Authority also proposes regulatory changes and other measures to remove existing obstacles to competition.

The Swedish Financial Supervisory Authority (FI) supervises the Swedish market participants that operate on the financial electricity market with permits from the authority. In 2022, Ei and the Swedish Financial Supervisory Authority (FI) have initiated a collaboration in which the agencies create an ongoing and recurring collaboration on monitoring and supervision of the energy and electricity derivatives market. The collaboration involves an increased exchange of information, established contact channels and ongoing harmonisation between the agencies. The aim of the collaboration is to ensure market stability, create the conditions for correct and healthy pricing and ensure confidence in the energy and electricity derivatives markets[87] .

Monitoring of the Swedish markets according to REMIT and the Transparency Regulation

The REMIT and transparency regulations enable coherent monitoring of the increasingly integrated European electricity and gas markets. Ei has procedures that are applied daily within the framework of the market surveillance work to increase reliability in the market and ensure that the participants comply with the rules that apply in the wholesale market.

According to REMIT, all trading of wholesale energy products that takes place, both via the electricity exchange and bilaterally, must be reported to ACER by the market participants. Ei has entered into an agreement with ACER to access the participants' trading data. The exact manner in which trading is to be reported is

[87]Energimarknadsinspektionen (14 december 2022) Ökat samarbete för att övervaka elmarknaden (Swedish Energy Markets Inspectorate (14 December 2022) Increased cooperation to monitor the electricity market) - Energimarknadsinspektionen (ei.se)

regulated by the implementing legislation.[88] The monitoring of trading in wholesale energy products by Ei is financed by Ei through levying a fee on registered market participants.

Ei also carries out market monitoring under the Transparency Regulation, which aims to increase transparency in energy markets by ensuring that information from market participants effectively reaches all stakeholders. Information to be reported under the regulation includes, among other things, physical limitations in grids, production and consumption. The information is collected on a transparency platform operated by the European Network of Transmission System Operators (ENTSO-E)[89] and is accessible to the public. Ei's role is to ensure compliance with the Transparency Regulation in Sweden.

Ei continuously reviews the data published by participants via market releases on unavailability of production, consumption and transmission. In 2022, Ei scrutinised 2,427 market communications, covering thirteen different participants, in more detail. In these cases, Ei asked participants to provide additional accounts of what had happened in order to ensure that participants have the necessary procedures to inform the market. In 2022, the supervision did not result in any injunctions to companies regarding further action. See Market surveillance 2022 (Ei PM2023:03) for more information.

Marketplace rules and market surveillance

All participants on Nord Pool, EPEX Spot and Nasdaq Commodities must comply with special regulations for trading in their respective trading venues. The rules apply in particular to the handling of information that could influence prices. Nord Pool, EPEX Spot and Nasdaq Commodities all have internal market surveillance functions where trading is continuously monitored.[90] The market surveillance functions at Nord Pool, EPEX Spot and Nasdaq Commodities also contribute to Ei's work, since any suspected violations of the regulations must be reported to Ei.

Measures to reduce the risks of joint ownership of nuclear power

In various contexts, the Swedish Competition Authority has drawn attention to the general risks of unlawful collaboration through joint ownership of electricity production resources. In 2011, the owners of nuclear power plants, with the support of Ei, adopted common sectoral ethical codes for the exchange of information between companies. Independent observers are members of the boards of directors where the nuclear power companies are jointly owned by

[88] Commission Implementing Regulation (EU) No 1348/2014 of 17 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.
[89] European Network of Transmission System Operators – Electricity.
[90] This shall be carried out in accordance with Article 15 of Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency.

several power producers. The board members have a specific mandate to monitor compliance with the ethical codes. Ei's task is to nominate one observer per board. At the end of 2022, joint ownership became relevant again in the nuclear power plant board of OKG AB. Ei has therefore nominated an independent observer to OKG's Board of Directors. Ei publishes an annual monitoring report from the respective boards, including any comments from the observer. The reports are published on our website.

2.3 The retail market for electricity

The Swedish retail market for electricity has been exposed to competition since 1996 and prices are set by the participants in the market. There are approximately 5.6 million electricity customers in Sweden, of which approximately 4.7 million are household customers[91].

Ei is tasked with working to strengthen the position of electricity customers by, among other things, enabling active choices with easily accessible information. Ei also promotes consumer rights in collaboration with the Swedish Consumer Agency. Cooperation with the Swedish Competition Authority occurs, among other things, in matters concerning electricity customers.

2.3.1 Monitoring price developments, transparency and competition in the retail electricity market

Elpriskollen

Ei runs Sweden's only independent price comparison site for electricity contracts: elpriskollen.se. Electricity trading companies that offer electricity contracts to electricity users with a consumption of up to 100,000 kWh per year are obliged by Ei's regulation[92] to report the most common contract types to elpriskollen.se. elpriskollen.se is run by Ei and enables comparisons between different electricity trading companies and their current offers.

In 2022, Ei has worked on producing a new version of the site where the goal has been for elpriskollen.se to be more user-friendly for the visitor. The new version of the comparison site was launched on 1 June 2023.

Many electricity trading companies – but some only operate locally

There are about 140 electricity trading companies on elpriskollen.se. Some electricity trading companies only offer contracts in certain bidding zones and some smaller, local electricity trading companies have chosen to operate only in

[91] Source: Statistics Sweden. The number of withdrawal points is based on 2021 data.
[92] The Swedish Energy Markets Inspectorate's regulations and general advice (EIFS 2020:4) on electricity suppliers' obligation to provide information on prices and delivery terms applied to electricity users.

the local area. Thus, an individual customer does not have the opportunity to choose from among all electricity trading companies in Sweden.

At the end of 2022, the three largest electricity trading companies had a combined market share of approximately 51 per cent[93] based on the number of customers, which is an increase of 6 percentage points from 2021.

Customer activity

In total, 15.4 per cent[94] of customers switched electricity trading companies in 2022, which is an increase of about 5 percentage points compared to 2021.

In terms of the number of renegotiated contracts, 17.6 per cent[95] of all household customers signed new electricity purchase agreements in 2022. A trend that has been seen for several years is that most agreements are renegotiated during the autumn and winter months. However, this trend was broken in 2022 when the share of renegotiated contracts was more or less unchanged during the autumn and winter months, with the exception of January, which was the month when most customers renegotiated their electricity purchase agreements.

However, changed and renegotiated electricity contracts do not give the full picture of how active customers in a market are. A customer can be active by choosing to stay with their electricity contract because they consider the electricity trading company, price or contract terms to be good, for example. In 2022 (see section 4 Consumer protection), we can state that the number of active customers in elpriskollen.se has increased by 155 per cent compared to previous years.

The wholesale market influences retail prices

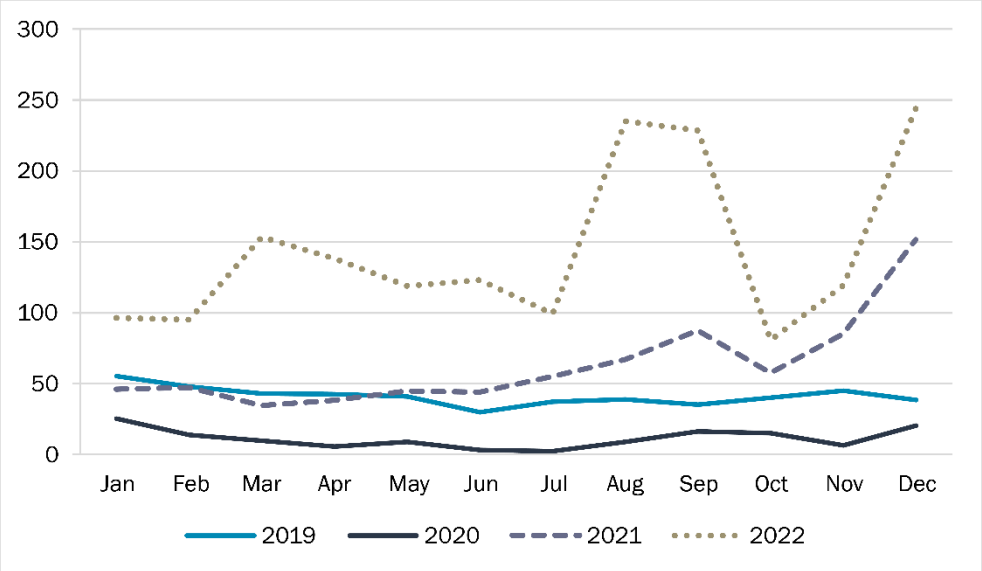
The largest part of the price of electricity consists of the electricity trading companies' costs for purchasing electricity to cover customers' consumption. The electricity is purchased on an electricity exchange or through bilateral agreements with producers. In variable electricity price contracts, the electricity trading company works from the spot price (the price on the day-ahead market) adjusted for the customer's withdrawal profile, while the fixed price contracts are based on the cost that the electricity trading company has for forward buying electricity adjusted for the customer's withdrawal profile. For fixed-price agreements, a cost for area price hedging and risk management is also sometimes included; read more about price hedging in section 2.2.1 The electricity trading system. In addition to the purchase price of electricity, there are costs for, among other things, electricity certificates, origin marking, administration and VAT.

[93] Source: Energimarknaden. The number of withdrawal points is based on 2021 data.
[94] Source: Statistics Sweden. The number of withdrawal points is based on 2021 data.
[95] Source: Statistics Sweden.

Development of spot prices and system prices

For almost all of 2022, spot prices in southern Sweden stand out as unusually high compared to previous years. During the latter part of 2022, spot prices in northern Sweden were also unusually high compared to previous years. In 2022, the system price was generally higher than in 2021. The highest price was noted in December, when the system price was 244.30 öre/kWh. The average system price in 2022 was 144.3 öre/kWh, which can be compared to the average for 2021 which was 63.3 öre/kWh and 2020 which was 11.4 öre/kWh; see Figure 11. Read more about price developments in the wholesale electricity market in section 2.2.2.

Figure 11. System price Nord Pool, öre/kWh average per month



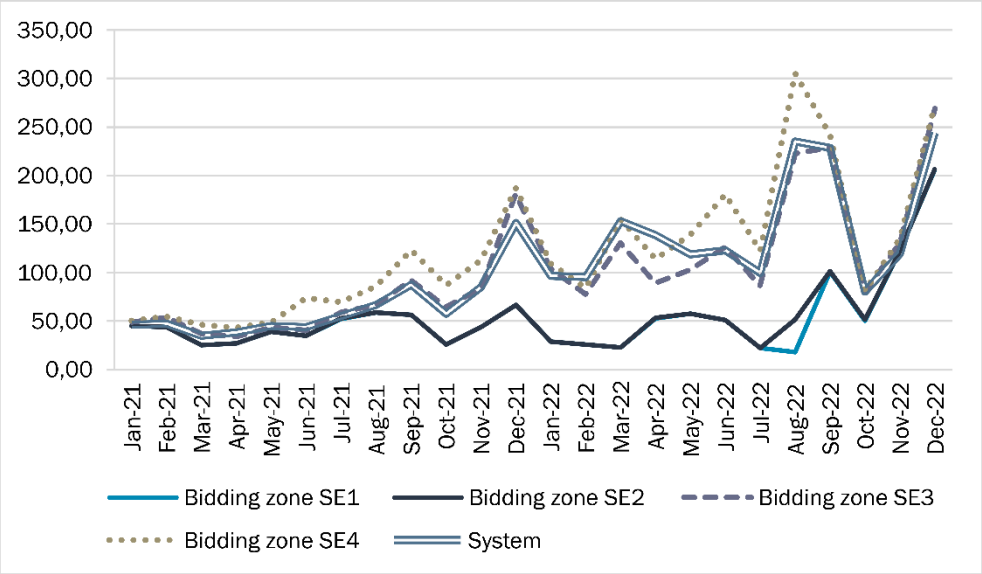
Source: Nord Pool

Price differences between bidding zones

Price differences between bidding zones were larger in most months of the year than in the year before. On average, the difference between bidding zones SE4 and SE1 was 161.1 öre/kWh in 2022, which can be compared with 2021 when the difference was on average 38.5 öre/kWh (SEK 1 = 100 öre). The difference between bidding zones SE4 and SE3 averaged 22 öre/kWh in 2022, which can be compared with 14.7 öre/kWh on average in 2021.

In 2022, August was the month with the largest price difference between bidding zones, when bidding zone SE4 had a spot price that was on average 286.7 öre higher than in bidding area SE1; see Figure 12. Prices in bidding zones SE1 and SE2 were almost the same and therefore together form a trend with two colours. When comparing SE4 and SE1/SE2, the lowest price difference was in November when it differed by 8.8 öre.

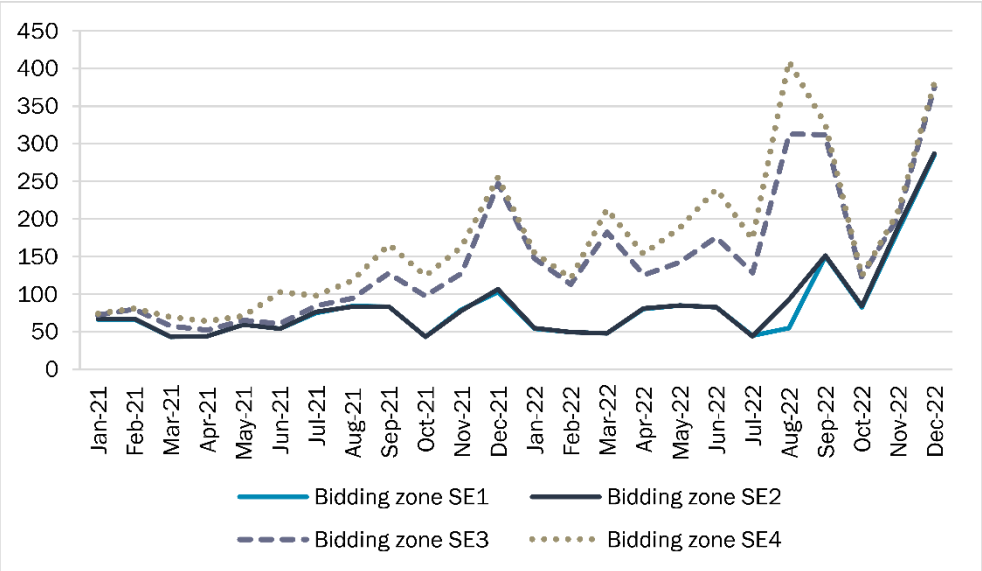
Figure 12. Spot price by bidding zone and system price 2021–2022, öre/kWh



Source: Nord Pool

Figure 13 shows that retail prices in the different bidding zones follow the spot prices in each bidding zone. The price differences between retail prices for variable price[96] contracts between the four bidding zones were greater in 2022 than in 2021. Prices in bidding zones SE1 and SE2 once again form a trend with two colours except in August 2022 when prices in SE2 were slightly higher.

Figure 13. Electricity trading price for variable price contracts for typical customer 20,000 kWh/year, öre/kWh

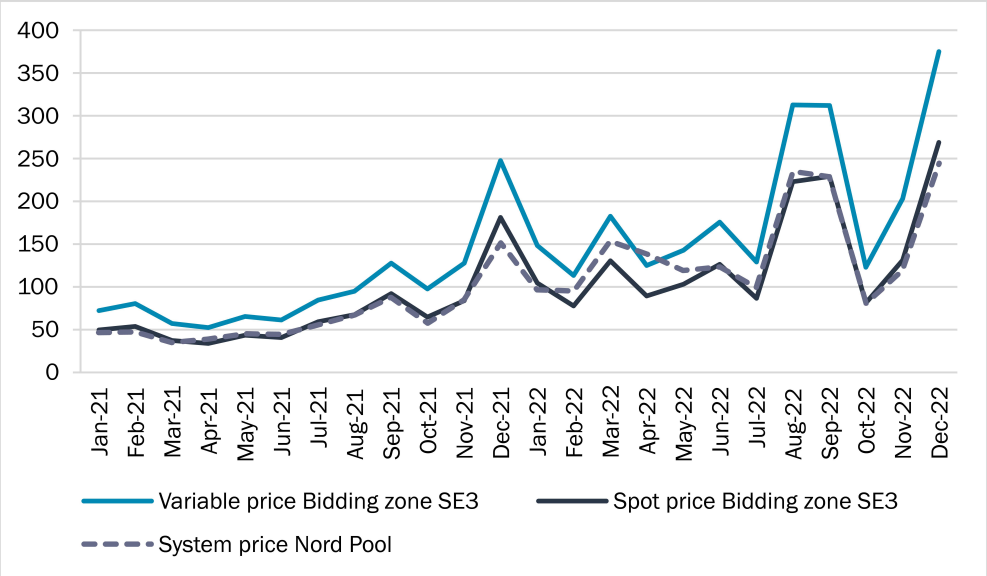


Source: Ei

[96] The price stated here is an average of all variable price agreements offered on an ongoing basis at Elpriskollen on the 15th of each month.

Figure 14 shows variable prices for a household customer in bidding zone SE3 in relation to spot price and system price.

Figure 14 Variable price for typical customer 20,000 kWh/year in SE3 in relation to spot and system price, öre/kWh

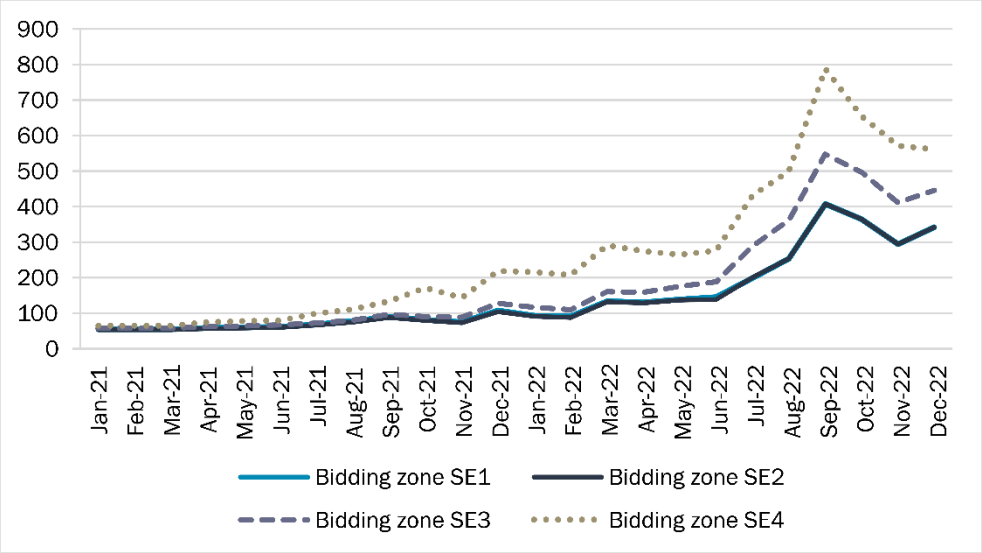


Source: Ei, Nord Pool

Differences between bidding zones can also be seen for fixed-price contracts with a fixed term of one year. Prices were consistently the highest in SE4 throughout 2022. In the second half of the year, the differences grew every month. On average over the year, fixed-price contracts with a fixed term of one year were 205.6 öre more expensive in SE4 than in SE1. The greatest difference can be seen in September, when a fixed-price contract in SE4 cost 383.2 öre more per kWh than the corresponding agreement in SE1. The greatest difference between fixed-price contracts with a fixed term of one year in SE3 and SE1 was also in December. The difference was then 141.9 öre per kWh; see Figure 15. The fixed prices are what customers were offered to sign a contract in that month, while the variable price is what the customers with the variable price paid.

The price of fixed-price contracts is usually based on the cost of the forward and hedging contracts for each bidding zone purchased by the electricity trading company. The price of these, in turn, is determined by the expected future price of electricity. In a bidding zone with prices that fluctuate a lot, there is a greater need for price hedging, which results in increased costs for electricity trading companies and thus a higher price for the electricity they can offer the end customer. There are also some electricity trading companies that operate only in northern or southern Sweden and their mark-ups and costs can be of different amounts, which has an impact on the price of electricity they offer customers.

Figure 15. Electricity trading price for fixed price 1 year for typical customer 20,000 kWh/year, öre/kWh

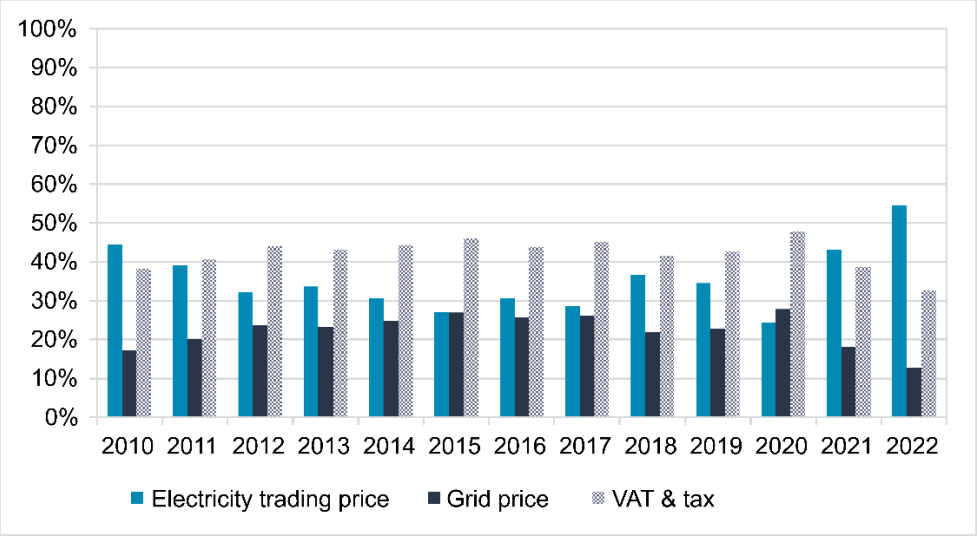


Source: Ei

Electricity trading accounts for the majority of total electricity costs

The distribution between the different parts of the total cost of electricity that a detached house with electric heating pays has varied in recent years. This is explained by the fact that the grid charge and the levels of retail electricity prices have varied at the same time as the energy tax has changed; see Figure 16. The energy tax is found on and paid through the electricity grid invoice and was 36 öre/kWh in 2022. Most municipalities in bidding zones SE1 and SE2 have reduced energy tax and in 2022 the energy tax in these municipalities was 26.40 öre/kWh. In 2022, the largest part of the electricity cost, 55 per cent, consisted of the electricity trading price. VAT and tax accounted for 33 per cent of the electricity consumer's total cost of electricity, while transmission in the grid accounted for 13 per cent; see Figure 16.

Figure 16. The distribution of the electricity cost for an electricity consumer consuming 20,000 kWh/year.



Source: Ei, Statistics Sweden

Total electricity cost for a consumer

The total electricity cost for 2022 for a customer in an apartment with annual consumption of 2,000 kWh per year and who has a variable price agreement amounted to approximately SEK 7,200; see Table 6. This can be compared with SEK 5,300 in 2021. For a customer in a detached house who consumes 20,000 kWh per year and who has a variable price agreement, the electricity cost in 2022 amounted to approximately SEK 56,900; see Table 7. Prices are averaged and consumption is weighted according to consumption patterns for different months.

Table 6. Total annual cost 2022 variable price, apartment customer in bidding zone SE3 2,000 kWh

	SEK
Electricity trading	3,429
VAT	**857**
Electricity trading inc. VAT	4,286
Electricity grid	1,686
Tax	720
VAT	602
Total	**7,206**

Source: Ei, Statistics Sweden

Table 7. Total annual cost 2022, variable price, apartment customer in bidding zone SE3 20,000 kWh

	SEK
Electricity trading	31,444
VAT	7,861
Electricity trading inc. VAT	**39,305**
Electricity grid	7,340
Tax	7,200
VAT	3,635
Total	**56,910**

Source: Ei, Statistics Sweden

The total annual cost for a customer who has a fixed-price contract of 1 year varies depending on when the customer signed the agreement. For an apartment customer who consumes 2,000 kWh per year, the total annual cost in 2022 averaged between approximately SEK 5,021 and SEK 12,044, depending on which month during the year the customer signed the agreement[97]; see Table 8. For a detached house customer who consumes 20,000 kWh per year, the total annual cost instead amounted to between SEK 35,771 and SEK 105,662 in 2022; see Table 9.

[97] The price has been calculated by the total annual consumption multiplied by the contract price for the month in which the contract was signed and one year ahead.

Table 8. Total annual cost 2022, fixed price 1 year, apartment customer in bidding zone SE3

Total electricity cost at fixed price 1 year, apartment customer 2,000 kWh	**SEK**
Electricity trading	2,013–9,036
VAT	503–2,259
Electricity trading inc. VAT	**2,517–11,296**
Electricity grid	1,686
Tax	720
VAT	602
Total	**5,021–12,044**

Source: Ei, Statistics Sweden

Table 9. Total annual cost 2022, fixed price 1 year, detached house customer in bidding zone SE3

Total electricity cost at fixed price 1 year, detached house customer 20,000 kWh	**SEK**
Electricity trading	17,596–87,487
VAT	4,399–21,871
Electricity trading inc. VAT	**21,996–109,359**
Electricity grid	7,340
Tax	7,200
VAT	3,635
Total	**35,771–105,662**

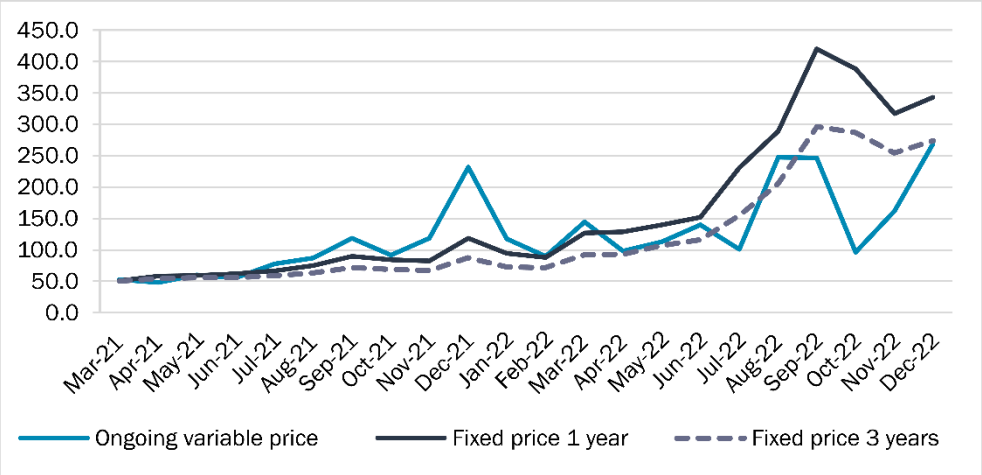
Source: Ei, Statistics Sweden

Prices for business customers

Since March 2021, electricity trading companies also report agreements to Elpriskollen that are offered to business customers with a consumption of up to 100,000 kWh per year. On the corporate side too, an increase in prices is consistently visible in 2022; see [98]. The increase is greatest for fixed-price 1-year contracts.

[98] The figures may differ from the previous annual report due to quality assurance being better.

Figure 17 Average prices for the contract types variable price on an ongoing basis and fixed price 1 and 3 years for a business customer with a consumption of 99,999 kWh per year in bidding area SE3 in 2022[99]

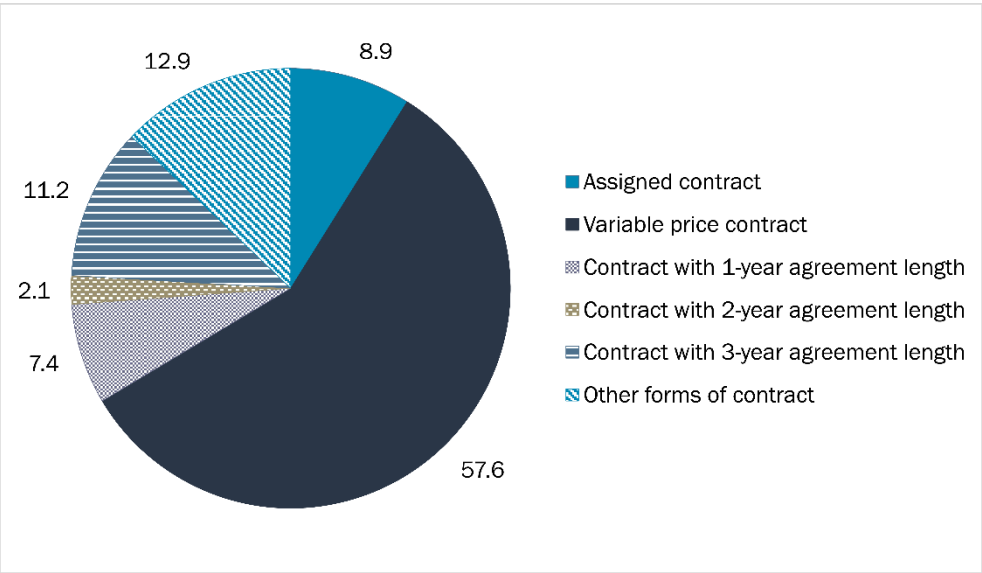


Source: Ei

Variable price still most common

A trend that has been going on for a number of years is that more customers[100] are choosing variable contract forms. In 2022, this trend seems to have accelerated, probably partly due to the high electricity prices on fixed-price contracts that prevailed during the year. In December 2022, 57.6 per cent of Swedish customers had signed variable price agreements, which is an increase of 4.8 percentage points compared to December 2021. Just over a quarter of the customers had a fixed-price contract with a fixed term of one, two or three years; see Figure 18.

Figure 18. Distribution of customers[101] by contract type in December 2022, per cent



Source: Statistics Sweden

[99] Prices exclude VAT and are shown in öre/kWh.
[100] This refers to both household and business customers.
[101] This refers to both household and business customers.

Customers with assigned contracts

Customers in the Swedish electricity market have the opportunity to choose their preferred electricity trading company. This means that participants operate in a free market in competition with other companies and with unrestricted pricing. If the customer does not make an active choice, the electricity grid company is obliged to assign the customer an electricity trading company. The price of assigned contracts is often higher than the prices of other forms of contract in the longer term.

The fact that customers, despite the often high prices, remain in the assigned contracts can have different explanations. Customers may be unaware that they have a contract type that is more expensive than other contract types and that they can easily switch to another, cheaper, contract. In its regulatory work, Ei has seen that the information provided to the assigned customers is inadequate. Some of the designated electricity trading companies allocate customers their regular variable contracts. In these cases, the electricity trading company's customers do not pay more just because they have not chosen an electricity trading contract themselves.

The proportion of customers with assigned contracts has decreased by 1.5 percentage points from 10.4 to 8.9 per cent since December 2021.

2.3.2 International work

Work to strengthen customers in the Nordic region

During the year, Ei has played an active role as, among other things, chair of NordREG's retail market group[102]. The aim of the retail market group is to strengthen the position of customers in the Nordic retail electricity markets.

In 2022, the group published a report illustrating unfair business practices in the electricity markets in Denmark, Finland, Norway and Sweden. Unfair business practices are a problem in all markets in the Nordic region and with this survey, NordREG wants to share experiences, including on measures to counteract unfair business practices. NordREG also conducted a customer survey in which 6,000 consumers in Denmark, Finland, Norway and Sweden answered questions such as when they last signed or compared electricity contracts, why they were active or not, knowledge of their own electricity contract and whether it was easy or difficult to sign an electricity contract. The results of the survey were presented in a report at the end of 2022.

In November, the group conducted the fifth NordREG Retail Market Monitoring Workshop with the aim of exchanging knowledge and experiences in the field of

[102] Retail Market Working Group.

supervision and identifying areas for collaboration, exchange of information and need for further development of regulations.

Ei's commitment to promoting the smooth functioning of retail markets in Europe

Ei is a member of the Council of European Energy Regulators (CEER) and participates in the Customer and Retail Markets Working Group (CRM WG). During the year, CEER agreed on common positions on how CEER wants the European electricity and gas markets to develop in the coming years and published a number of reports. Ei has also been actively involved in the preparation of the annual report on customer protection that CEER publishes together with ACER (Agency for the Cooperation of Energy Regulators). The report, *Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2021 - Energy Retail and Consumer Protection Volume*, was published in October 2022.

2.4 Reliability of electricity supply

Reliability of supply in the Swedish electricity system is generally good. Manual disconnection of certain electricity users, which is the method that Svenska Kraftnät must use according to the Electricity Act when it is not possible to otherwise achieve a balance between input and withdrawal in the electricity system, has never had to be applied.

In 2022, when Sweden had unusually high electricity prices, the functioning of the electricity market was questioned by both households and companies. However, high and volatile electricity prices do not automatically mean that Sweden does not have good resource adequacy, since resource adequacy is a measure of the extent to which production resources and other supplies of energy are able to meet the expected demand. ENTSO-E concluded in the *Winter Outlook Report 2022–2023*[103] that there was an increased risk of power shortages in southern Sweden during the winter of 2022. Svenska Kraftnät's assessment of the risk of power shortages during the winter of 2022 also went from low risk to real risk.

Since Svenska Kraftnät assessed that the risk of power shortages had increased, it warned the public that they might have to disconnect electricity users during the winter. Contributing factors for Svenska Kraftnät's assessment were that the Ringhals 4 nuclear reactor was shut down for maintenance and was not expected to be back in operation until 1 April 2023, which meant that it was shut down for part of the winter.

Svenska Kraftnät is responsible for ensuring that a strategic reserve (the so-called power reserve) is available during the winter period, between 15 November and 15

[103] Winter Outlook 2022-2023_Report.pdf (entsoe.eu)

March.[104] Svenska Kraftnät procures the power reserve by entering into agreements with electricity producers in which they will make production capacity available to Svenska Kraftnät that can be activated in the event of a power shortage. However, the power reserve was never fully activated in 2022 but was ordered to be able to start from standby and run on minimum power if it needed to be activated.[105] Nor was there any disconnection of electricity users in Sweden. The power reserve is valid by law until 15 March 2025. The act has been extended, most recently in 2016.[106]

Since November 2022, Sweden has had a defined reliability standard of 1 hour/year, based on Ei's proposal in the report *Ei's proposal for a reliability standard for Sweden*[107]. Briefly, the decision means that the production and import of electricity must be able to cover the entire expected consumption need for electricity 99.989 per cent of the time during a year. The reliability standard thus sets a level of reliability of supply and, according to the Electricity Market Regulation, must exist in order for a country to introduce so-called capacity mechanisms, for example in the form of a strategic reserve similar to the present power reserve. In connection with the Government's decision on the reliability standard in November 2022, Ei was tasked with annually calculating a reliability standard for 2023 and 2024 and, if necessary, proposing a new reliability standard. See section 2.4.2 for a more detailed description of how the reliability standard was calculated.

2.4.1 Monitoring of electricity production capacity

Addition of renewable production

In Sweden, investments in new electricity production capacity are mainly made on market-based grounds. To build a new plant for electricity production in Sweden, no permit from Ei is required. However, permits are required in accordance with both the Environmental Code (1998:808) and the Planning and Building Act (2010:900).

Renewable power such as hydropower, wind power and solar power currently accounts for about 80 per cent of the total installed capacity. These types of power also constituted the largest addition to the installed capacity in 2022. Table 10 shows the installed capacity by production type excluding thermal power.

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[104] According to the Act (2003:436) on power reserve.

[105] https://www.svk.se/press-och-nyheter/nyheter/allmanna-nyheter/2023/en-vinter-med-tuffa-forutsattningar-och-elsparande-svenskar/

[106] SFS (2016:422).

[107] Ei R2021:05 Ei:s förslag till tillförlitlighetsnorm för Sverige (Ei R2021:05 Ei's proposal for a reliability standard for Sweden)

Table 10. Installed capacity in Sweden's power stations 2015–2022, MW.

Power type	2015	2016	2017	2018	2019	2020	2021	2022
Nuclear power	9,714	9,076	8,586	8,614	7,725	6,871	6,882	**6,885**
Hydropower	16,184	16,181	16,301	16,315	16,328	16,334	16,286	**16,302**
Wind power	6,029	6,495	6,691	7,406	8,980	10,017	12,074	**14,662**
Solar power	126	185	254	435	690	1,090	1,593	2,384

Source: Energy companies Sweden

2.4.2 Resource adequacy and reliability standard for Sweden

The Electricity Market Regulation contains, among other things, rules on how resource adequacy in the electricity market – that is, the measure of the extent to which production resources and other supplies of energy are able to meet the expected demand – are to be calculated and assessed within the EU. These rules state that Member States with resource adequacy concerns should primarily achieve resource adequacy through well-functioning markets. Member States must therefore first develop their electricity markets so that national barriers to the development of well-functioning electricity markets are removed and examine whether interconnections with neighbouring countries can be increased.

Only in certain circumstances and for a limited period of time is a country allowed to take support measures in the form of capacity mechanisms[108] to achieve resource adequacy.

According to the Electricity Market Regulation, countries that have or intend to have capacity mechanisms must have a reliability standard. A reliability standard must set out in a transparent manner the necessary level of reliability of supply for the Member State. The reliability standard is to be expressed through the key performance indicators expected energy not served (EENS) and loss of load expectation (LOLE).

The Electricity Market Regulation requires the European Union Agency for the Cooperation of Energy Regulators (ACER) to decide on a methodology for calculating the reliability standard. ACER made such a decision in 2020 on the method for calculating the reliability standard. In ACER's methodology, the reliability standard corresponds to a calculated value for LOLE, while EENS is calculated indirectly. LOLE is calculated using two key parameters, the value of lost load (VoLL) and the cost of new entry (CONE). CONE is produced for a number of reference technologies, which can be production, storage, demand

[108] Capacity mechanism: any measure involving payment to resources in the electricity system so that they are available in order to produce electricity or reduce their electricity consumption where necessary, thus ensuring a desired level of resource adequacy.

flexibility or equivalent. The data and assumptions on the basis of which VoLL and CONE are calculated are set out in ACER's methodology.

In January 2021, Ei decided that VoLL for Sweden should amount to EUR 7,869/MWh at the 2020 price level. Furthermore, Ei calculated fixed and variable CONE for eleven different reference technologies. Of the eleven reference technologies, one was storage technologies, four were demand flexibility technologies and the remaining six were production technologies.

Based on the CONE values of the different technologies, and the decided VoLL value, LOLE values were calculated, one for each reference technology. The reference technology with the lowest value of LOLE, and which at the same time has a capacity above the minimum capacity requirement (or maximum possible power shortage), is the reference technology that determines the size of the reliability standard. Demand flexibility from residential heating was the technology that set the reliability standard at 0.99 hours per year. The smallest capacity requirement, or the largest possible power shortage in Sweden, was assumed to be 1,750 MW based on data from Svenska Kraftnät. The simulated power shortage is calculated by Svenska Kraftnät according to a method similar to the European Resource Adequacy Assessment (ERAA) method, which is the resource adequacy analysis method decided by ACER and which is used to evaluate a Member State's resource adequacy.

Based on ACER's method for calculating the reliability standard, Ei proposed a reliability standard for Sweden of 0.99 hours per year, which corresponds to a reliability target where the production and import of electricity should be able to cover the entire expected consumption requirement 99.989 per cent of the time. Ei also proposed that the 0.99-hour reliability standard should apply for the period 2021-2026, i.e. for a five-year period[109].

The Government then, on 17 November 2022, decided on a reliability standard that amounts to 1 hour per year for Sweden[110]. The Government tasked the Swedish Energy Markets Inspectorate with annually calculating the reliability standard for 2023 and 2024 and, if necessary, proposing a new reliability standard[111].

In addition to proposing and deciding on a reliability standard, the Electricity Market Regulation also requires Member States to develop an implementation plan. The implementation plan must set out measures to be taken by the Member

[109] Ei:s förslag till tillförlitlighetsnorm för Sverige (EI's proposal for a reliability standard for Sweden), Ei R2021:05.
[110] Regeringen beslutar om en tillförlitlighetsnorm för Sverige (The Government decides on a reliability standard for Sweden) - Regeringen.se
[111] Uppdrag att årligen beräkna tillförlitlighetsnormen för Sverige (Assignment to annually calculate the reliability standard for Sweden) - Regeringen.se

State to eliminate distortions resulting from legislation or market failures. Furthermore, Member States have an obligation to regularly assess resource adequacy in their country. Where resource adequacy concerns are identified, through the European Resource Adequacy Assessment (ERAA) or a national equivalent, these must primarily be addressed by removing barriers and taking measures to improve the functioning of the market as set out in the Member State's implementation plan. The Member State may then, as a last resort to address remaining resource adequacy concerns, put in place capacity mechanisms.

In June 2022, Ei was commissioned by the Government to report annually, until 2025, on a number of measures proposed by Ei in 2020 in the report *Implementation plan with timetable for improving the functioning of the electricity market*[112] [113]. The assignment for 2022 was presented in December 2022 through the interim report *Follow-up of implementation plan with timetable for improving the functioning of the electricity market*[114].

[112] 2022-102491.pdf (ei.se)
[113] Ei R2020:09 Genomförandeplan med tidsplan för att förbättra elmarknadens funktion (Implementation plan with timetable for improving the functioning of the electricity market)
[114] Uppföljning av genomförandeplan med tidsplan för att förbättra elmarknadens funktion (Follow-up of implementation plan with timetable for improving the functioning of the electricity market) (ei.se)

The natural gas market

3 The natural gas market

Natural gas was first introduced in Sweden in 1985 and today accounts for about two per cent of Sweden's total energy consumption. Gas is mainly used as process fuel and raw material in industries, for power and district heating production, as vehicle fuel and by households that use gas for heating and cooking.

In Sweden, the gas is distributed through a larger natural gas network along the west coast, a smaller gas network in Stockholm, a number of small local gas networks and via filling stations and LNG[115] terminals in Lysekil, Gothenburg and Nynäshamn. Only the western Swedish gas network and the Stockholm gas network are covered by the Natural Gas Act (2005:403) and therefore also by Ei's supervision.

Sweden does not have its own natural gas production, but is dependent on imports via a pipeline from Denmark and on LNG transported by ship. However, Sweden has a certain proportion of its own production of biogas that is upgraded before it is injected into the natural gas network.

The instructions for Ei state that the agency shall, within its scope, carry out tasks pursuant to the Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC (Natural Gas Market Directive). The Natural Gas Market Directive and national rules require the regulator to comply with and implement the legally binding and relevant decisions taken by ACER and the European Commission.

Under the Natural Gas Act, Ei may issue such orders as are necessary to ensure compliance with the regulations and conditions covered by the supervision. Such an order may be accompanied by a fine. The Act also states that the regulatory agency has the right, upon request, to obtain the information and documents necessary for supervision.[116]

In addition to the above-mentioned regulations, there are five EU regulations in the gas area that concern both the market and the network:

[115] Liquefied Natural Gas (LNG).
[116] Natural Gas Act 2005:403, Chapter 10 section 2–3

Type	Abbreviation	Full name	Affected area
Market Regulation	TAR	Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas	Harmonisation of tariff structures for gas transmission
Market Regulation	BAL	Commission Regulation (EU) 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks	Balancing gas transmission networks
Market Regulation	CAM	Commission Regulation (EU) No 984/2013 of 14 October 2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems and supplementing Regulation (EC) No 715/2009 of the European Parliament and of the Council	Capacity allocation mechanisms in gas transmission systems
Market Regulation	CMP	Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005	Overload management
Operation Regulation	IO	Commission Regulation (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules	Interoperability and information exchange

It is primarily the EU regulations for tariffs (TAR) and balancing (BAL) that affect Sweden. CAM, CMP and IO are largely concerned with requirements for interconnection points (points between two transmission systems), which do not exist in Sweden. For this reason, many of the rules are not applicable to Sweden. Ei, together with the other European regulatory authorities, has participated in the dialogue on the design and implementation of these EU regulations in the framework of ACER's work.

3.1 The gas network

The natural gas network is divided into four different areas of activity: transmission, distribution, gasification and storage. In transmission lines, the gas is transported long distances under high pressure. Pressure reduction is then carried out in metering and regulating stations before the local distribution network takes over for transport to the customer.

The natural gas system in western Sweden is small compared to most other natural gas networks in Europe and consists of about 600 km of transmission pipeline and about 3,000 km of distribution pipeline. The network stretches from Trelleborg in the south to Stenungssund in the north and a little bit east into Småland; see Figure 19. About 30 of Sweden's 290 municipalities have access to natural gas. The gas comes to Sweden via a pipeline from Dragör in Denmark.

Figure 19. Transmission pipelines in the natural gas network in western Sweden

Source: Ei

There is also an urban gas network and a vehicle gas network in the Stockholm area, both owned by Gasnätet Stockholm AB, which is responsible for the development, operation and maintenance of the networks. The urban gas network comprises about 500 km of pipeline and covers large parts of Stockholm city as well as Solna and Sundbyberg. The production and in-feed of gas to the urban gas grid takes place mainly from a gasification plant in Stockholm where both biogas and LNG, i.e. liquefied natural gas, are delivered. In the plant, LNG is vaporised into natural gas, which is then mixed with air to become the urban gas that is adapted for the customer devices used in the urban gas network. Distribution takes place via pipes that are pressurised in special regulating stations around the city. The 40 km long vehicle gas network connects biogas suppliers' production facilities for gas in Stockholm with bus depots for bus refuelling and filling stations for vehicle gas.

There are also a number of small local gas networks around Sweden. Many of the small local networks are mainly used to transport biogas of the vehicle gas type from a production plant to filling stations. What the gas network in Stockholm and the small local gas networks around Sweden have in common is that they are not connected to any transmission network. The networks covered by the provisions of the Natural Gas Act are the western Swedish gas network and the gas network in Stockholm. In the Natural Gas Act, the term natural gas also refers to biogas to the extent that it is technically possible to use the gas in a natural gas system.

3.1.1 The role of gas network companies

Certification of system operators

The Natural Gas Market Directive[117] and national rules[118] require transmission system operators[119] to be certified. Ei certified Swedegas AB as system operator in July 2012. A certification is valid until further notice, but Ei can review the decision if the system operator does not comply with the requirements for certification. In September 2021, Ei decided to recertify Swedegas AB after Swedegas' ownership structure changed in 2019. Under the Natural Gas Market Directive, a reassessment of certification must then be carried out. The decision to recertify means that Swedegas AB retains its certification from 2012.

Since January 2020, Swedegas AB, together with its sister company Weum Gas AB, has been part of Nordion Energi, which is owned by European Diversified Infrastructure (EDIF II). EDIF II is in turn managed by First State Investment.

Functional unbundling of natural gas companies

In order to prevent cross-subsidisation between companies carrying out different types of natural gas activities, a so-called functional unbundling of the companies is necessary. This means that companies engaged in the transmission, gasification or storage of natural gas may not trade in natural gas. In a company that holds pipelines in a Swedish natural gas system, a director, CEO or authorised signatory may not simultaneously hold any of these roles in a company engaged in trading in natural gas. However, there is no requirement in Swedish law that a gas network company may not be part of a group engaged in the production of or trade in natural gas.

According to the Natural Gas Act (2005:403),[120] all companies engaged in the transmission of natural gas that are part of the same group as a company engaged in the production of or trade in natural gas must draw up a monitoring plan. The purpose of the monitoring plan is to ensure that companies act objectively and do not unduly favour any market participant. The monitoring plan must set out the measures the company intends to implement to prevent discriminatory behaviour towards other market participants. They must publish an annual report describing the measures they have implemented.

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[117] Article 10 of Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC.
[118] Act (2011:711) on certification of certain natural gas companies.
[119] The term transmission system operator is synonymous with transmission network operator and transmission network company.
[120] Chapter 3 section 9.

3.1.2 Technical functioning of the gas network

The natural gas network in western Sweden consists of a number of different types of networks. The largest pipelines that transport the gas under high pressure are transmission lines. Pressure reduction is then carried out in metering and regulating stations before the local distribution network takes over for transport to the customer. In Sweden, the transmission network is owned and operated by Swedegas, which also has system balance responsibility. A few very large consumers are connected directly to the transmission network.

Biogas in the natural gas network

The natural and biogas markets in Sweden are to some extent integrated as the natural gas network can also be used for the distribution of biogas. In 2022, biogas accounted for about 38 per cent[121] of the gas in the western Swedish transmission and distribution network. Biogas upgraded to natural gas quality can, in most cases, enter the natural gas network without any technical consequences for natural gas users. There are currently eleven biogas producers connected to the natural gas system in western Sweden, two of which are connected so that feed can take place into the transmission network[122]. Another three biogas producers are connected to Gasnätet Stockholm AB's vehicle gas network. The largest share of biogas in the network is imported via Denmark.

Natural gas balancing

As a transmission system operator, Swedegas owns the natural gas network in western Sweden and is responsible for its operation and maintenance. The role is comparable to that of Svenska Kraftnät in the electricity market, as Swedegas both owns the grid and is responsible for balancing the in-feed and out-feed of gas in the short term.

To ensure balance, Swedegas signs balance agreements with participants in the gas market, so-called balancers. The balancers undertake to be financially responsible for ensuring that end-users' consumption is matched by supply. The natural gas network in western Sweden offers great opportunities to store gas in the pipelines, so-called linepack, which facilitates balancing. Short-term imbalances can account for as much as 25 per cent of a winter day's consumption without compromising the technical functioning of the network.

The system balancer may not conclude balancing responsibility agreements with individual balancers until the terms and conditions of the agreement have been approved by Ei. According to the Natural Gas Act, Ei must review the terms of the contract to ensure that they meet the requirements of being objective and non-discriminatory. The latest balancing

[121] Source: Swedegas - Gas barometer

[122] Source: The Swedish Energy Agency and Energigas Sverige - Produktion av biogas och rötrester och dess användning år 2021 (Production of biogas and digestate and its use in 2021)

responsibility agreement was approved by Ei at the end of 2021 due to changes in the terms and conditions related to the forthcoming connection to Baltic Pipe, which became operational on the 1 October 2022 (read more about Baltic Pipe under section 3.1.4 Cross-border issues). As of the 1 April 2019, the balancing markets for Sweden and Denmark have been integrated. The purpose of the common balancing zone is to increase the efficiency of cross-border trading between the Swedish and Danish markets and to harmonise balancing procedures.

Quality control of the natural gas network

Ei develops regulations and general guidelines (so-called metering regulations) that contain provisions for line holders regarding metering and reporting of gas supply. Gas network operators are responsible for ensuring that the operation and management of their installations is safe, reliable and efficient so that they meet reasonable requirements for gas transmission, storage and gasification in the long term.

The network owner collects meter readings from border, withdrawal and input points. The metered values are then reported to gas trading companies, balancers and system balancers. The metered values form the basis for calculation of input and withdrawal quantities of energy.

Gas billing is based on delivered energy. To calculate the quantity of energy, the volume of the gas, measured in cubic metres (m^3) is multiplied by the energy content of the gas per unit volume, measured in kWh/m^3. Energy content per unit volume is usually called calorific value and in the Swedish system a calorific value is used for the entire system. The calorific value can be expressed either as upper or lower calorific value depending on whether the products of combustion, flue gases in the case of natural gas, are cooled to the same temperature as the gas before combustion began or not. For a plant that has equipment that can utilise the energy of the flue gases, the energy content of the gas per unit volume is thus higher.

Connection to a natural gas pipeline

The owner of a natural gas pipeline is obliged, on reasonable terms, to connect other owners' natural gas pipelines, storage facilities and gasification facilities. However, if the pipeline lacks capacity, this obligation does not apply. When a connection is requested, the holder of the natural gas pipeline must provide within a reasonable time written information on the charges and other conditions for connection.

Connection to storage plant and gasification plant

The owner of a facility or pipeline for storage of natural gas, or of a gasification facility connected to the Swedish natural gas systen is obliged to, on reasonable terms, natural gas on behalf of another party of storage or gasification. This obligation does not apply if the facility does not have sufficient capacity. When a

request for in-feed is submitted, the owner of the storage or gasification facility must submit written information on the charges and other conditions for the in-feed within a reasonable time.

Examination of conditions for connection to a natural gas installation

The methods for drawing up contracts for connection to different types of natural gas facilities are approved by Ei before they are put into operation. The terms and conditions set out in the connection agreements must also be approved before they are used by the owners of natural gas facilities.

Implementation of safety measures

The holder of a natural gas pipeline, storage or gasification plant must have plans to manage the operation and safety of its own plant in a crisis situation.[123] The holders must draw up an action plan for crisis situations and ensure that the plan is disseminated within their own organisation and that it is followed. Holders shall also inform the authorities and other relevant stakeholders of their plans.

3.1.3 Network charges for connection and transmission

Gas network charges

The income of gas network companies is regulated in advance in a revenue framework that extends over a period of four years. The revenue framework sets an upper limit on the total revenues companies are allowed to earn from their gas operations. The purpose of revenue framework regulation is to ensure that the operations of gas network operators are conducted efficiently at low costs and that gas network operators receive a reasonable return and customers a reasonable price for the network service. The revenue framework consists of capital costs, ongoing influenceable costs and ongoing non-influenceable costs. Ei supervises gas network operators and sets the revenue framework for network operators. The supervision of network companies' tariffs covers those companies that are connected to the Swedish natural gas system under the terms of the Natural Gas Market Directive.[124]

The revenue framework must be calculated to cover reasonable costs and, since the gas network companies have a monopoly, there are no market mechanisms that naturally exert pressure for efficiency. Therefore, there needs to be an efficiency requirement in revenue regulation so that not all cost increases can be passed on to the customer collective. Ei uses a general efficiency requirement and has calculated

[123] Regulations are formulated in the Swedish Energy Agency's regulations and general advice (STEMFS 2016:1) on safe natural gas supply.
[124] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC.

the influenceable costs for the period 2019–2022 with an annual efficiency improvement requirement of 1 per cent.

Ei sets a revenue framework for the natural gas operations of each gas network operator for each regulatory period. As it is not possible to know all the data before the start of the regulatory period, such as what investments the gas network companies will make during the regulatory period, Ei bases decisions for the regulatory period partly on the companies' forecasts. The forecasts are reconciled with actual outcomes after the end of the supervisory period, in a reconciliation decision. Ei then decides on the actual revenue framework of the gas network operator for the regulatory period. This decided revenue framework is then compared with the revenues collected by the gas network companies from their customers during the relevant regulatory period. This is done in a separate decision, called a deviation decision. Any under withdrawal or over withdrawal of gas increases or decreases the revenue framework of the gas network operator for the following regulatory period. This means that Ei issues at least three decisions for each period: a decision before the supervisory period, a decision after the supervisory period and a deviation decision. A review of a revenue framework may also take place during the supervisory period, under certain conditions.

When setting charges for the transmission of natural gas (network tariffs), companies must take into account, in particular, the number of connected customers, the geographical location of the customers, the quantity of energy transmitted, subscription costs for upstream pipelines, security of supply and the pressure in the pipes. Ei's supervision under the Natural Gas Market Directive also applies to tariffs for access to gasification plants.

Ei's supervision of the methods used for formulating tariffs aims to ensure that they are objective and non-discriminatory as required by the Natural Gas Market Directive. Ei's decision may be appealed within three weeks by the person to whom the decision relates. The review takes place before the general administrative court.

Prior to the 2019–2022 regulatory period, the companies applied for revenue frameworks totalling SEK 6.41 billion at the 2017 price level. In 2019, Ei decided on revenue frameworks of approximately SEK 6 billion. Six out of nine companies appealed the decision to the Administrative Court in Linköping. In its judgment of 17 May 2019 (Case No 7369-18), the court upheld the appeal that the regulatory depreciation period should be 90 years for distribution lines and 40 years for metering and regulating stations for both transmission and distribution when calculating the revenue framework for the supervisory period 2019-2022. The decisions were referred back to Ei, which in February 2020, based on the conditions

in the Administrative Court's ruling, set the companies' revenue limits at approximately SEK 6.05 billion.[125]

Under the Natural Gas Act[126] gas network operators are required to draw up separate financial reports for transmission, distribution, storage and gasification operations in the form of an annual report. The annual report must be submitted to Ei no later than seven months after the end of the financial year and contain, among other things, the complete income statement and balance sheet for each accounting unit. The annual report forms the basis for further supervision.

In November 2022, Ei decided on updated regulations on financial reporting for natural gas operations (EIFS 2022:12). The regulation entered into force on the 1 February 2023 and will be applied in the submission of companies' annual reports by 31 July 2023. An amendment to the financial reporting regulations in autumn 2022 has made it possible to handle all incoming annual reports digitally. Ei has therefore updated its regulations so that submission of annual reports and auditors' certificates can be done completely digitally.

Review of income regulation for gas network companies

On 17 December 2020, the Swedish government instructed Ei to review the regulation of the income of gas network operators. It emerged from this assignment that the rules should to a greater extent harmonise with the corresponding regulation of income for electricity grid operations. The assignment also included taking into account that the return on the capital used in the business should be determined using methods that are generally accepted, transparent to operators and that take due account of capital market conditions, while also taking into account the interests of gas network customers. The assignment was to be reported to the Swedish government on 13 April 2021. Due to the new legal situation (read more about the legal situation that also affects the gas network regulation in section 2.1.8), Ei did not consider it appropriate to propose new rules concerning the revenue framework regulation for natural gas.

Based on the purpose of the EU legal regulation, Ei has designed a methodology that was used to calculate the revenue frameworks for natural gas companies for the period 2023–2026 in autumn 2022. The method has produced an outcome, i.e. a revenue framework, that meets the objectives of the EU legal framework better than before. The method means, among other things, that the valuation principle for the capital base has been changed from a capacity preservation to an asset preservation principle. The decisions were made for all reporting units on 27 October 2022. The decisions have since

[125] A more detailed history of the court proceedings regarding the revenue framework for gas network companies can be read in the previous report, Ei R2021:08 Sweden's electricity and natural gas market 2020.

[126] Natural Gas Act 2005:403, Chapter 3 section 3.

been appealed by three reporting units (out of a total of nine). The proceedings are ongoing in the Administrative Court.

3.1.4 Cross-border issues

Ei cooperates with the other European regulatory authorities within ACER and CEER. There are also ongoing discussions with the Danish regulatory authority on how the common market can be developed and how reliability of supply can be improved in the Danish-Swedish area.

Cross-border cooperation aims to coordinate the rapid incorporation of European legislation and identify areas for development. Through the ACER cooperation body, Ei has been involved in the implementation of the European regulatory framework for the internal market in natural gas.

Capacity allocation mechanisms in gas transmission systems

The Commission Regulation on capacity allocation mechanisms in gas transmission systems, also known as CAM, entered into force in 2017. CAM shall contribute to the flexible use of existing transmission systems so that gas can be transported from areas where prices are lower to areas where prices are higher.

Both CAM and CMP (access to the natural gas transmission networks) relate to rules concerning interconnection points. Since there are no such interconnection points in Sweden, Ei does not carry out supervision under the regulations nor does it implement any measures in response to the regulations. For the Swedish participants which trade in gas within the EU and transport gas from other countries within the EU to Denmark, and out of Denmark to Sweden, the rules in CAM and CMP are of importance..

Ei therefore monitors implementation by participating in ACER working groups.

Interoperability and information exchange

In 2015, the Commission Regulation laying down rules on interoperability and information exchange (IO) entered into force. The IO Regulation aims to promote and facilitate intra-EU gas trading and transmission through harmonised rules for the operation of the gas network and the exchange of information between transmission system operators. The rules in IO shall be implemented by Swedegas.

Ei supervises compliance with the provisions of the regulation. Ei monitors the application of IO through participation in ACER working groups.

Baltic Pipe

Baltic Pipe is a pipeline that creates a new connection for gas supplies from Norway to Denmark and Poland, as well as to end users in Central and Eastern

Europe. Among other things, Baltic Pipe helps to secure the supply of gas and reduce dependence on Russian gas.

On the 1 October 2022, the Swedish-Danish gas market was integrated with Baltic Pipe. Baltic Pipe means an increased quantity of gas in the system, which has an impact on both volume and flexibility. Against this background, the current balancing model has had to be reviewed. The most significant change in the balancing model involves the calculation of balancing reconciliation every hour of the 24-hour day for gas. The revisions to the balancing model resulted in changes to the balance responsibility agreement concerning the relationship between Swedegas and the Swedish gas companies. Ei approved these proposed amendments on 1 December 2021 and the amendments entered into force on the 1 October 2022.

3.2 The wholesale market for natural gas

Natural gas covers about 2 per cent of Sweden's total energy needs and is thus a relatively small source of energy. However, in the municipalities where the natural gas network has been developed, natural gas accounts for just over 20 per cent of final energy consumption, which is in line with the average in the rest of Europe. The Swedish natural gas market is closely linked to the Danish market.

3.2.1 Monitoring price developments, transparency and competition

Sweden does not produce its own natural gas, but is supplied from Denmark through a pipeline under Öresund Sound (from Dragör). The natural gas consumed in Sweden has therefore historically mainly come from the Danish gas fields in the North Sea. The Danish gas platforms have been under renovation since 2019 and this is expected to be completed in winter 2023/2024. Because of this, since the 1 October 2022, natural gas mainly comes via the Baltic Pipe and Norwegian gas fields, but also to a relatively large extent from biogas (34%[127]). Sweden also imports liquefied gas (LNG) via ships from, among others, the USA and Qatar. The gas is used, among other things, in industries and in Stockholm's urban network. However, the LNG terminals are not connected to the western Swedish gas grid.

Due to the design of the Swedish network, the Swedish natural gas market is closely linked to the Danish market. The balancers in the Swedish natural gas system are also active in the Danish gas market. Since 2020, natural gas has mainly been traded on the European Energy Exchange (EEX), in which the trading

[127] Presentation from Shippers´ Forum 9 March 2023 (energinet.dk)

platform PEGAS[128] is integrated. Competition, price trends and transparency in the Swedish natural gas market are largely dependent on developments in Denmark.

There is a technical capacity to transfer approximately 32 TWh of natural gas annually from Denmark to Sweden via the pipeline from Dragör. Table 11 below presents energy consumption and the total import capacity of natural gas in Sweden during the years 2008–2022.

Table 11. Transmission of natural gas in the natural gas network in western Sweden 2016–2022[129]

Year	Total energy consumption (MWh)	Total import capacity (TWh)
2016	10.6	22
2017	8.7	22
2018	9.2	22
2019	9.0	32
2020	8.1	32
2021	8.7	32
2022	6.5	6.4

Source: Energinet and Swedegas

Natural gas in Sweden is mainly used by industry and in combined heat and power plants, while only a few per cent are used in homes. There is therefore a strong link between weather conditions, especially during the winter months, and natural gas consumption in Sweden. Natural gas consumption in 2022 decreased by 2.2 TWh compared to 2021.

Trading in natural gas

On EEX, a participant can trade gas on the same day as delivery, the day before, before the weekend and for the following month, as well as futures contracts with delivery up to 6 years ahead. To transport natural gas to Sweden, a participant needs to book capacity in Dragör. The capacity of the transmission is auctioned in Energinet's regular capacity auctions. In order to transport gas from Denmark to Sweden, balancers must also be registered as gas traders with Energinet. Due to the low consumption in relation to the transmission capacity of the system, there is no risk of bottleneck problems in transmission with today's consumption. Once in Sweden, the gas can be sold on to consumers such as industries and gas distributors.

[128] Pan-European Gas Cooperation (PEGAS)

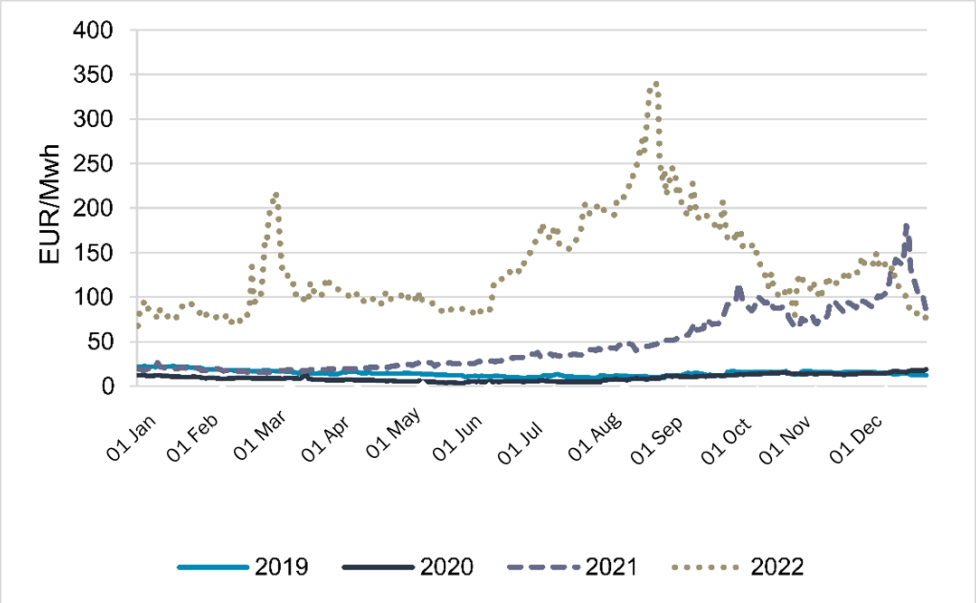
[129] As a result of Sweden moving to a common balancing zone together with Denmark, there was a pressure increase in 2019. There is no longer any pressure regulation between the countries and Sweden now has the full pressure that prevails in Denmark. This explained the higher import capacity on the Swedish side, while energy consumption remained basically unchanged.

The balancing of gas within the common balancing zone in Sweden and Denmark is handled by the so-called Balancing Area Manager (BAM), which uses the Danish virtual trading point ETF to manage the balancing of the gas market. BAM is administered jointly by Energinet and Swedegas.

Price development in the gas market in 2022

The year 2022 was marked by very high natural gas prices and volatility. The price level of natural gas reached 339 EUR/MWh at the end of August 2022 but subsequently fell sharply back to 77 EUR/MWh[130] towards the end of December 2022 (see Figure 20).

Figure 20: Gas price (Dutch Front Month Futures) 2019–2022 in EUR/MWh



Source: SKM Syspower

The increase in demand for natural gas globally has been driven by economic recovery since the easing of restrictions linked to the Covid-19 pandemic. In connection with the imposition of sanctions on imports of Russian gas, Russia periodically shut down the Nord Stream 1 pipeline for maintenance and eventually the pipeline was permanently shut down. Russia's piped supplies of natural gas to the EU fell by more than half in 2022. The EU has replaced part of the shortfall with increased LNG deliveries and implemented demand reduction measures. By March 2023, the share of Russian gas had fallen to 7 per cent, which has been made possible, among other things, by EU imports of LNG increasing by 74 per cent in 2022, while EU gas consumption decreased by 13 per cent in

[130] The price of Dutch front month futures on TTF: Source Årskrönika Energimarknaderna 2022 (Annual Energy Markets Chronicle 2022) (energimyndigheten.se)

2022[131]. On 13 November 2022, the EU gas stores were 96 per cent full[132], which is one of the highest figures ever.

Measures to cover peak demand or supply shortages

Consumption peaks and lack of deliveries from the balancers are handled through the balancing space available in the transmission network pipelines, so-called linepack. Where additional measures are required, the system balancer uses market mechanisms to address imbalances as far as possible. The Swedish Energy Agency may order network owners to limit or suspend the transmission of natural gas to industrial customers. If this is done, the supply to consumers must be secured.

Monitoring the balance between supply and demand

Although reliability of supply has historically been high, the Swedish natural gas market is vulnerable, in both the short and long term. The situation with a single supply point, together with the fact that Sweden has no natural gas production of its own, makes the Swedish natural gas market vulnerable to external disturbances and production stoppages in the Danish and Norwegian natural gas fields.

The Swedish Energy Agency is the supervisory authority under the Act (2012:273) on secure natural gas supply. In line with the requirements of the Natural Gas Supply Regulation[133], a national preventive action plan and a national emergency plan for secure gas supply were published in 2019[134].

Expectations of future demand and deliveries as well as added capacity

Future demand for gas in the world looks set to continue for at least a few years. Demand is driven by, among other things, increased growth in Asia. Due to the war in Ukraine, the European Commission has launched a new energy plan, REPower EU, in 2022. This contains three elements relating to the gas market:

1 Save energy, where the Commission proposes, among other things, to increase the energy efficiency target in the Energy Efficiency Directive.

2 Reduce dependence on Russian natural gas, which in January 2021 accounted for 42[135] per cent of EU gas imports, including through more LNG terminals to import more liquefied natural gas.

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[131] Source: ACER - Market Correction Mechanism - Energy working group 30/03
[132] Quarterly report on European gas markets Q3_FINAL.pdf (europa.eu)
[133] 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.
[134] National emergency plan for Sweden's natural gas supply - according to the rules of the Regulation of the European Parliament and of the Council
(EU) 2017/1938.
[135] Source: ACER - Market Correction Mechanism - Energy working group 30/03

3 Increase the pace of expansion of renewable energy production, to promote climate-friendly solutions and hydrogen technology.

Gas prices are predicted to remain volatile, creating issues in areas such as storage. High prices and market uncertainty risk creating a reluctance on the part of operators to hold gas stocks, which in turn leads to problems for reliability of supply.

For this reason, the EU has decided to amend the Gas Supply Regulation which sets requirements for gas storage levels starting in winter 2022/2023 to ensure reliability of supply in the EU.

The Danish Tyra gas field, which has been closed for maintenance, is expected to be back in operation by winter 2023/2024, improving the delivery conditions for natural gas.

In December 2021, the European Commission presented a gas market package, consisting of directives and regulations. In 2022, the proposal for new rules has been the subject of negotiations in the European Council. The Transport, Telecommunications and Energy Council decided on the general direction on 28 March 2023 and at the time of writing, negotiations with the European Parliament are ongoing. The new gas market package reflects the increased ambition of the European Union Green Deal and is part of efforts to reach the objective of climate neutrality by 2050. The proposed amendments are intended to contribute to the harmonisation of the gas rules with the existing regulatory framework for the EU electricity market. The changes are also in line with developments in the second and third energy market packages. With the proposed rules, the Commission also wants to strengthen customers' opportunities to make renewable and sustainable choices. This is facilitated, among other things, by providing customers with basic information about their energy consumption and its origin, which improves customers' opportunities to make active choices. A large part of the new rules consist of proposals for new regulation of hydrogen plants and an emerging hydrogen market.

3.3 The retail market for natural gas

The Swedish retail market for gas is competitive and prices are set by the participants in the market. The natural gas network in western Sweden has around 27,000 household customers[136], as well as larger customers such as large industries and combined heat and power plants. Stockholm's city and vehicle gas network has approximately 50,000 customers, most of which are household customers.

[136] Source: Swedegas.

At the end of 2022, there were a total of seven participants[137] in the Swedish natural gas retail market, six of which were in the western Swedish natural gas network and one in Stockholm's city and vehicle gas networks.

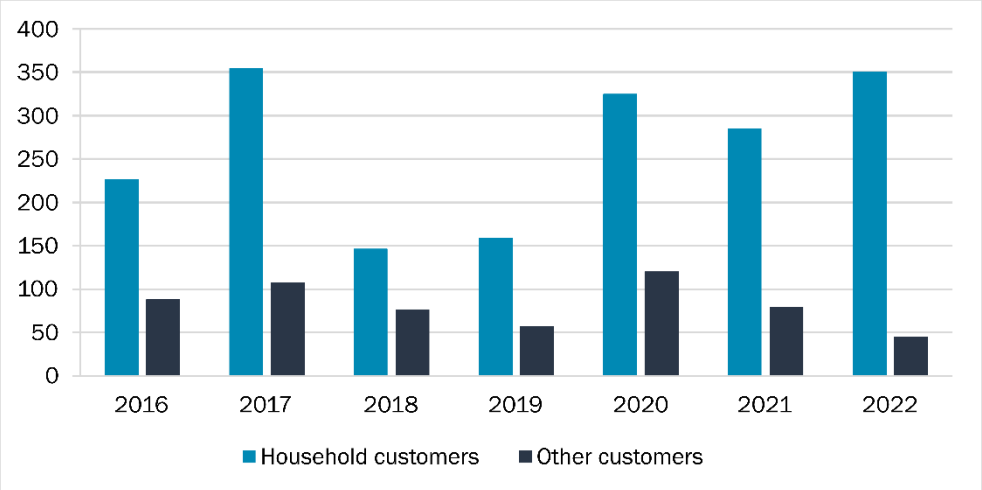
Ei is tasked with working to strengthen the position of natural gas customers by, among other things, enabling active choices with easily accessible information.

Ei also promotes consumer rights in collaboration with the Swedish Consumer Agency. Cooperation with the Swedish Competition Authority occurs, among other things, in matters concerning customers.

3.3.1 Monitoring price developments, transparency and competition in the retail gas market

The gas trading market is competitive and customers in the western Swedish network are free to change supplier. However, this is not possible in Stockholm as only one supplier operates there. Statistics on natural gas supplier changing are shown in Figure 21. Ei receives few questions and complaints from consumers about gas trading and gas networks, usually only a few per area each year.

Figure 21. Number of natural gas supplier changes 2016 - 2022



Source Statistics Sweden

Development of natural gas prices in the retail market

As can be seen in Table 12 and Table 13, natural gas prices have generally increased between 2018 and 2022. In the second half of 2021, unusually high gas prices were seen that continue to increase in the first half of 2022, which is also reflected in retail gas prices. Read more about gas prices in section 3.2 The wholesale market for natural gas.

[137] ApportGas, Eon Försäljning Sverige AB, Göteborg Energi, Kraftringen Energi AB, Varberg Energi, Öresundskraft, Stockholm Gas. Source: Swedish Consumer Energy Markets Bureau.

Table 12 Prices in öre per kWh of natural gas for household customers 2018–2022[138], 5,500 - <55,000 MWh annual consumption

	Trading Price	Network price	Total
2018 Jan–Jun	38.40	27.26	117.17
2018 Jul–Dec	45.43	26.90	125.51
2019 Jan–Jun	42.54	27.93	123.92
2019 Jul–Dec	41.22	22.17	115.07
2020 Jan–Jun	48.62	33.19	138.63
2020 Jul–Dec	49.82	38.46	146.71
2021 Jan–Jun	54.06	33.13	145.71
2021 Jul–Dec	98.03	39.93	209.17
2022 Jan–Jun	118.45	37.56	232.22

Table 13. Prices in öre per kWh of natural gas for household customers 2018 - 2022[139], <5,000 MWh annual consumption

	Trading Price	Network price	Total
2018 Jan–Jun	42.92	49.36	150.45
2018 Jul–Dec	46.66	73.54	185.35
2019 Jan–Jun	49.90	80.73	199.12
2019 Jul–Dec	46.68	62.01	171.70
2020 Jan–Jun	51.52	67.11	184.64
2020 Jul–Dec	46.68	71,71	184,34
2021 Jan–Jun	44.42	77.53	189.16
2021 Jul–Dec	71.08	139.64	300.12
2022 Jan–Jun	125.02	184.48	424.08

Source: Statistics Sweden

Easy to compare household natural gas prices

Since 2014, the Swedish Consumer Energy Markets Bureau has been running the website gaspriskollen.se where household customers can compare prices for natural gas from natural gas trading companies in Sweden. Read more about the Swedish Consumer Energy Markets Bureau in section 4.1.6 The Swedish Consumer Energy Markets Bureau as a national contact point. The website also

[138] The table shows the average total price of natural gas paid by household customers, per six months. The total price includes natural gas, networks, energy and carbon dioxide tax and VAT. When comparing with previous years, note that Statistics Sweden has implemented major methodological changes, which has resulted in the entire time series being revised.

[139] The table shows the average total price of natural gas paid by household customers, per six months. The total price includes natural gas, networks, energy and carbon dioxide tax and VAT. When comparing with previous years, note that Statistics Sweden has implemented major methodological changes, which has resulted in the entire time series being revised.

contains information on how to change gas supplier and information on the different cost items in the gas price.

Regulations for natural gas activities 2022

The Swedish Energy Markets Inspectorate's regulations for natural gas operations (EIFS 2022:12) apply to the reporting of gas network operations for a company engaged in the transmission of natural gas in accordance with Chapter 3 section 3 and chapter 4 section 3 of the Natural Gas Act (2005:403). The regulation is based on sections 8 and 18 of the Ordinance (2006:1051) on accounting and auditing of transmission of natural gas, storage of natural gas and operation of gasification plants. It applies to accounting for a financial year beginning on 1 January 2022 and officially entered into force on 1 February 2023.

3.4 Development of hydrogen infrastructure

Hydrogen has an important role to play in reducing carbon dioxide emissions, in particular in industry, the transport sector and, in the energy sector, for energy storage and the use of gas turbines.

Consumer protection

4 Consumer protection

4.1 Customer information, complaint handling and consumer advice

4.1.1 Elpriskollen

In order to strengthen the position of consumers in the electricity market, Ei offers a price comparison website, elpriskollen.se, where electricity users[140] can compare the prices and terms of the most common contracts from all electricity trading companies.

The ability to compare prices and other factors that may influence the choice of electricity supplier is a prerequisite for having active customers. Ei is therefore working to constantly develop and improve the price comparison site to make things easier for electricity users and enable extended searches. The number of unique visitors was just over 780,000 in 2022, which is an increase of 155 per cent over the previous year.

Ei also carries out regular checks of the reported prices and associated conditions, to ensure that electricity trading companies report correct data. Ei has checked the prices and contract terms of electricity trading companies in 2022. When deficiencies have been discovered, electricity trading companies have been asked to rectify them, which has been done in all cases. All electricity trading companies that address consumers are obliged to report the prices and terms of such contracts, as set out in Ei's regulations on reporting[141] (which are the vast majority of electricity contracts, such as variable and fixed contracts and so-called mix agreements). Electricity trading companies that do not report a contract that is subject to the reporting obligation, and new electricity trading companies that are not aware of their obligations, are contacted by Ei and encouraged to start reporting in accordance with the existing regulation and manual. In 2021, Ei initiated a review of reported hourly rate agreements at Elpriskollen. Out of a total of 62 electricity trading companies that offered hourly rate agreements during the year, 30 have been scrutinised during the regulatory process. The results and analysis of the review were published in 2022.

4.1.2 Consumer Contact

Consumer Contact is a function that, among other things, works to answer questions and receive complaints, primarily from consumers (private individuals), about how the

[140] Refers to consumers and businesses with an expected annual consumption below 100,000 kWh.
[141] EIFS 2013:8.

electricity, gas and district heating markets work and what rules apply. The aim of the activity is for consumers to understand their rights and be able to make active choices.

The aim is also to be an effective channel into the organisation to answer questions from the public. Ei also answers questions and complaints from business practitioner and others. Based on questions and complaints, Consumer Contact can provide input for regulatory development and enforcement efforts within Ei's areas of responsibility.

Consumer Contact receives questions and complaints via email, forms on the Ei website, telephone and the online consumer forum. On the consumer forum, consumers can ask questions or look for answers to previously asked questions directly online. The goal of this approach is to maintain a high level of service with short response times and relevant answers to consumers.

Ei has an in-depth cooperation with the Swedish Consumer Energy Markets Bureau regarding the handling of questions and complaints. Consumers who have questions outside Ei's areas of responsibility are referred to the bureau. This may, for example, concern contract law issues. The Swedish Consumer Energy Markets Bureau also answers some of the questions asked via the online consumer forum.

In 2022, Ei had 3,207 consumer contacts. These contacts were mainly regarding electricity grids, electricity trading and elpriskollen.se, but also district heating, gas networks and gas trading. Consumer contacts are sorted into questions and complaints: a question is when the customer wonders about something and a complaint is when the customer expresses dissatisfaction. There were more complaints than questions in 2022. Most of the questions and complaints concerned electricity grids and electricity trading. Consumer contacts on electricity grid charges could, for example, concern increases in charges, their level, the difference in charges between different grid areas or the different components of the charges, such as the variable part, the fixed part or the power charge. Consumer contacts on electricity trading often focused on unfair business practices, which sometimes occur in outreach sales, electricity price levels and contract terms, such as unfair contract terms or lack of information on contract terms.

4.1.3 Notifications to Ei

In addition to asking questions about the energy markets, consumers can also report that a company does not comply with the provisions of the Electricity Act and the Natural Gas Act for which Ei is responsible. As the supervisory authority, Ei can then investigate whether the company is in breach of its legal obligations.

4.1.4 Working against unfair business practices

Ei has, among other things through its many consumer contacts, drawn attention to a number of questionable business practices used by some companies in the electricity trading market that in various ways make the situation of customers more difficult. This may involve, for example, electricity trading companies that apply unfair contract terms or carry out a change of electricity supplier without the consumer's approval. In 2021, Ei therefore initiated a project to develop proposals for measures to counteract unfair business practices in the electricity trading market. During the work, collaboration took place with market participants and other government agencies. The project resulted in a report with proposed measures that was published in early 2022[142]. In the spring of 2022, Ei received a government assignment to prepare proposals for amendments to the Electricity Act (1997:857). The report was published in 2023 with the aim of expanding electricity users' rights and protection against unfair business practices[143]. The measures can help make electricity users stronger and safer and increase confidence in the electricity trading market.

4.1.5 Help for vulnerable customers

The Swedish definition of vulnerable customers is formulated in Ei's official instructions and reads "vulnerable customers refers to people who permanently lack the ability to pay for the electricity or natural gas transmitted or supplied to them for purposes that fall outside the scope of business activities". In the Swedish electricity and natural gas markets, this category of consumers is protected by social legislation in such a way that the consumer has the right to receive financial assistance to manage their electricity and natural gas supply.

Both the Electricity Act and the Natural Gas Act also contain provisions that protect consumers who risk being disconnected from the electricity grid or natural gas network due to non-payment or other significant breach of contract. The provisions mean that the company carrying out the disconnection must first follow a certain statutory approach. This includes, among other things, the consumer's right to correct information from the company, the opportunity for the consumer to comply without disconnection taking place and that the company must send a message to the social services in the municipality where the consumer lives a certain time before disconnection can occur.

[142] Oschyssta affärsmetoder på elhandelsmarknaden – En rapport med åtgärdsförslag (Unfair business practices in the electricity trading market – A report with proposed measures) (EiR2022:02)
[143] Oschyssta affärsmetoder - En rapport med författningsförslag (Unfair business practices - A report with a legislative proposal) (Ei R2023:01) was submitted to the Government in February 2023.

4.1.6 The Swedish Consumer Energy Markets Bureau as a national contact point

Ei is one of five clients of the Swedish Consumer Energy Markets Bureau. This is an independent agency that provides information and guidance to consumers on issues related to the electricity, district heating and natural gas markets. Advice to consumers is free of charge. There is an agreement between Ei and the Swedish Consumer Energy Markets Bureau which means that the bureau is the national contact point for the electricity and natural gas markets. This fulfils the requirements of the EU Electricity and Gas Market Directives. The bureau's website had just over two million unique visits in 2022, which was a large increase compared to 2021 when approximately one million unique visits were registered. Consumers can contact the Swedish Consumer Energy Markets Bureau by telephone and email and approximately 5,500 cases were answered during the year, which was an increase compared to 2021. Most of the complaints concerned electricity trading and mainly concerned contracts and terms. The complaints received by the Swedish Consumer Energy Markets Bureau showed that the contract terms were perceived as complex, and consumers who were dissatisfied rarely felt satisfied with the electricity trading company's response. These cases also included a wider range of criticisms of the functioning of the market, such as marginal pricing and bidding zone division.[144]

When there is a reason to do so, the bureau informs consumers that it is possible to report a case to the regulatory authority or request a review of a dispute with the National Board for Consumer Disputes (ARN).[145]

The Swedish Consumer Energy Markets Bureau publishes quarterly complaint information on individual electricity trading companies.[146] The purpose is informative, to show which electricity trading companies are most complained about and what the complaints are about, i.e. what problems customers have with these electricity trading companies[147].

During the year, the Swedish Consumer Energy Markets Bureau also continued to report summaries of consumer problems in the energy markets to government agencies and companies. This work has, among other things, created opportunities for companies to take action to reduce complaints. For Ei, together with the authority's own summaries of consumer complaints, this has meant that supervisory measures have been able to be deployed where they are most useful.

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[144] Swedish Consumer Energy Markets Bureau Annual Report 2022.
[145] Swedish Consumer Energy Markets Bureau Annual Report 2022.
[146] www.energimarknadsbyran.se/el/dina-avtal-och-kostnader/valja-elavtal/klagomalsinformation/ Retrieved in April 2023.
[147] The website of the Swedish Consumer Energy Markets Bureau describes how complaint information and the list of companies have been produced www.energimarknadsbyrån.se

4.1.7 Other consumer advice

Among other agencies that have a consumer responsibility in the energy markets, the Swedish Consumer Agency in particular can be mentioned. The Swedish Consumer Agency examines, among other things, whether companies have used misleading or aggressive marketing, used unfair contract terms or provided inadequate price information.

The Swedish Consumer Agency operates a central consumer information service under the name Hallå Konsument (Hello Consumer).[148] Hallå Konsument not only covers the energy markets but includes all consumer markets. The consumer can turn to Hallå Konsument with questions about, for example, purchases, terms in contracts and complaints.

Several other agencies, including Ei, are responsible for collaborating with the Swedish Consumer Agency in the development of Hallå Konsument.

The Swedish Consumer Energy Markets Bureau is responsible for answering questions referred from Hallå Konsument and for certain information on the Hallå Konsument website.

For advice on various issues, consumers in the electricity and natural gas markets also have the opportunity to turn to their municipality of residence. There, consumer advisors offer, among other things, advice before signing an agreement and guidance in disputes. Budget and debt advisers can offer advice and support in the event of payment problems, while energy and climate advisers can offer analysis of energy use and advice on choosing a new heat source. Another advisory function is the Swedish Energy Agency's Solelportalen. There, consumers can get information about solar cells and make calculations before the decision to acquire solar cells for their house.

4.2 Resolving disputes

Electricity trading companies, electricity grid companies, gas trading companies and gas network companies shall provide, on their websites and on the invoice to the consumer, clear information on the consumer's rights, how the consumer can lodge a complaint and where the consumer can turn for information or dispute resolution.

4.2.1 Ei examines certain dispute issues

Ei checks that companies in the electricity and natural gas markets comply with the legislation and also, in some cases, has a dispute resolution function for disputes between a consumer and a company. This is for disputes concerning the obligation

[148] www.hallakonsument.se

of electricity grid companies to connect an installation to the grid, the cost of metering and calculating electricity, payment for feeding electricity into the system and network tariffs for smaller production installations.

According to the provisions of the Electricity Act, the connection charge must be reasonable.[149] If the consumer considers that the cost is too high, they can turn to Ei, which will then examine it. If Ei finds that the connection charge is too high, the electricity grid company must reimburse the difference to the consumer. Ei's decision on a reasonable connection charge can be appealed and it is the courts that ultimately decide what applies. It is free of charge ask Ei to examine a case and to appeal against Ei's decision.

4.2.2 Dispute resolution support at the National Board for Consumer Disputes

A consumer in the electricity and natural gas markets can report a dispute with a company to the National Board for Consumer Disputes (ARN). Such a notification can be described as a quick and easy but still legally secure alternative to court. ARN is a government agency that adjudicates disputes between customers and companies free of charge in the electricity and natural gas markets, among others.

ARN does not conduct its own investigation of what happened, but it is up to the parties to submit and present the documentation the board is to decide on. When assessing a dispute, the board relies on current legislation and case law. In its decision, the board makes a proposal as to how the dispute should be resolved. In order for the consumer to be able to report a dispute to ARN, the company must have rejected the consumer's claim or not responded to the consumer at all, the notification must be received no later than 1 year from the date on which the company said no to the consumer's claim and the claim must be above the value thresholds of SEK 500, SEK 1,000 or SEK 2,000 depending on what the notification concerns.

The consumer usually has to wait about 6 months for a decision on the matter from ARN. The consumer can also turn to the ordinary courts of law to resolve a dispute with an electricity or natural gas company. A business practitioner can only turn to the ordinary courts of law for dispute resolution, which entails certain risks as it can be a costly process.

[149] Electricity Act 1997:857, Chapter 4 section 9.

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