

Sweden's electricity and natural gas market, 2023



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

The overall aim of our work is to ensure that Sweden has well-functioning distribution and trading of electricity, district heating and cooling, and natural gas. We shall also safeguard our customers' interests and strengthen their position in the markets.

In concrete terms, this means that we supervise companies' compliance 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 the companies in the competitive energy markets.

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

Swedish Energy Markets Inspectorate

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Swedish Energy Markets Inspectorate Ei R2025:07

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Foreword

The Swedish Energy Markets Inspectorate (Ei) is the regulatory authority for the electricity, natural gas, district heating and district cooling markets and continuously monitors developments in these markets. The purpose of this report is to describe developments in the electricity and natural gas markets in 2023.

According to Ei's instructions, the authority 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 regulatory 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, October 2024

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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 regulatory 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.

Recent events affecting energy prices

In the autumn of 2021 and in 2022, energy prices rose to significantly higher levels than previously experienced. Russia's war with Ukraine led to a reduction in gas supplies from Russia, which was a major contributor to the increase in natural gas prices. This, in turn, had an impact on electricity prices. Natural gas prices in Europe fell sharply in 2023, but were still more than twice as high as prices before the COVID-19 pandemic.

The high electricity prices resulted in the Swedish Government taking a series of measures in 2022 and early 2023, notably through electricity and gas price support for households and industries. In addition to sanctions against Russia, the European Commission introduced measures to mitigate the negative impact of high electricity and gas prices on society and increase security of supply in Europe. In 2023, the EU institutions also agreed on revised rules for the electricity and gas markets (Electricity Market Regulation, Electricity Market Directive, Gas Market Regulation and Gas Market Directive).

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 593,000 km of cable, approximately 437,000 km of which is underground cable¹.

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). In its capacity as a regulatory authority, 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 continuity of supply is maintained. The Swedish electricity grids are operated as regulated monopolies and Ei decides how much the electricity grid operators may charge their customers over a four-year period by establishing revenue frameworks. Between 2022 and 2023, charges decreased on average by 0.2 per cent for apartment customers and 0.3 per cent for detached house customers using 16 A fuses, while the charges increased by 2.3 per cent for detached house customers using 20 A fuses. This equates to an annual charge change of about SEK 3 for apartment customers, SEK 12 for detached house customers using 16 A fuses, and about SEK 186 for detached house customers using 20 A fuses.

The wholesale market for electricity

In 2023, electricity prices decreased significantly compared with the previous year in all Swedish bidding zones. Prices have remained at a high level, but lower compared with 2022. On average, the system price² in the Nordic region during the year was EUR 56.45/MWh. In the SE4 zone of Sweden, the annual average price was EUR 64.88/MWh, while in SE3 it was slightly lower at EUR 51.70/MWh. In SE1 and SE2, the corresponding price was around EUR 40/MWh. During the year, electricity prices were volatile at times, and the price of electricity was negative much more often than in previous years. Negative prices were seen in all bidding zones to roughly the same extent, around 400 hours in 2023. The lowest daily average price was EUR 8.31/MWh in all bidding zones in July. The highest daily average price was EUR 188.64/MWh in SE4 in January. Nord Pool's day-ahead market is the marketplace for most physical trading in electricity in the Nordic and Baltic countries. In 2023, Nordic operators traded around EUR 102.14/MWh on Nord Pool's day-ahead market, which was a significant decrease from EUR

¹ Energiföretagen, "Elnätets längd" [The length of the electricity grid], Kalle Lindholm, downloaded 15 July 2024, <https://www.energiforetagen.se/energifakta/elsystemet/elnetet--distribution-av-el/elnetets-langd/>

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 will be consumed.

261.40/MWh the year before. Some trading also takes place via bilateral contracts and on the intraday market.

In 2023, 163 TWh of electricity was produced in Sweden, which was a decrease of around 4 per cent compared with the previous year. In contrast, the proportion of production from wind power and, to a certain extent, solar power increased during the same period. In 2023, wind power produced 34 TWh, which is an increase of 2.7 per cent compared with 2022. Net exports of electricity amounted to 29 TWh in 2023, which was a decrease of 13 per cent compared with the previous year.

The retail market for electricity

In 2023, there were about 130 electricity trading companies on Ei's comparison site elpriskollen.se. At the end of 2023, the three largest electricity trading companies had a combined market share of approximately 47 per cent based on the number of customers, which is a decrease of 4 percentage points from 2022.

In 2023, the largest share of the electricity cost, 44 per cent, consisted of the electricity retail price. VAT and tax accounted for 34 per cent of the electricity consumer's total cost of electricity, while transmission in the grid accounted for 22 per cent, which is almost double the proportion in 2022.

Variable contracts remain the most popular, with over half of customers having this type of contract. New for 2023, Statistics Sweden now publishes official statistics on the proportion of customers with hourly rate contracts. At the end of the year, the proportion of customers with this type of contract was around 14 per cent.

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 an urban gas network and a vehicle gas network comprising approximately 500 and 40 km of pipeline, respectively.

Ei is the regulatory authority for the networks covered by the provisions of the Natural Gas Act (2005:403), which are the western Sweden 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 additional biogas producers are connected to the city and vehicle gas network in the Stockholm area. During the time period that plants in the North Sea around the Danish Tyra gas field were being refurbished, the natural gas network in western Sweden was supplied primarily with gas from continental Europe. Tyra was brought back into operation in the first quarter of 2024.

As with electricity market rules, Ei sets revenue frameworks for gas network operators over a period of four years. This framework sets an upper limit for the total revenue that companies can collect from their natural gas operations.

The wholesale market for natural gas

In 2023, 6.5 TWh of natural gas was used in the natural gas network in western Sweden. Due to the design of the western Sweden network, the Swedish natural gas market is closely linked to the Danish market. Natural gas prices in the EU in 2022 were several times higher than prices before the pandemic. Gas prices fell in 2023 to a significantly lower level compared to 2022, but were still more than double the pre-pandemic level.

Natural gas is traded in Denmark on the European Energy Exchange (EEX), where the former Danish trading platform ETF PEGAS is integrated, as well as through bilateral delivery contracts on the Gas Transfer Facility (GTF). Competition, price trends and transparency in the Swedish natural gas market are largely dependent on developments in Denmark.

The retail market for natural gas

There are two main natural gas networks in Sweden that supply gas to customers: the natural gas network in western Sweden and the city and vehicle gas network in Stockholm. 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. A common factor for the gas network in Stockholm and the small local gas networks around the country is that they are not connected to any transmission network.

In 2023, there were a total of seven operators supplying gas to household customers on the Swedish natural gas market, including six operators in the natural gas network in western Sweden and one operator in Stockholm's city and vehicle gas network.

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 electricity and gas market.

Among the regulations Ei monitors are those concerning the quality of electricity deliveries to customers, as poor delivery quality causes major inconvenience to customers and results in high costs for society. Power outages cost Swedish society around SEK one billion every year. Deficiencies in voltage quality in the electricity grid can also cause major costs. A well-functioning electricity supply is of great importance for the functioning and development of society.

Consumers can report a company that does not comply with the provisions of the Electricity Act (1997:857) and the Natural Gas Act. As the regulatory authority, Ei can then investigate whether the company is in breach of its legal obligations. In 2023, Ei was in contact with just over 2,700 consumers. There were more complaints than questions in 2023. Most of the questions and complaints received were related to 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 trading companies. The ability to compare prices and other factors that may influence the choice of electricity trading company is a prerequisite for having active customers. All customers (both consumers and small businesses) with an expected annual consumption of up to 100,000 kWh can compare contracts via Elpriskollen, as required by the Electricity Directive³. Elpriskollen has been undergoing development for several years to make it more user-friendly, and Ei launched the new version of the comparison site on 1 June 2023.

Ei also collaborates with the Swedish Consumer Agency within the framework of "Hallå konsument", an online service where consumers can obtain information about their rights in a number of markets, including the energy markets. Ei provides knowledge and data on issues related to the energy markets.

³ 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 (recast)

The electricity market



1 Recent events impacting the energy markets

In recent years, a number of international and national events have impacted the EU and Swedish energy markets in various ways, including disruptions in energy supplies to Europe and high electricity and gas prices. The section below aims to provide an overview of some of the key events that have affected energy markets and actions taken in the near future.

1.1 Events in the natural gas market

In the context of Russia's war against Ukraine and the imposition of EU sanctions against Russia, the supply of Russian gas within the EU decreased. This caused turmoil in the natural gas market in 2022, and a record natural gas price of EUR 339/MWh was reached in August 2022, which in turn affected electricity prices. As piped gas decreased, the use of LNG (liquefied natural gas) increased for EU countries. In total, natural gas consumption in the EU decreased by 16 per cent in 2023.

In response to the crisis, new gas crisis regulations were introduced in record time in 2022, aiming to secure gas supply, sufficient stocks and reduced demand for gas in the EU. EU natural gas stocks stood at 96 per cent at the end of September 2023, the highest level ever. See the section "Price trends in the gas market in 2023" in section 3.2.1 Monitoring price trends, transparency and competition.

1.2 Electricity prices in 2023

In 2022, high gas prices drove up electricity prices to historically high levels. In 2023, electricity prices were significantly lower than in 2022 in all Swedish bidding zones. On average, the system price was 64 öre/kWh in 2023, which was a decrease of 55 per cent compared with the previous year's prices. In the four Swedish bidding zones SE1, SE2, SE3 and SE4, the average prices were between 46 and 74 öre/kWh.

1.3 Measures and reduction in demand

The energy price increases affected households, industry and businesses across the EU. To mitigate the consequences of the high energy prices that prevailed in 2022, an Electricity Crisis Intervention Regulation ((EU) 2022/1854) was adopted in October 2022. The Crisis Regulation contained three main measures to reduce energy prices. The first measure aimed to reduce electricity consumption and

involved voluntary measures to reduce total EU electricity consumption by 10 per cent by the end of March 2023. It also included an obligation for EU countries to reduce consumption by at least 5 per cent during peak demand hours and the possibility for countries to choose measures to reduce electricity consumption.

The second measure was the possibility of introducing a cap on electricity producers' revenues, targeting electricity producers that did not use gas for their electricity production, which could potentially result in large financial gains. The aim of a market revenue cap was to allow redistribution to those affected by high electricity prices. The third measure was to ensure so-called solidarity contributions from companies operating in the crude oil, natural gas, coal and refinery sectors in order to contribute to affordable energy prices for households and businesses. In addition, it was also clarified that congestion income (capacity charges)⁴ could be used to support end customers.

1.3.1 Reduced electricity consumption

The forecast for the coming years is that electricity consumption in Sweden will increase. However, in 2023, electricity consumption in Sweden as a whole decreased by about 2 per cent compared to 2022, and electricity production decreased by about 4 per cent over the same period. Overall, electricity consumption was 135 TWh and electricity production amounted to 163 TWh in 2023⁵.

1.3.2 Natural gas measures

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, and in March 2023 a regulation was adopted that extended this voluntary target by one year. On 22 December 2022, the implementation of a market correction mechanism for gas was decided. Subject to certain conditions being met, the market correction mechanism imposes a cap on the price of gas equivalent to EUR 180/MWh. In December 2023, the decision was taken to extend the mechanism until 31 January 2025. 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 continued in 2023 with a view to

⁴ When there is insufficient transmission capacity between bidding zones, prices in the zones 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, sometimes also referred to as congestion income.

⁵ Swedish Energy Agency, "Minskad elanvändning och elproduktion under 2023" [Reduced electricity consumption and electricity production in 2023], [Minskad elanvändning och elproduktion under 2023 \(energimyndigheten.se\)](https://energimyndigheten.se)

reaching an agreement between the Council of Ministers and the European Parliament in 2024.

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 congestion income to fund electricity price support for households (private individuals), businesses and legal entities in bidding zones SE3 and SE4. The electricity support for all groups covered the period 1 October 2021 to 30 September 2022 and the compensation level was 50 öre per kWh consumed in bidding zone SE3 and 79 öre per kWh consumed in bidding zone SE4. In total, approximately 4.3 million households benefited from the electricity price support.

At the beginning of January 2023, the Government decided to task Svenska kraftnät with another electricity price support for households (private individuals), this time covering the whole of Sweden, i.e. bidding zones SE1, SE2, SE3 and SE4. This electricity price support was applied during the period November and December 2022 and covered around 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 a gas price support for households connected to the gas network in western Sweden. The support covered the period October 2021–September 2022 and amounted to 79 öre per measured kilowatt hour. The Swedish Energy Agency received applications for gas price support in the autumn of 2023 (4 September–2 October) and was responsible for making payments to the gas network operators⁶.

1.3.5 Development of the regulatory framework for the electricity market

In early 2023, the European Commission presented legislative proposals in the form of amendments to the Electricity Market Directive, the Electricity Market Regulation and the REMIT Regulation (see also section 2). Since autumn 2021, discussions had been ongoing at the EU level on how the electricity market could potentially be redesigned to be made more efficient and mitigate the impact on electricity customers in times of crisis. Among other things, the European Commission tasked the Agency for the Cooperation of Energy Regulators (ACER) with developing proposals for changes to the current electricity market model in the longer term. ACER presented its final report in spring 2022, noting that improvements could be made, for example by making long-term energy markets

⁶ Swedish Energy Agency, "Gasnätsföretagen får pengar att fördela till sina kunder som gasprisstöd" [Gas network operators receive money to distribute to their customers as gas price support], [Gasnätsföretagen får pengar att fördela till sina kunder som gasprisstöd \(energimyndigheten.se\)](https://www.energimyndigheten.se/om-energi/nyheter/2023/gasnatsforetagen-far-pengar-att-fordela-till-sina-kunder-som-gasprisstod)

more efficient and increasing the flexibility in the electricity system.⁷ The Commission's proposals for new regulations were negotiated during the year in the European Parliament and in the Council of Ministers.

⁷ ACER, "ACER publishes its Final Assessment of the EU Wholesale Electricity Market Design", [ACER publishes its Final Assessment of the EU Wholesale Electricity Market Design | www.acer.europa.eu](http://www.acer.europa.eu)

2 The electricity market

About one third of Sweden's energy consumption comes from electricity and, as the climate transition progresses, electricity consumption is expected to increase to compensate for the reduced use of fossil fuels⁸. To manage 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 will 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 manage more variable energy flows in the electricity grids over time.

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

The Swedish Energy Markets Inspectorate (Ei) works for well-functioning electricity markets in which participants follow the rules that will enable a safe, efficient, flexible and integrated electricity system. Ei's tasks include supervising companies' fulfilment of their obligations under both national and EU legislation. Ei supervises electricity grid operators, electricity traders and several other participants on the wholesale market. Ei continuously makes proposals on how the markets can be developed.

Ei cooperates with other national energy regulators and ACER, as well as with the regulators in CEER (Council of European Energy Regulators). Ei also cooperates regionally with the Nordic regulators of NordREG and with the regulators in the capacity calculation regions⁹ that Sweden is part of, i.e. the Nordic, Baltic and Hansa capacity calculation regions. Cross-border cooperation aims to coordinate cases, coordinate the rapid transposition of European legislation, and identify areas for development.

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

⁸ [Framtidens elektrifierade samhälle Analys för en hållbar elektrifiering \[The electrified society of the future: Analysis for sustainable electrification\] \(ER 2021:28\)](#)

⁹ Capacity calculation region: the geographical area in which coordinated capacity calculation is applied.

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.
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	Operation of electricity transmission systems, continuity 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 exercises supervision in accordance with the REMIT Regulation, which means that Ei has a mandate to monitor trading in wholesale energy products for electricity. This monitoring creates confidence and favourable conditions for correct pricing. The current rules prohibit insider trading and undue market influence on the European wholesale energy markets and require market participants to publish inside information immediately. Ei also supervises under Commission Regulation (EU) 543/2013 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 593,000 km of cable, approximately 437,000 km of which is underground cable. 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 17,000 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 what are known as bidding zones. Sweden has four bidding zones: SE1, SE2, SE3 and SE4, based on where the greatest transmission capacity constraints in the transmission network existed 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 reviewing the divisions and for investigating and analysing alternative divisions.

Svenska kraftnät and the other European transmission system operators (TSOs) are currently analysing alternative bidding zone divisions. A proposal to change or maintain the current bidding zones is tentatively¹⁰ expected to be submitted to the Government in the fourth quarter of 2024. If the decision is made to change bidding zones in Sweden, this could be implemented in 2027 at the earliest.

2.1.2 The role of the grid operators

Transmission system operator

Svenska kraftnät, which operates and manages the Swedish transmission grid, is also the authority responsible¹¹ for the Swedish transmission system. Svenska kraftnät is tasked with commercially managing, operating and developing a cost-effective, reliable and environmentally sound power transmission system. They are also required to provide transmission capacity, and Ei, as the regulatory authority, is tasked with scrutinising and ensuring that Svenska kraftnät complies with the rules for transmission system operators in the EU internal electricity market.¹²

The Electricity Market Directive requires transmission system operators to be certified; detailed rules on this can be found in national legislation¹³. In July 2012, Ei decided 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 about 170 electricity grid operators. The regional and local grid operators 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 for ensuring that the system can meet reasonable requirements for the distribution of electricity in the long term.¹⁴ Each electricity grid operator has a local monopoly, i.e. the exclusive right to distribute electricity. Ei decides on exclusive rights in the form of permits (grid

¹⁰ In the spring of 2024, Svenska kraftnät announced that the results of the alternative bidding zone work, which was previously set for May 2024, has been postponed. The delay in the results for bidding zone division is not expected to affect the previously communicated timetable for the possible implementation of new bidding zones in Sweden.

¹¹ Svenska kraftnät is the authority responsible for the system according to the Electricity Act (1997:857) and thus has overarching 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.

¹² In Sweden, there is no independent system operator. For this reason, the provisions that specifically cover supervision of independent system operators are not applicable to Ei.

¹³ The Act (2011:710) on Certification of Transmission System Companies for Electricity contains provisions on certification of transmission system companies.

¹⁴ 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.

concessions). In order to ensure that the electricity grid operators 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 Network tariffs and the revenue frameworks for electricity grid operators. 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 operators function as regulated monopolies, while electricity trading 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-subsidisation¹⁵, 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 outage. Grid operations must also be separated from all other operations in the financial accounts, and thus be reported separately from other operations that may be carried out in the same legal entity as the grid operations. As of July 2022, a grid operator may not engage in any activity other than grid operations, with only a few exceptions.¹⁶

Grid operators must submit a specific annual report on grid operations 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 regulatory work and economic analysis.

There is also a requirement for certain electricity grid operators to be functionally separate from companies engaged in the production of or trade in electricity.¹⁷ Functional separation means, among other things, that a person who is a board member, CEO or authorised signatory of a legal entity that is engaged in grid operations may not at the same time be a board member, CEO or authorised signatory of a legal entity that is engaged in the production of electricity or the 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

¹⁵ When a company strategically uses revenue from one part of the business to finance another part of the business.

¹⁶ In addition to electricity grid operations, grid operators 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 outage, and repair and maintain the grid of another company.

¹⁷ 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.

has at least 100,000 electricity users, which only applies to a small number of Sweden's more than 170 electricity grid operators.

A distribution grid operator¹⁸ that is part of the same group as a company engaged in the production of or the trading in electricity must formulate a monitoring plan, in accordance with the Electricity Act (1997:857)¹⁹. 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, referred to as 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 decision from Ei.

The ongoing energy transition has increased interest in, among other things, locally produced electricity, opportunities to meet the electricity needs of vehicles, feeding electricity into the public grid and using energy storage in the form of both batteries and hydrogen. When lines are to be built and used for purposes such as contributing to the energy transition, they often involve IKNs.

The influx of cases that arose when new and amended rules entered into force on 1 January 2022, concerning, among other things, the sharing of locally produced electricity and the transfer of electricity from energy storage, remained at a high level in 2023.

In 2023, Ei investigated several cases and issued what are known as binding decisions that also provide guidance for similar situations. New information has been posted on the authority's external website to make it easier to find answers to questions and reduce the need for market participants to request new binding decisions in similar cases. This has improved the efficiency of Ei's work on IKN

¹⁸ The Electricity Act (1997:857) defines a distribution grid operator as a grid operator that owns a local or regional grid and, on the basis of a grid concession, makes a high-voltage line available for the transmission of electricity on behalf of a third party and takes the measures necessary for the transmission.

¹⁹ Chapter 3, Section 24.

cases and helped Ei to reduce lead times, and the number of IKN cases is not increasing.

In the report *Slutna distributionssystem och interna nät*²⁰, Ei found that there is a need for changes to the IKN regulation. Ei proposed that the possibility of IKN for the transmission of electricity on behalf of a third party be expanded to include grids within public and private institutions, and that lines for the electricity needs of ships be exempt from the requirement for a grid concession. In addition, it was proposed to extend the exemption for production facilities in relation to the feeding of electricity into the public electricity grid to energy storage facilities, installations for the consumption of electricity or installations for the conversion of electricity into another energy carrier. The proposals made have not yet been implemented.

2.1.4 Expansion of the electricity grid

The Swedish distribution and transmission network is currently in a period of extensive expansion, driven by increased electrification in society so as to achieve net-zero emissions in the transport sector and industry and to be able to handle new electricity generation and new electricity customers. At the same time, there is a significant need for reinvestment in the Swedish electricity grid.

Shorter lead times for electricity grid expansion

To meet the greatly increased demand brought about by electrification, measures need to be taken, both to use and produce electricity efficiently and to enhance the possibilities 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, in partnership with Lantmäteriet (the Swedish mapping, cadastral and land registration authority) and the county administrative boards, was tasked by the Government with developing and testing 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 were identified, both by 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 were reported to the Government Offices of Sweden in April 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 conduct pylon planning at an earlier stage.

²⁰ Slutna distributionssystem och interna nät [Closed distribution systems and internal grids] (Ei R2022:12)

In the appropriation directions for 2023, Ei was given the assignment of developing working methods and parallel processes for the examination of grid concessions for electricity grids. The assignment also included implementing the results and lessons learned from the previous assignment. The assignment is to be reported in November 2024.

Grid development projects

In November 2023, Svenska kraftnät published a grid development plan for 2024–2033 that includes a number of different planned grid investments. One example of the driving forces behind grid development is that the number of applications for connection to the transmission grid is constantly increasing, not least from industries that want to convert and electrify their processes. The need for grid investments is greatest in northern Sweden, but this need exists throughout the country. However, a large part of Svenska kraftnät's investments in facilities over the next 10 years will consist of reinvestments in the transmission grid.

Zone SE1 is expected to see a sharp increase in power demand, and Svenska kraftnät has drawn up an action programme called “Fossil-free in Upper Norrland”, in which it intends to reinforce the grid and increase the possibility of connecting these power sources in the zone. This greater power demand also affects the south-north flows, which means that the transmission between zones SE1 and SE2 also needs to be reviewed.

Reinforcements of the transmission between SE2 and SE3 are underway within the framework of Svenska kraftnät's North-South programme. Among other measures, the outdated 220 kV grid will be replaced with a 400 kV grid. North-South is a comprehensive investment package that is planned to span 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 grid that can meet the need for increased transmission from north to south. The package is mainly divided into four north-south corridors, which Svenska kraftnät has named Uppsalabenet [Uppsala Corridor], Västeråsbenet [Västerås Corridor], Karlstadbenet [Karlstad Corridor] and Hallsbergbenet [Hallsberg Corridor]. At present, these corridors are expected to be completed in 2034, 2035, 2033–2035 and the late 2030s, respectively.

Located in the Baltic Sea is the island of Gotland. A new connection at transmission grid level between the mainland and Gotland was decided for zone SE3 in 2023. This is planned to consist of two 220 kV AC cables. Forecasts show that Gotland's power balance will be in deficit from 2030, which is why a new connection is planned to be in operation in the early 2030s. Another major grid development project in zone SE3 is the system reinforcements in the Stockholm region (which Svenska kraftnät has named Storstockholm Väst [Greater Stockholm West] and Stockholms ström [Stockholm Power]) that need to be coordinated with

municipalities and regional grid operators in the area. In partnership with regional and local grid owners Vattenfall and Ellevio, Svenska kraftnät 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 continuity and reliability of supply for electricity and gas in the EU is key to the proper functioning of the energy market and therefore an important issue for Member States. To achieve a comprehensive approach, there is a common EU regulatory framework for energy infrastructure. The framework states, among other things, that major infrastructure projects of common interest within the EU (PCIs) are identified according to an established process and compiled into a common list. These projects are subject to a specific regulatory framework aimed at simplifying and coordinating permit processes between countries, as well as rules allowing project owners to apply for specific EU funds to facilitate the financing of the projects. For the period 2021–2027, there is EUR 42.3 billion in the so-called CEF fund²¹ 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 regulation²² governing the processes and obligations under the PCI framework was revised. Among other things, the possibility to apply for PCI status has been extended to more infrastructure categories, such as offshore renewable energy infrastructure, smart electricity grids and gas networks, and hydrogen infrastructure. The new regulation also introduced a new concept that to some extent extends the regulation's scope to infrastructure to third countries. This is referred to in the regulation as projects of mutual interest (PMIs).

Ei has several tasks under the regulatory framework, including participating in the evaluation of the projects applying to become PCI projects, reporting on the progress of the projects and, on application, deciding how the costs are to be allocated between the countries involved, known as cross border cost allocation (CBCA).

²¹ Connecting Europe Facility.

²² 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.

In November 2023, an updated list of PCI and PMI projects²³ was published by the Commission. Sweden is involved in four PCI projects, two concerning electricity transmission and two concerning hydrogen infrastructure.

The first PCI project for electricity is the Aurora line, which consists of a 400 kV cable from Messaure in the north of Sweden to Keminmaa in Finland. It is approximately 180 km long, running between the Messaure station in Jokkmokk Municipality and the Finnish border in the Torne River at Risudden, Övertorneå Municipality. In total, the entire overhead line is estimated to be 380 km long and will run parallel to the existing transmission grid line on the same stretch. As this is an international connection, Ei does not decide on the concession, but has in an opinion statement to the Government been in favour of granting a grid concession, and the Government granted it in October 2023. The line is expected to be commissioned by the end of 2025.²⁴ The planned line between Sweden and Finland is expected to result in major benefits for the entire Nordic electricity market, increase security of supply in Finland, further integrate Sweden into the Nordic electricity system and meet future needs for reliable electricity supplies.

The second electricity PCI project is Aurora line 2, which aims to further strengthen market connection in northern Sweden with Finland. If realised, it will be the fourth 400 kV line between northern Finland and zone SE1 in Sweden.

2.1.5 Cross-border issues and transmission restrictions

Under the EU regulatory framework, 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.

Svenska kraftnät must use so-called remedial measures, countertrading or redispatch, 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 countertrading is that there are available production and/or flexibility resources in the area in question.

The 70 per cent rule

According to the Electricity Market Regulation, transmission system operators are not allowed to limit the amount of interconnection capacity to be made available to market participants to resolve congestion within their own bidding zone or as a way to manage flows resulting from intra-zonal transactions. This means that, in

²³ Official Journal of the European Union, C(2023)7930 28 November 2023

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

the event of congestion problems in the electricity grid, the transmission system operator (which in Sweden is Svenska kraftnät) needs to use remedial measures such as countertrading and redispatching to ensure that the minimum requirement of 70 per cent of the transmission capacity is not undercut. Until a coordinated capacity calculation methodology is introduced in Sweden, the proportion of capacity made available for trading is not calculated on all critical line segments, and monitoring is only done on the critical line segments that have restricted trading on the interconnections. In 2023, Ei reviewed compliance with the 70 per cent rule for 2022. Svenska kraftnät's compliance with the 70 per cent rule for 2023 will be reviewed based on Acer's follow-up of 2023 in 2024²⁵.

2.1.6 The capacity challenge in the grid

Electrification and the transition of industry and the transport sector have led to a strained capacity situation in parts of Sweden's electricity grid. In several regions, this has resulted in grid operators not being able to connect new customers, or allow an increase in existing subscriptions, at the rate at which needs have arisen in the local and regional electricity grid. This hampers both growth and the transition to a more sustainable society. Measures to free up capacity in the electricity grid are therefore a priority. In 2020, Ei was commissioned by the Government to publish the report *Kapacitetsutmaningen i elnäten*²⁶ [The capacity challenge in the electricity grids]. In this report, Ei presented an action plan with measures to address the short-term and long-term capacity shortages in the electricity grids. In 2023, Ei worked on a report²⁷ that finally proposed ten measures that could contribute to fewer “air bookings” (i.e. an industry booking power allocation that is not used) and a more transparent application process that contributes to faster electrification.

As consumption and production patterns change and new electricity-intensive industries and businesses connect to the electricity grid, measures to promote flexibility are also important. Within the government assignment to promote a more flexible electricity system, the government agencies involved presented an action plan in 2023 with measures in five areas: industrial flexibility; aggregation, imbalance adjustment, correct metering and settlement; efficient grid utilisation; development of and information about the balancing market; and customer information²⁸ (see section 2.2.2 for more information about the assignment).

²⁵ Acer, “Transmission capacities for cross-zonal trade of electricity and congestion management in the EU. 2024 Market Monitoring Report”

²⁶ Swedish Energy Markets Inspectorate, “Kapacitetsutmaningen i elnäten” [The capacity challenge in the electricity grids] (Ei R2020:06)

²⁷ “Informationsdelning vid ansökningar om anslutning till elnäten” [Information sharing for grid connection applications] (Ei R2024:05)

²⁸ Swedish Energy Markets Inspectorate, “Främjande av ett mer flexibelt elsystem - deluppdrag 5” [Promoting a more flexible electricity system – sub-assignment 5] (Ei R2023:18)

Redispatching is a tool that grid operators can use in the event of capacity shortages in the electricity grid. In 2023, Ei received data on redispatching from grid operators. Ei's compilation of reported redispatching²⁹ shows that five distribution grid operators and Svenska kraftnät used redispatching in 2022, mainly to avoid congestion in their own grid.

Smart electricity grids

“Smart electricity grids” is often used as an umbrella term to describe the electricity grids of the future. Smart electricity grids can contribute to the integration of renewable energy, increased energy efficiency and a more resilient and reliable electricity grid. However, they are not an end in themselves and should be seen as a tool to create benefits for electricity customers and society at large. The concept of smart electricity grids thus includes new technologies, new services and new conditions for regulation and market design to enable the energy transition.

Article 59(1) of the Electricity Market Directive requires Ei to monitor and evaluate the development of smart electricity grids based on a limited set of indicators. In 2021, Ei published the report *Indikatorer för utvecklingen av smarta elnät*³⁰, in which Ei presents a number of selected indicators to provide a picture of smart electricity grid development in Sweden. In the same year, Ei presented the report *Utvärdering av kostnader och nyttor av smarta elnät*³¹ [Evaluation of costs and benefits of smart electricity grids], in which Ei, on behalf of the Government, developed both strategic and operational work on smart electricity grids. In the report, Ei evaluates the socioeconomic costs and benefits of smart electricity grids compared with other alternatives. The evaluation covers different scenarios for the composition of electricity generation in the Nordic electrical power system and increased electrification in society.

In 2022, Ei issued regulations³² on the data that electricity grid operators are required to report in order for Ei to monitor smart electricity grid development. The regulations entered into force on 1 October of the same year. The first reporting under the regulation was carried out in April 2024. Ei is currently analysing the reported data together with other data.

²⁹ Swedish Energy Markets Inspectorate, “Omdirigering i Sverige under 2022” [Redispatching in Sweden in 2022] (Ei R2024:06)

³⁰ Swedish Energy Markets Inspectorate, “Indikatorer för utvecklingen av smarta elnät” [Indicators for smart electricity grid development] (Ei R2021:07)

³¹ Swedish Energy Markets Inspectorate, “Utvärdering av kostnader och nyttor av smarta elnät” [Evaluation of costs and benefits of smart electricity grids] (Ei R2021:06)

³² Swedish Energy Markets Inspectorate “Energimarknadsinspektionens föreskrifter och allmänna råd om skyldighet att rapportera uppgifter om utvecklingen av smarta elnät” [Regulations and general guidelines of the Swedish Energy Markets Inspectorate on the obligation to report data on smart electricity grid development] (EIFS 2022:5)

Grid development plans for distribution grid operators

According to Article 32(3) of the Electricity Market Directive, the development of distribution systems shall be based on a network development plan. The purpose of network development plans is to ensure long-term and transparent planning by distribution grid operators and strengthened cooperation between distribution and transmission grid operators and other relevant system users.

The rules on network development plans entered into force in Sweden in July 2022. All distribution grid operators are subject to the obligation to draw up a network development plan which must be submitted to Ei. In 2023, Ei developed regulations³³ on, among other things, how a network development plan should be drawn up and more detailed provisions on its content. The regulations entered into force on 15 February 2024, and all distribution grid operators are required to publish and submit their first network development plan by 31 December 2024.

The network development plan shall describe the planned investments of the grid operator over the next 5–10 years, with particular emphasis on the main distribution infrastructure required to connect new generation capacity and new consumers, including charging stations for electric vehicles. It shall also include the need for resources that can be used as an alternative to grid expansion, such as flexibility services.

Each distribution grid operator shall consult transmission grid operators and relevant system users when developing its network development plan. Thus, in the future, network development will be characterised by greater transparency and a comprehensive approach.

Demand response

In the electricity market of the future, with a higher proportion of variable electricity production, it will be important to make good use of all resources, both production and consumption, in the electricity system. Flexibility can be defined differently in different contexts, but flexibility resources are characterised by the fact that they are flexible in their input or withdrawal of energy or power. Electricity producers that have technology that allows the facility to be ramped up or down can often be flexible. Different markets in which flexibility can be bought and sold can stimulate such developments. To incentivise electricity customers to be demand-responsive in their electricity use, it is effective to use price signals, where the price of electricity and grid charges vary with supply and demand. For example, customers can be given signals to reduce their electricity consumption when the grid is heavily loaded, or to increase their consumption when the price of

³³ Swedish Energy Markets Inspectorate "Energimarknadsinspektionens föreskrifter och allmänna råd om nätutvecklingsplaner" [Regulations and general guidelines of the Swedish Energy Markets Inspectorate on network development plans] (EIFS 2024:1)

electricity is low, which is the case, for example, when there is good access to electricity production from wind power. Demand response enables a more effective use of resources and can facilitate frequency management in the electricity system. Demand response can also help in the event of power deficits and local grid problems. It is also financially beneficial to be flexible.

Under the Electricity Act (1997:857), electricity grid operators may not impose technical requirements or other conditions that make it difficult for market participants to provide demand response services, unless the condition is warranted to ensure the safe, reliable and efficient operation of the electricity grid.

Ei has overarching responsibility for promoting demand response on the electricity market in Sweden, as set out in the Government ordinance (2016:742) containing instructions for Ei. To guide its promotion work, Ei developed a flexibility strategy, which was published in 2020 and updated in 2024³⁴. The strategy consists of three strategic areas: efficient markets that promote flexibility, efficient grid utilisation and flexible electricity customers.

In practice, Ei's promotion work takes different forms, such as through what is known as "Effektdialogen" [The Power Dialogue], which is an Ei-run forum for dialogue with market participants on flexibility issues.

In 2023, Ei worked with several other government agencies on a government assignment to promote a more flexible electricity system. More than forty measures in total were proposed in an inter-agency action plan³⁵.

Each year, Ei shall also compile and publish the technical requirements and other conditions which exist for the provision of demand response. As in previous years, the survey for 2023 indicates that electricity grid operators do not impose technical requirements and conditions that are not justified to ensure the safety, reliability and efficient operation of the electricity grid. However, other inspections carried out by Ei during the year have revealed that, in some cases, electricity grid operators impede or prevent demand response.

2.1.7 Delivery quality

Rules on security of supply, voltage quality and outage 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

³⁴ Swedish Energy Markets Inspectorate, "Ei:s strategi för flexibilitet i elsystemet" [Ei's strategy for flexibility in the electrical system]

³⁵ Swedish Energy Markets Inspectorate, "Främjande av ett mer flexibelt elsystem - deluppdrag 5" [Promoting a more flexible electricity system - sub-assignment 5] (Ei R2023:18)

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 the customer level, and functional requirements for higher load levels. Since 1 January 2024, Ei has been able to grant exemptions from the 24-hour requirement in the Electricity Act and from the regulations.

Grid operators are obliged to conduct risk and vulnerability analyses and to draw up action plans showing how continuity of supply can be improved in their own grids. The aim of the provisions is for the grid operators to reduce the vulnerability of the electricity grid through preventive work and to help fulfil the Electricity Act's functional requirement for power outages not to exceed 24 hours. Ei has decided on regulations concerning the annual reporting of risk and vulnerability analyses in the electricity grids, which also include the submission to Ei of a report based on the risk and vulnerability analysis and the action plan.

An electricity user who suffers a power outage lasting at least 12 hours is entitled to compensation from the grid operator to which it is connected, referred to as outage compensation. The requirement applies to outages that fall within the grid operator's control responsibility³⁶. The compensation is flat-rate and shall 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 contains provisions on the right to compensation from grid operators in the event of personal injury, property damage or financial loss.

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 (since 2010 for outages), the grid operators have been reporting detailed data on outages at the customer level on an annual basis, both for short and long outages. Based on this data, Ei measures and analyses the continuity 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 to enable Ei to assess delivery quality in the electricity grids and to intervene if the measures implemented by the grid operators are insufficient. Assessment of delivery quality also has a bearing on the size of the revenue framework, i.e. the amount of revenue that the grid operator may receive during a regulatory period. The principle is that quality below a

³⁶ Events within control responsibility are those that the operator can reasonably foresee and for which the operator can be expected to dimension the design and operation of the grid.

predefined standard reduces the size of the revenue framework, while higher quality may instead result in a higher revenue framework. Read more about the revenue framework in 2.1.8 Network tariffs and the revenue frameworks for electricity grid operators.

Table 1 shows power outages in local grids during the period 2010–2022 (the operators submit outage data on a yearly basis per calendar year, based on the previous year)³⁷. 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 well in advance of the outage. These outages may be required to ensure electrical safety or for operational reasons, for example to perform repairs and preventive maintenance 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.

Table 1. Power outages in local grids due to faults in the local grid, average values per customer³⁸

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
2022	0,26	0,80	19	65

Statistics for 2023 will be finalised in the summer of 2024. Source: Ei

Customers connected to rural electricity grids suffer on average both more outages and longer outage times than customers connected to urban grids. 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 grids. To reduce electricity grids' vulnerability to extreme weather, the proportion of underground cables in

³⁷ For more outage statistics, see Ei's annual report on the continuity of supply in Sweden's electricity grids, Ei R2023:17

³⁸ SAIFI = System Average Interruption Frequency Index (average number of outages per customer during the year (outages/year)).

SAIDI = System Average Interruption Duration Index (average outage duration per customer during the year (outage minutes/year)).

local grids has increased. However, underground cables can be affected by non-weather-related 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 local grids' total power line length in the low-voltage grid is insulated. At the medium and high voltage levels of local grids, about 85 per cent of the power lines are insulated.³⁹

2.1.8 Network tariffs and the revenue frameworks for electricity grid operators

As previously mentioned, electricity grid operators have a monopoly to operate electricity grids, and are therefore not subject to competition. To ensure that grid operators do not exploit their position and impose unreasonably high charges on their customers, Ei supervises the electricity grid operators.

Network tariffs

According to the Electricity Act, the network tariffs paid by each customer must be objective and non-discriminatory, and be compatible with efficient utilisation of the electricity grid. Objective means that the operator's total charges for a category of customer must reflect the costs incurred by the grid operator for that particular category. The operators may therefore have different charges for different customer categories, such as detached house customers and apartment customers. Non-discriminatory means that the operators may not favour one customer category at the expense of another. The network tariff often consists of a fixed component (subscription charge) and a variable component (electricity transmission charge). The fixed component varies with the size of the fuse or the subscribed power. The variable component varies based on the customer's consumption.

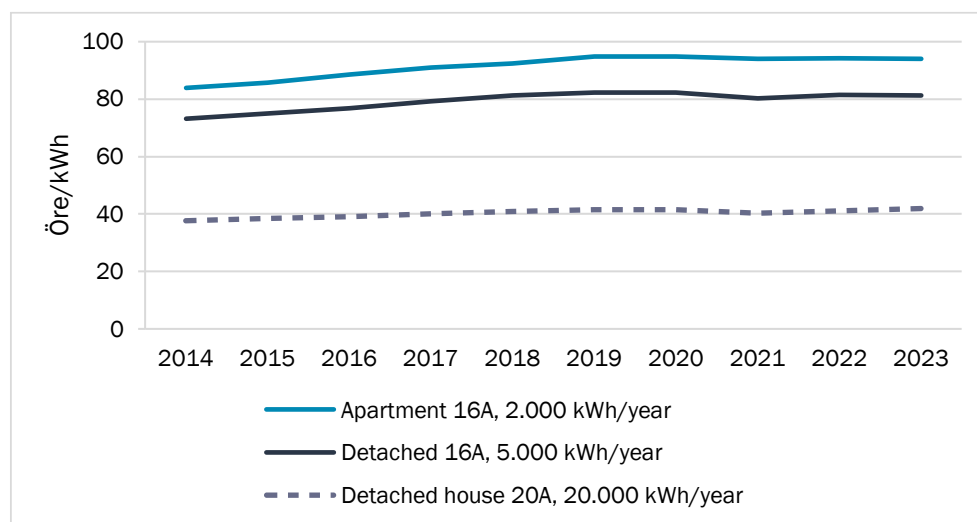
Every year, the electricity grid operators report data on their network tariffs to Ei, which then compiles and publishes them. To make it possible to compare the network tariffs of different electricity grid operators, Ei collects data for 15 different types of customer categories. Figure 2 shows how the grid charges for different types of household customers have developed over the past ten years. Between 2022 and 2023, charges decreased on average by 0.2 per cent for apartment customers and 0.3 per cent for detached house customers using 16 A fuses, while the charges increased by 2.3 per cent for detached house customers using 20 A fuses⁴⁰. In SEK, this equates to an annual charge decrease of about SEK 3 for apartment customers and SEK 12 for detached house customers using 16 A fuses, as well as an annual charge increase of about SEK 186 for detached house

³⁹ The figures are for 2021.

⁴⁰ Real values at 2023 prices, not weighted.

customers using 20 A fuses. A comparison of grid charges in running prices⁴¹ between 2022 and 2023 whose average increases of about 11–14 per cent in the above-mentioned customer categories.

Figure 2. Real development of grid charges for household customers⁴²



Source: Ei

Customers with low electricity consumption usually have fewer options than customers with high electricity consumption. Most electricity grid operators offer only one type of charge, known as a single tariff, to low-consumption customers. A single tariff means that the customer pays the same amount per kilowatt hour regardless of the time of day when the electricity is consumed.

An alternative to a single tariff is some form of time-differentiated tariff, whereby the customer pays different amounts per kilowatt hour depending on the time of day or year when the consumption takes place. A number of electricity grid operators have also introduced capacity-based tariffs for household customers. Both of these tariffs consist of a small, fixed charge linked to the fuse size, which determines the maximum power output, and a variable price that is based on the amount of electricity consumed. This variable price can vary between hours of the day and/or between seasons. A capacity-based tariff, on the other hand, is based on the customer's power consumption and includes a charge charged for the power used by the customer. This power price can be based on the household's previously measured maximum average power consumption per hour or part of an hour⁴³. The power charge can also be time-differentiated like the time tariff, and differ in size during different times of day and/or different seasons.

⁴¹ Comparison in each year's price level, average value not weighted.

⁴² Average value calculated at 2023 price level, not weighted.

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).

In March 2022, Ei decided on new regulations (EIFS 2022:1⁴⁴) regarding the design of grid tariffs. The rules aim to ensure that grid tariffs are designed in such a way that they contribute to more efficient use of the electricity grid and thus help to ensure that society's electricity needs can be met at the lowest possible cost. In this way, new actors can also be connected and gain access to the electricity grid that is sufficient for more customers without being expanded. The new regulations will apply from January 2027 at the latest.

The new regulations state that grid tariffs need to be composed of four components in order for the tariff to be considered to promote efficient grid utilisation. The first component, the energy charge, shall be levied as a charge per kilowatt hour and 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). The power charge is cost-reflective and, according to the regulation, is to be time-differentiated, i.e. vary in some way over time. The third component is the customer-specific charge, and it must correspond to the costs incurred by the grid operator for a specific customer or customer group, in the form of metering, reporting and the like. This component shall be levied as a fixed charge. The fourth and final component is the tariff component, which is to correspond to the other costs of operation that are not already covered by the other components (referred to as residual costs). This component shall be levied on customers as a subscription charge, either as a hedging subscription or as a power subscription. Customers should, as far as possible, perceive this cost as fixed.

Ei's decision on revenue from network tariffs for distribution companies

Ei reviews the revenues of the electricity grid operators by establishing in advance a framework for each grid operator's revenues over a four-year period, known as a revenue framework. After the regulatory period, Ei reconciles the company's revenue framework with the actual outcome.

The purpose of the revenue frameworks is to ensure that the electricity grid operators work efficiently at low costs and that they receive a reasonable return. The revenue frameworks aim to ensure that the customer pays a reasonable price for the transmission of electricity and to help provide customers with good long-term continuity of supply.

The revenue frameworks shall cover reasonable costs of conducting grid operations during the regulatory period and provide a reasonable return on the capital required to carry out grid activities. Costs incurred for effectively and

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).

efficiently conducting of grid operations with similar objective conditions shall be considered as reasonable costs of conducting grid operations. 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 framework, factors such as the age of the installations are taken into account when assessing the operator's capital costs. As a direct consequence of the Energy Efficiency Directive⁴⁵, a provision has been introduced into the Electricity Act stating that, when assessing the revenue framework, Ei shall also take into account the extent to which grid operations are conducted in a manner that is compatible with or contributes to efficient utilisation of the electricity grid.

If an electricity grid operator's revenue deviates from the revenue framework, this affects the revenue framework for the subsequent regulatory period. If the operator's income has been lower than the framework allows, the revenue framework for the next period is increased by the corresponding amount. If the grid operator has instead exceeded the revenue framework, the framework for the coming period is decreased. If the infringement exceeds five per cent, an overcharge surcharge is added, further reducing the revenue framework. The Electricity Act also contains rules on reviewing the revenue framework during and after the regulatory period.

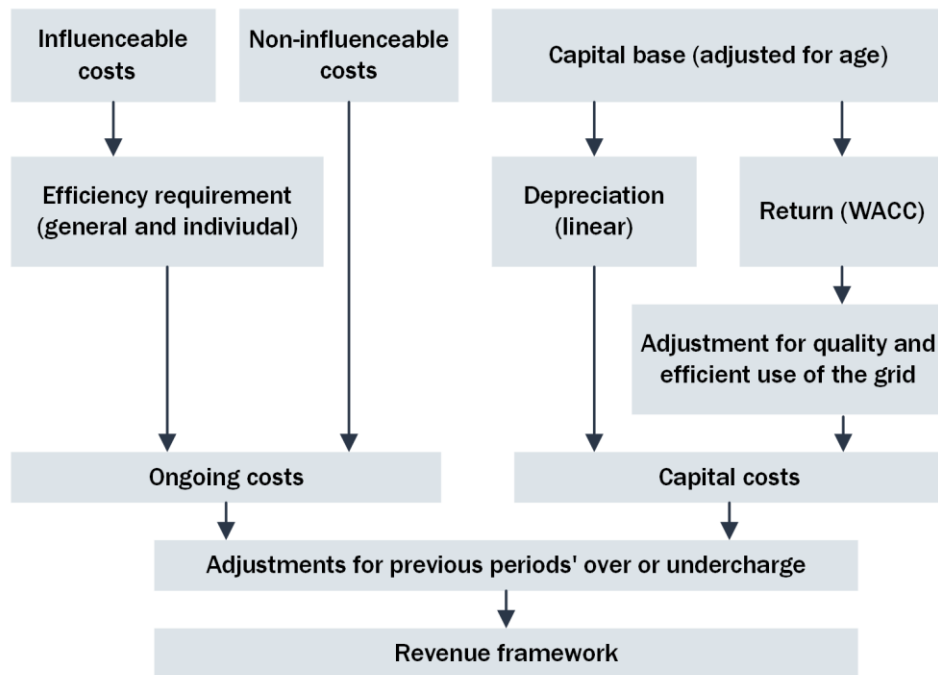
Method for determining electricity grid operators' revenue frameworks

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

The capital cost is the cost of using capital. The base for calculating capital costs is the capital base. The capital base includes fixed assets, such as power lines and substations, that an electricity grid operator 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 based on the new acquisition value, and return is calculated using a real pre-tax calculation rate. When calculating capital costs, Ei takes into account investments made during the respective regulatory period.

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.

Figure 3. Revenue framework components for regulatory period 2020–2023



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

Non-controllable costs include the costs of grid losses, subscriptions to superordinate and adjacent grids, connection to superordinate and adjacent grids, and costs of regulatory fees. Operators are fully covered for non-controllable costs.

Examples of controllable costs include costs for operation and maintenance, and customer-specific costs for e.g. metering, calculation and reporting. Ei uses operators' historical costs as a starting point for determining controllable costs for the regulatory period. In order for customers to benefit from expected productivity increases, the regulation contains an efficiency improvement requirement. The efficiency requirement implies an annual reduction in controllable costs of between 1 and 1.82 per cent depending on the efficiency of the operators.

In April 2021, the Government decided on the Act (2021:311) on special investment scope for electricity grid operations. This Act aims to create special incentives for electricity grid operators to make investments that increase the capacity of the electricity grid. In practice, the Act means that operators with unutilised capacity left over from the 2012–2015 regulatory period may, under certain conditions, increase their revenue frameworks during the period 2020–2031. However, operators must apply to use this capacity.

For the period 2020–2023, electricity grid operators had until 31 December 2023 to apply for special investment scope for their respective reporting units. Of the total of 156 reporting units that had an unutilised revenue framework from 2012–2015 (a total of SEK 35.1 billion at 2018 price levels), 105 applied for and received a decision on it.

Revenue frameworks applied for and decided on

The level of the revenue frameworks in Table 2 shows the revenue frameworks applied for by the electricity grid operators, the revenue frameworks decided by Ei, and the revenue frameworks established after review by a court.⁴⁶ When comparing the different regulatory periods, it should be noted that the amounts for the regulatory periods are stated at the price levels of the different years.

Table 2. Revenue frameworks

Revenue frameworks, SEK billions	Amount applied for	Decided framework	Framework following review by a court
2012–2015 (2010 price level)	183	160 ⁴⁷	196 ⁴⁸
2016–2019 (2014 price level)	176	164 ⁴⁹	173 ⁵⁰
2020–2023 (2018 price level)	. ⁵¹	168	. ⁵²
2024–2027 (2022 price level)		270	

Source: Ei

Review of the regulatory framework for revenue frameworks

In September 2021, the Court of Justice of the European Union ruled in what is known as the Commission v Germany judgment⁵³. The judgment ruled, among other things, that the independence and exclusive powers of the regulatory authorities vis-à-vis legislators and public and private bodies may not be curtailed.

⁴⁶ Svenska kraftnät's revenue framework is not included in the table.

⁴⁷ 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.

⁴⁸ The SEK 196 billion corresponds to approximately SEK 201 billion after reconciliation and at the 2014 price level.

⁴⁹ In the court proceedings, Ei agreed to change the calculation rate from 4.53 per cent to 4.56 per cent, which increased the revenue frameworks from SEK 163 billion to SEK 164 billion.

⁵⁰ Upon receipt of an application from the operators to increase the capital base, Ei reviewed a number of revenue frameworks during the regulatory period 2016–2019. After review of the revenue frameworks, the frameworks were increased from SEK 172 billion to SEK 173 billion.

⁵¹ As of the 2020–2023 regulatory period, the operators do not apply for amounts. All operators receive a revenue framework based on the results of the calculation, and Ei adjusts the calculation after the period based on the actual conditions.

⁵² Decisions on the revenue frameworks were referred back to Ei for reconsideration. Ei shall therefore redefine revenue frameworks for the period 2020–2023, this time based on the goals and criteria of the Electricity Market Directive.

⁵³ Court of Justice of the European Union ruling in case C-718/18.

Following the judgment, a government inquiry⁵⁴ was initiated to review the national implementation of the Electricity Market Directive. The report was submitted on 1 November 2023, and essentially concludes that parts of Swedish legislation must be amended to be compatible with EU law. This is to ensure that the regulatory authority's independence and exclusive powers are not restricted. The inquiry proposes that a new regulatory framework for the revenue frameworks should enter into force on 1 January 2025. The proposal is currently being prepared within the Government Offices of Sweden.

Upcoming regulatory period and review of the revenue framework regulation

For several years, Ei has recognised a need to develop regulation of electricity grids. Among other things, Ei sees a need to review the method of valuing the electricity grid operators' facilities. We also see a great need to strengthen the incentives for cost-effective solutions for grid operations.

The proposed amendments would enable Ei to change the methodology for calculating the electricity grid operators' revenue frameworks. In anticipation of new legislation, Ei has begun work to review the regulation of electricity grid operators for the coming regulatory period.

2.2 The wholesale market for electricity

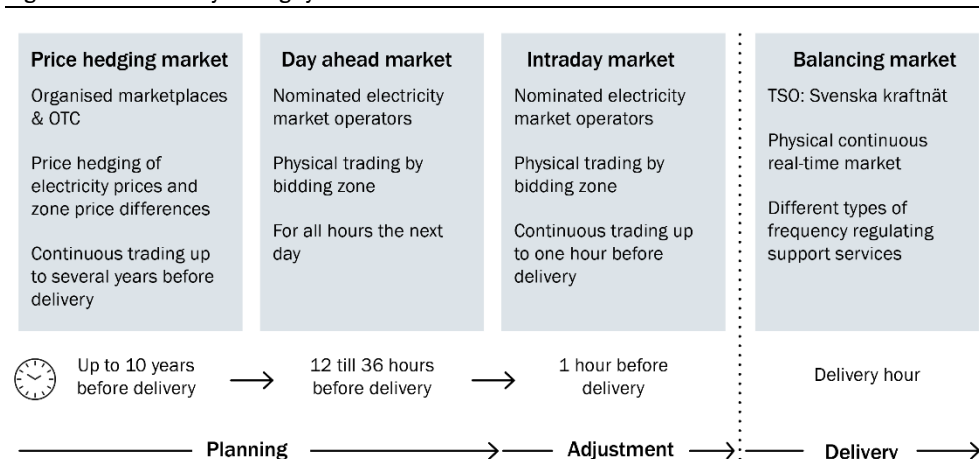
The price of electricity varies with supply and demand on an hour-by-hour basis. The electricity market is special in that, at any given time, as much electricity must be produced as is consumed in order for the system to be in balance and to operate safely. In order to allow electricity to be traded over 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 in which electricity is traded at different times in relation to delivery: the price hedging market, the day-ahead market, the intraday market and finally the balancing market; see Figure 4.

⁵⁴ Ett förändrat regelverk för framtidens el- och gasnät [A changed regulatory framework for the electricity and gas grids of the future], SOU 2023:64

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 marketplaces 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 FCA⁵⁵, respectively. In addition to these market rules, there are also rules on the organisation of the markets in the Electricity Market Regulation (2019/943). There are also, for example, rules on congestion management through redispatch. Redispatching must primarily be market-based.

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 Spot⁵⁶ have permits to act as nominated electricity market operators (NEMOs⁵⁷) 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.

⁵⁵ Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation.

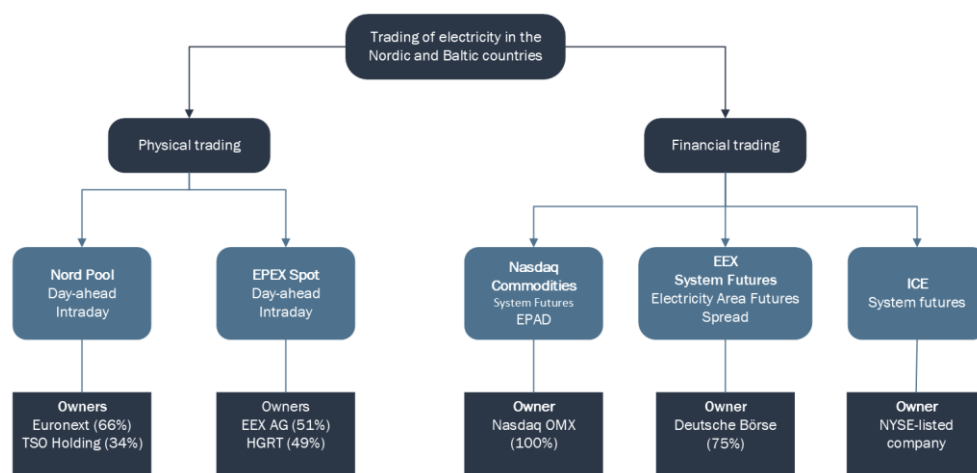
⁵⁶ The EEX group operates both EPEX spot and EEX. EPEX's focus is spot markets and EEX's focus is financial products.

⁵⁷ *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.

Nord Pool's day-ahead market is the marketplace for most physical trading in electricity in the Nordic and Baltic countries. In 2023, Nordic and Baltic players traded around 681 TWh on Nord Pool's day-ahead market. The majority of all electricity traded in the Nordic region 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.

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



Source: Nord Pool⁵⁸, 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 region, combinations of different financial contracts are mainly used for price hedging (e.g. EPAD contracts, system price contracts, zonal contracts) and in the rest of the EU, financial zonal contracts are mainly used for price hedging in one bidding zone (e.g. German futures contracts) and long-term transmission rights are used for price hedging of transmission between bidding zones. The main difference is that long-term transmission rights are issued directly by transmission system operators outside the exchange, while other financial contracts in the Nordic region (EPAD contracts, system price contracts, zonal contracts) can be

⁵⁸ The Nordic system operators together with the Lithuanian system operator (Litgrid) own a total of 34 per cent of Nord Pool through a joint holding company, TSO Holding.

bought and sold freely and continuously by market participants on trading venues or bilaterally.

In Sweden and the other Nordic countries, it is common for market participants to use derivative instruments, known as system price contracts, to hedge their prices. In some cases, these are combined with so-called EPAD (Electricity Price Area Differentials) contracts. A system price contract is linked to a reference price, known as the system price.⁵⁹ 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. From March 2024, it will also be possible to trade futures contracts for each bidding zone.

System price contracts and EPAD contracts are traded by the participants bilaterally, via brokers or on trading venues. In the Nordic region, Nasdaq Commodities, ICE and EEX organise trading in, and settlement of, financial contracts. The contracts traded bilaterally are generally settled by a clearing house.⁶⁰ At present, it is possible in Sweden to hedge the price of electricity production or consumption up to several years in advance. Trading takes place on a continuous basis and is priced according to bid pricing.⁶¹ Participation in the financial market is voluntary and the participants themselves choose which contracts are suitable for managing electricity price risks. 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.

The FCA Regulation aims to ensure that market participants have adequate means to manage the economic risks of inter-zonal transmission and requires an evaluation of hedging capabilities to be carried out at least every four years. Ei's last evaluation was conducted in 2021⁶² and concluded that the liquidity of the hedging market had deteriorated since the 2017 evaluation, but that hedging capabilities could not be considered insufficient. Ei will re-evaluate hedging opportunities in 2024.

⁵⁹ *The system price* is the price that would prevail in the Nordic trade area if there were no transmission restrictions.

⁶⁰ A clearing house is a party that acts as a neutral intermediary in bilateral trading in financial products.

⁶¹ *Pay-as-bid pricing* means purchase and sale bids that are accepted are settled at the price the party has given on the market.

⁶² [Utvärdering av risksäkringsmöjligheter på den svenska elmarknaden – för samråd enligt FCA-förordningen](#)[Assessment of hedging opportunities in the Swedish electricity market – for consultation in accordance with the FCA regulation] (2021)

The day-ahead market

The day-ahead market, often referred to as the spot market, is the main market for electricity trading. The market is therefore considered to be key to the earning capacity of operators. The design of the day-ahead market is regulated in the CACM Regulation. CACM exists to achieve a single internal market for electricity within the EU. CACM contains provisions that regulate, among other things, the calculation of transmission capacity and the allocation of available transmission capacity to the market in a coordinated manner. It also aims to ensure, among other things, that correct bidding zones are defined within the Union, that nominated electricity market operators (NEMOs) within the EU can compete with each other on equal terms, and that the costs incurred in the development and operation of the market coupling are shared between the relevant actors and Member States in a cost-effective manner.

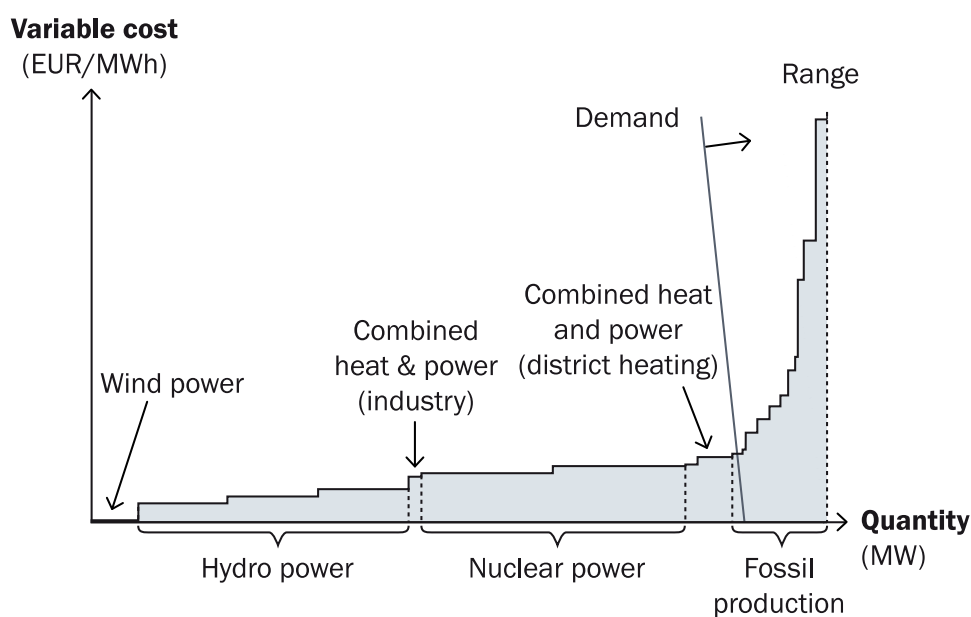
Trading on the European day-ahead markets is based on the submission of purchase and sale bids to the electricity exchange by 12:00 noon. The bids are valid for the following day and are submitted for each full hour. There are plans to introduce shorter 15-minute bids in EU day-ahead markets. The bids specify how much the trader wants to buy and 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, nominated market operators must publish prices for the following day.

Marginal pricing is applied in the day-ahead market, which means that all successful bidders are allowed to trade at the established market price, regardless of their initial bids. No distinction is made between different production technologies. This means that bids compete on equal terms.

The price of electricity is set where the supply curve intersects the demand curve. Figure 6 presents a general picture of price formation on the spot market and the order in which different types of power are allocated 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, can choose between production today and production at a later date depending on how much it is paid for its capacity. When demand

increases, the demand curve shifts to the right; see the dashed line 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 key feature of the supply curve is the possibility of imports, which vary in both volume and price from hour to hour. The possibility to export comes into play on the demand side and is therefore represented in the demand curve in the figure, although it is not explicitly stated 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 current rules for market coupling have been proposed by the NEMOs and approved by the relevant regulators and ACER. To calculate the equilibrium price, where supply and demand meet, for each bidding zone, supply and demand across the entire EU integrated electricity market need to be taken into account, along with the possibilities to transfer electricity between bidding zones. The functioning of the price coupling algorithm, EUPHEMIA⁶³ is publicly available on the respective websites of the electricity exchanges. To manage transmission constraints, the electricity market is divided into bidding zones; see section 2.2.3 for more information.

⁶³ Acronym for Pan-European Hybrid Electricity Market Integration Algorithm

A key element of effective market coupling is the efficient calculation and allocation of available transmission capacities in the electricity grid. Currently, capacity is calculated differently in the various capacity calculation regions in the EU. Net transmission capacities (NTC) were used in 2023. These were based on a forecast of expected flows in the transmission grid and how much transmission an interconnector can reliably handle. It is the respective national transmission system operator who carries out the forecast and capacity calculation. In 2024, the Nordic transmission system operators intend to switch to a new coordinated method that is flow based. Using, among other things, a common grid model (CGM), the flow-based method will take 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. A test run of the method was conducted in 2023.

The intraday market

Like the day-ahead market, the intraday market is governed by the Commission regulation CACM. The intraday market is an adjustment market that allows participants to trade in balance up to one hour before the operating hour if conditions have changed after the day-ahead market has closed. For example, the weather may have differed from what was forecast, which can affect both production, in the form of wind and solar power, and consumption, for example via heating needs.

The participants trading on the intraday market are mainly the balancers, i.e. the companies that have undertaken to take financial responsibility for market imbalances, although being a balancer is not a requirement for trading on the intraday market. Trading on the intraday market opens at 14:00 the day before and closes one hour before the delivery hour. Bids are continuously matched when a counterparty is found, which means that trading takes place between two parties and without price impact on other transactions. The volumes traded in 2023 are small compared to the volumes on the day-ahead market.

In other European trading venues, the intraday market plays a greater role than in the Nordic region. It is also crucial for the intraday market that capacities in the electricity grid are calculated and allocated in an efficient manner, so as to ensure that market coupling is effective. At present, the NTC method described above is also used in Sweden and the other Nordic countries for the intraday market. The intraday market will also move to a flow-based approach to capacity calculation in the future.

NEMOs and TSOs are working to introduce EU-wide intraday auctions (IDAs), but this has been delayed until 2024.

The 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 balance in the electricity system. This balance is largely achieved by the participants fulfilling their buying and selling contracts from physical trading, as described above, but imbalances at the minute and second level, as well as unforeseen events, mean that there needs to be the possibility of balancing the electricity system within the hour, in real time. Balancing services, or support services as they are also known, consist of several different services and have been developed by Svenska kraftnät. Electricity producers or electricity users that fulfil the requirements for a balancing service can sell balancing services to Svenska kraftnät and receive compensation.

The Swedish balancing market is currently in a state of change due to adaptation to the 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.

Svenska kraftnät has developed several balancing services. The balancing services mainly consist of two sub-markets, the automatic and the manual reserve market. To be able to offer services on the two markets, the operators' facilities must satisfy certain requirements. The automatic reserves need to be activated within a few minutes to keep the system in balance. The operators offering the automatic reserves receive a payment at the procurement stage for making their capacity available during the operating hour; this is called capacity payment. Today, bid pricing or marginal pricing is applied, but in the future all automatic reserves will be paid based on marginal pricing. For example, frequency restoration reserves for automatic activation (aFRR) were remunerated based on marginal pricing in May 2022 and frequency containment reserves (FCR) will also be paid based on marginal pricing. Some automatic products are also paid based on the energy supplied, but the volume of energy is often small.

The manual reserves have a slower minimum activation time of 15 minutes and are traded on a Nordic market. Balancers submit voluntary upward and downward adjustment bids to the market starting at 13:00 on the day before the start of the delivery day and up to 45 minutes before the delivery hour.

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

Deviations from the “lowest bid first” principle may be necessary in the event of transmission constraints, for example.

The prices for upward and downward 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.

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.⁶⁴ The Nordic TSOs also have an ongoing project called “Nordic Balancing Model” that aims to implement the new methods and conditions as well as other changes to the Nordic balancing market. This project aims to enable the Nordic TSOs to join the European balancing platforms MARI⁶⁵ and PICASSO⁶⁶, which concern the support services mFRR and aFRR, respectively. The new methods and conditions will be implemented in the coming years and will fundamentally change the current Swedish balancing market.⁶⁷

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 region. This work takes place both within Ei and in collaboration with other European regulatory authorities through active participation in various working groups within ACER and CEER. 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, Ei prepared a draft implementation plan⁶⁸ for Sweden in 2020 in accordance with Article 20(3) of the Electricity Market Regulation. In the draft implementation plan, Ei identified three main areas for improvement: the balancing market, policy instruments and demand response. An implementation plan was adopted by the Government in 2022 based on Ei's proposal. In June 2022, the Government tasked Ei with following up the measures in the implementation plan annually until 2025. The 2023 follow-up, *Uppföljning av*

⁶⁴ [Connection to European market platforms | Svenska kraftnät \(svk.se\)](#)

⁶⁵ Acronym for Manually Activated Reserves Initiative

⁶⁶ Acronym for Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation

⁶⁷ For more information, read the decision case file with registration numbers 2022–100136 and 2022–100137 for MARI and PICASSO, respectively.

⁶⁸ [Swedish Energy Markets Inspectorate, “Genomförandeplan med tidsplan för att förbättra elmarknadens funktion” \[Implementation plan with timetable for improving the functioning of the electricity market\] \(Ei R2020:09\)](#)

genomförandeplan med tidsplan för att förbättra elmarknadens funktion [Follow-up of the implementation plan with a timetable for improving the functioning of the electricity market] (Ei R2023:16)⁶⁹, shows which of the measures have been implemented, how work is progressing on the remaining measures and whether there are any obstacles to their implementation. In the 2023 follow-up, Ei also responded to the European Commission's comments on the Swedish implementation plan. In the same follow-up, Ei also submitted proposals for new measures that Ei recommends be included in the Swedish implementation plan. The situation on the electricity market has changed in several respects since Ei recommended the measures in the implementation plan. As the measures are still relevant, Ei 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.

Demand response and flexibility markets

The Electricity Market Directive highlights demand response as an important tool for meeting future challenges in the electricity system. At Ei, we have a promotional assignment in our instructions that relates specifically to demand response. In August 2022, Ei, Svenska kraftnät, the Swedish Energy Agency and SWEDAC (Sweden's national accreditation body) were jointly tasked by the Government with developing the conditions for realising the potential for flexibility in the electricity system.⁷⁰ The final report of the assignment was submitted in 2023 in the form of an action plan.

In 2023, Ei participated in ACER's work to monitor the work of transmission and distribution grid operators to develop guidelines⁷¹ for demand response at the EU level. In spring 2024, a proposal will be submitted to ACER for review before ACER submits it to the European Commission. The new EU rules aim to make it easier for parties to participate in the market through their demand response, for example in the form of storage or moving electricity consumption to another time point. The new rules will also facilitate market-based procurement of flexibility services for electricity grid operators, including transmission system operators.

One example of market-based procurement of flexibility is local flexibility markets, where grid operators can purchase flexibility. A number of pilot projects are being tested in Sweden, including in the Stockholm region, Skåne and Gothenburg⁷². In

⁶⁹ [Swedish Energy Markets Inspectorate, "Uppföljning av genomförandeplan med tidsplan för att förbättra elmarknadens funktion – 2023 års rapportering" \(Follow-up of implementation plan with timetable for improving the functioning of the electricity market – 2023 reporting\] \(Ei R2023:16\)](#)

⁷⁰ <https://www.regeringen.se/regeringsuppdrag/2022/08/uppdrag-att-framja-ett-mer-flexibelt-elsystem/>

⁷¹ 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)

⁷² The local flexibility market Effekthandel Väst was established in Gothenburg in 2022.

the report *Flexibilitet i distributionsnäten – deluppdrag 3 [Flexibility in the distribution grids – sub-assignment 3 (Ei R2023:05)*, Ei conducted a review of the local flexibility markets being tested in Sweden. Ei's conclusion is that the Swedish local flexibility markets are at an early stage and that they do not currently fulfil all the criteria for being considered well-functioning markets. However, several of the barriers identified in the evaluation are expected to be addressed in the new EU rules for demand response that are under development.

On 1 June 2023, rules for independent aggregators were implemented in the Electricity Act through the new role of *aggregation service provider*. The Electricity Act defines aggregation as a pooling of several electricity users' consumption or pooling of produced electricity for sale, procurement or auctioning on electricity markets. Aggregation service is defined as a service that requires aggregation. The rules state, inter alia, that an aggregation service provider may not be prevented from gaining access to electricity markets by other market participants, and that an electricity supplier may not impose unreasonable charges or requirements on an electricity user on the grounds that the electricity user has a contract for the provision of an aggregation service. Before an aggregation service provider starts to provide such services at an electricity user's withdrawal point, it shall notify the grid operator with which the electricity user has a contract.

2.2.3 Price trends and transmission restrictions

Sweden is divided into four so-called bidding zones (also called spot price zones or electricity areas); see Figure 7. Prices in the individual zones are determined by production and consumption in the zone in question 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



Källa: Ei

Volatile and negative electricity prices in 2023

In 2023, electricity prices decreased significantly compared with the previous year in all Swedish bidding zones. However, from a historical perspective, prices remain at a high level. On average, the system price⁷³ in the Nordic region was EUR 56.45/MWh; see Table 3. The annual average price was higher than the system price in SE4, EUR 64.88/MWh, while it was slightly lower in SE3, EUR 51.70/MWh. In SE1 and SE2, the corresponding price was around EUR 40/MWh. In comparison, Germany, which is more dependent on natural gas, had an annual average price of EUR 95.46/MWh⁷⁴.

⁷³ 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 will be consumed.

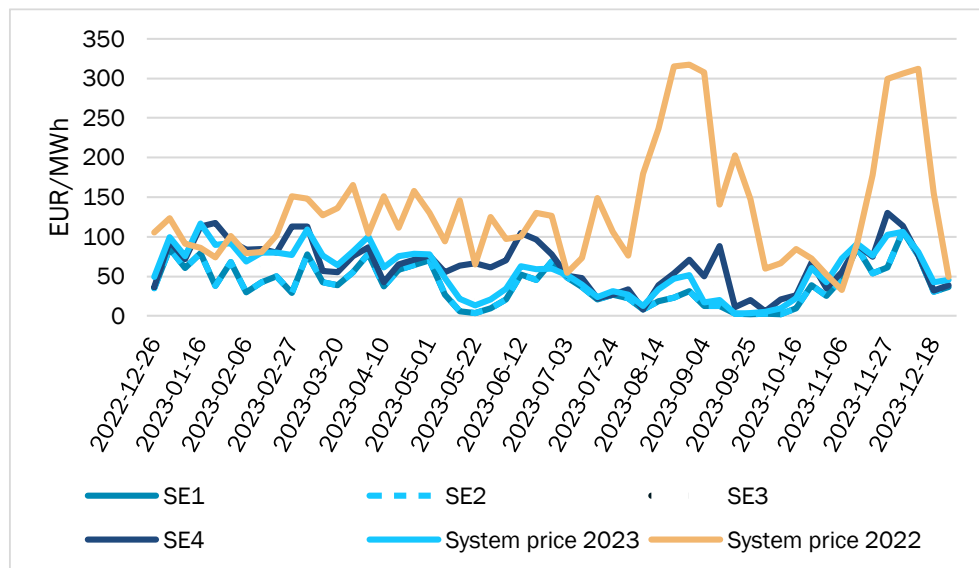
⁷⁴ Nordpool (2023), day-ahead prices (Nordpool, day-ahead prices).

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

	System price	SE1	SE2	SE3	SE4
2023	56,45	39,97	39,98	51,70	64,88
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
Max 2023	137,68 (2023-03-06)	159,71 (2023-12-05)	159,71 (2023-12-05)	166,5 (2023-11-30)	188,64 (2023-01-23)
Min 2023	-4,14 (2023-08-08)	-8,31 (2023-07-16)	-8,31 (2023-07-16)	-8,31 (2023-07-16)	-8,31 (2023-07-16)

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 at the beginning and end of 2023. 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 EUR 188.64/MWh and a lowest price of EUR -8.31/MWh in SE4. The lowest hourly price occurred in July for all bidding zones. The highest daily average prices in SE1 and SE2 occurred in December, while the highest prices occurred in November for SE3 and in January for SE4.

Electricity prices in Europe and Sweden were significantly lower in 2023 than in 2022 as a result of the market stabilising since Russia's invasion of Ukraine. In 2023, there were also many hours with negative prices, partly due to more production from renewable energy sources with low variable costs. As traditional thermal generation plants often have costs for starting and stopping production, they have offered their production at a negative price instead of suspending production. The high prices have incentivised businesses and households to reduce their electricity use. This, combined with the fact that several countries in Europe are in a recession, has led to reduced demand for electricity.

Overall, the price declines in 2023 can be explained by a more stable energy supply situation for Europe, with natural gas being the clearest price driver. Natural gas prices were much calmer in 2023, but coal prices also stabilised. During the winter of 2022/2023, a total of 56 of the French nuclear power reactors were unavailable, and their return to normal conditions has been an important factor for the situation in Europe in 2023. The nuclear power situation in Sweden also improved in 2023. The new Finnish reactor Olikiluoto 3 was also commissioned during the year, contributing to more power in the grid. Wind power and solar power had their highest production during the year, while hydropower, nuclear power and other thermal power produced less electricity in 2023 compared with the previous year.

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 zone. It is not uncommon for all four of Sweden's bidding zones to form a joint price zone, especially during hours with lower demand. Price zones can also extend across national borders where interconnections exist. This means, for example, that SE4 had the same price as Denmark and Germany at certain hours.

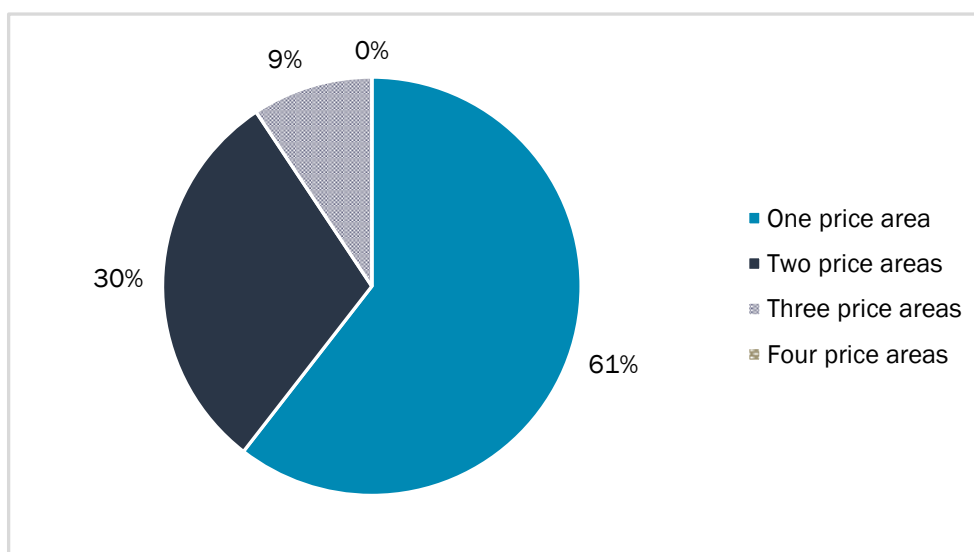
When there is insufficient transmission capacity between bidding zones, prices in the zones will differ. When electricity is transferred from low-price areas to high-price areas, a financial surplus is generated by the electricity exchange that accrues to the transmission system operator or the company that transmits the electricity between the two bidding zones. This is called capacity income, sometimes also referred to as congestion income. In accordance with EU regulations, these are 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.

Sweden's different price zones 2023

Electricity prices differences within Sweden were large in 2023, with southern Sweden having much higher prices than northern Sweden. In 2023, Sweden was a single price zone 61 per cent of the time, an increase of 20 percentage points

compared to 2022, which the equivalent figure was 41 per cent (see Figure 9 below). Furthermore, Sweden was divided into two different price zones 30 per cent of the time in 2023, which was a decrease compared with 2022, when Sweden was divided into two price zones 44 per cent of the time. Either SE1 and SE2 formed one price zone and SE3 and SE4 formed another, or SE1, SE2 and SE3 formed one price zone and SE4 had its own price. As mentioned in section 2.1.1, the design of the bidding zones is under investigation.

Figure 9. Percentage of time in 2023 that Sweden was divided into 1–4 price zones



Source: SKM Syspower

2.2.4 Production and consumption

Electricity production and consumption

In 2023, 163 TWh of electricity was produced in Sweden, which was around 4 per cent less than in the previous year. Production from wind power and to some extent solar power increased, see Table 4, while hydropower and nuclear power production decreased. In 2023, wind power produced 34 TWh, which is an increase of 2.7 per cent compared with 2022. This is partly attributable to the fact that there was more wind on average in 2023 compared with 2022, and partly to the increase in installed production capacity (see section 2.4.1 Monitoring of electricity production capacity). Net electricity export amounted to 29 TWh in 2023, a decrease of 13 per cent compared to the previous year. During the year, we exported just over 9 TWh of electricity to Finland, followed by Denmark (8.8 TWh) and Norway (5.8 TWh). Table 4 below shows a summary of Sweden's energy balance during the period 2019–2023, while Table 5 shows Sweden's electricity imports and exports in 2023.

Table 4. Sweden's electricity balance 2019–2023, TWh (per cent of total domestic production), negative values indicate exports.

	2019	2020	2021	2022	2023
Total production	164,9	159,6	165,5	169,9	163
Wind power	19,9 (12 %)	27,6 (17 %)	27,4 (17 %)	33,1 (19%)	34 (20%)
Solar power	0,7 (0,4 %)	1,0 (0,6 %)	1,2 (1 %)	1,9 (1%)	3 (2%)
Hydropower	64,6 (39 %)	71,2 (45 %)	70,6 (43 %)	69,9 (41%)	66 (41%)
Nuclear power	64,3 (39 %)	47,3 (30 %)	51,0 (31 %)	50,1 (29%)	47 (29%)
Combined heat & power	15,6 (9 %)	12,7 (8 %)	15,5 (9 %)	15,3 (9%)	13 (8%)
Domestic electricity use	138,7	134,6	143,6 ⁷⁵	136,8	135
Grid losses	8,7	9,3	9,9	10,2	10
Net yield	-26,2	-25,0	-25,6	-33,2	-29

Source: Statistics Sweden

Table 5. Sweden's import and export of electricity in 2023 in TWh.

Country	Export	Import	Net
Finland	9,2	0,9	8,3
Denmark	8,8	1,5	7,4
Lithuania	4,7	0,03	4,7
Norway	5,8	4,3	1,5
Poland	4,0	0,3	3,8
Germany	3,2	0,4	2,9
Total	35,8	7,3	28,5

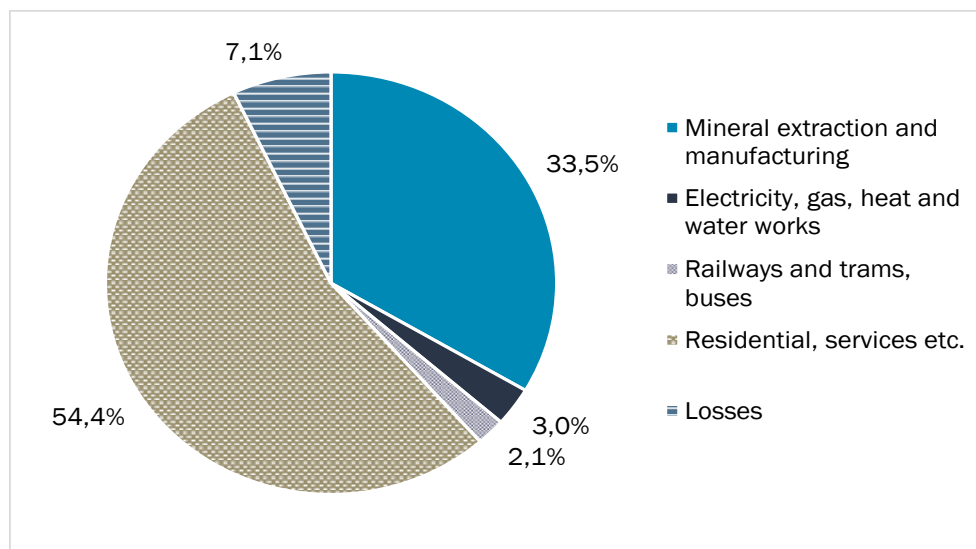
Source: Statistics Sweden

The total electricity consumption in Sweden, including losses during transmission, was about 135 TWh in 2023, which is a decrease of about 1.3 per cent compared to 2022⁷⁵.

Electricity consumption by sector is presented in Figure 10 below. More than half of the electricity, 54.4 TWh, was used in the housing and services sector, etc. In 2023, industrial electricity consumption amounted to just over 34 TWh and accounted for about one third of total electricity consumption.

⁷⁵ Source: Statistics Sweden, the category Housing, Services etc. constitutes a residual item in the calculation of electricity consumption by sector, thus including the electricity consumption that does not fall under any of the other categories.

Figure 10. Electricity consumption in 2023 by area of use



Source: Statistics Sweden

The highest electricity consumption in 2023 occurred between 16:00 and 17:00 on 6 December, when consumption amounted to 23,322 MW. The highest electricity consumption during the preceding year was 23,900 MW. Sweden's highest electricity consumption to date was recorded on 5 February 2001, when it amounted to 27,000 MW. The highest net export occurred between 4:00 and 5:00 on 11 February and amounted to 7,520 MW. The highest net import occurred between 16:00 and 17:00 on 4 December and amounted to 1,324 MW.

Competition in the wholesale market

Ei has determined that Swedish domestic electricity production is dominated by a small number of major operators. Vattenfall alone accounts for just over 35 per cent of production, and the three largest players (Vattenfall, Fortum and Uniper⁷⁶) collectively account for 61 per cent⁷⁷. The three largest players own the majority of Swedish nuclear power in various constellations. In any assessment of competition in the electricity market, it must also be taken into account that individual Swedish bidding zones rarely form isolated price zones. Typically, a price zone extends across several national borders, which means that there is a risk that an isolated study of competition in the Swedish bidding zones will miss how the electricity market works in practice. As described in section 2.1.1, a review of the bidding zones is under way. In last year's report on Sweden's electricity and natural gas markets, Ei concluded that the conditions for competition in the electricity market are favourable. Ei makes no other assessment for 2023.

⁷⁶ Fortum has owned 76.1 per cent of Uniper's shares since 31 December 2020.

⁷⁷[energiaret-2023 tabeller.pdf \(energiforetagen.se\)](#)

In the spring of 2023, the Swedish Competition Authority published a report on energy markets in times of crisis, which aimed to describe the competitive conditions of the electricity market. The report was based on events in 2022. Among other things, the Competition Authority highlighted that the increased spot price volatility, i.e. the increasingly large price fluctuations on the day-ahead market, has resulted in producers leaving or reducing their exposure to the futures exchange. This, in turn, has made the exchange less liquid and futures prices more volatile, further reducing the attractiveness and price transparency of the futures market. The lack of market liquidity and price transparency on the exchange hits smaller producers hardest in the longer term, as they lack the resources and creditworthiness to enter into and manage a large number of bilateral contracts. In this way, the turbulence has a negative impact on competition. However, less reliable futures prices and a declining correlation between system and zone prices have also made bilateral hedging via PPAs more difficult, so the whole price hedging market is facing major challenges.⁷⁸ Furthermore, the Swedish Competition Authority highlighted some competition-related benefits, stating that a positive aspect of the energy crisis was that it seems to have accelerated the development of flexibility and support services such as battery storage and aggregators of flexibility or support services. They also noted that an additional new phenomenon is hybrid power parks, such as production plants with both wind and solar power, wind power and hydrogen production, or wind/solar power combined with battery storage. This can reduce the intermittency of the electricity system. For the electricity exchange, this can mean higher bottom price levels, lower top levels and lower volatility. The Swedish Competition Authority also mentions that subsidised electricity prices and revenue/price caps applied in accordance with the EU's crisis intervention regulation may have an impact on competition. In its recommendations, the Swedish Competition Authority emphasises, among other things, that investments in power generation are greatly affected by political uncertainty and, from this perspective, effective competition, particularly in energy production, requires a certain long-term perspective and thus good support for political initiatives. According to the Swedish Competition Authority, in addition to appropriate emission and environmental taxes, it is important to influence price formation at the margin as little as possible, as it is the price signals that steer electricity to where it has the highest value. Generally speaking, a cost shock can affect competition in a market in two ways. On the one hand, some companies may be forced to leave the market, which could be negative for competition. At the same time, the remaining companies may be forced to compete more fiercely for customers, who have become more price sensitive. In addition, electricity producers with low marginal costs may have the opportunity and incentive to expand their production and/or production capacity in order to

⁷⁸ Energimarknaden – konkurrens i kristider [Energy market – competition in times of crisis], Swedish Competition Authority, p. 13.

make extra profits, which may push down prices in the long term. The Swedish Competition Authority also points out that, given that electricity prices have increased dramatically for a larger proportion of Sweden's households, electricity bills have become more important for household budgets. Against this background, it is particularly important to promote lively competition between electricity companies. There should therefore be an investigation into whether, like the mortgage market, it should be regulated that fixed electricity price contracts are automatically converted to variable price contracts when they expire in order to increase customer mobility. Customer mobility should be promoted because it contains a positive externality: an individual customer does not take into account the aggregate pro-competitive effect of more active switching behaviour by the customer collective.

In 2023, Thomas Tangerås was commissioned by the Swedish Competition Authority to analyse how the changes in the electricity market in recent years have affected operators' opportunities and incentives to exercise market power in the electricity market. The report⁷⁹ states that developments in the electricity market have probably changed the incentives to exercise market power. The studies highlighted in the report indicate that the electricity market is not fully competitive, although the economic effects appear to be small. More detailed data are needed to better study competition.

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 NEMOs. The Nord Pool marketplace, which is based in Norway, is also supervised by the

⁷⁹ Konkurrensen på den nordiska elmarknaden – vad säger den senaste forskningen [Competition in the Nordic electricity market – what the latest research says], Thomas Tangerås, Commissioned Research Report 2023:07.

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 Competition Authority can actively intervene against the above-mentioned competition restrictions on its own initiative or following notifications from companies and the public. 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 2023, Ei and the Swedish Financial Supervisory Authority (FI) had ongoing and regular collaboration on the supervision and oversight of the energy and electricity derivatives market. This collaboration has resulted in an increased exchange of information, established contact channels and regular coordination 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.

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

The REMIT regulatory framework and the Transparency Regulation enable cohesive monitoring of the increasingly integrated European electricity and gas markets. Ei has monitoring procedures that are applied on a daily basis within the framework of its market monitoring work in order to increase confidence in the market and ensure that the participants comply with the rules that apply on the wholesale market.

According to REMIT, all trading of wholesale energy products that takes place, both via an 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 regulated by the implementing legislation.⁸⁰ The monitoring of trading in

⁸⁰ 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.

wholesale energy products by Ei is financed by Ei levying a fee on registered market participants.

Ei also carries out market monitoring under the Transparency Regulation, which aims to increase transparency in electricity 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 the grids, production and consumption. The information is collected on a transparency platform operated by the European Network of Transmission System Operators for Electricity (ENTSO-E)⁸¹ and is available to the public. Ei's role is to ensure compliance with the Transparency Regulation in Sweden.

Ei regularly reviews the information on unavailability in production, consumption and transmission published by operators via urgent market messages (UMM). In 2023, Ei reviewed 861 UMMs, and in cases where the UMMs were reviewed in more detail, Ei asked the operators to provide additional explanations of what had happened in order to ensure that the operators have the necessary procedures in place to inform the market. In 2023, the supervision did not result in any orders for further action. More information can be found in the memorandum *Marknadsövervakning 2023* [Market monitoring 2023] (Ei PM2024:03).

Marketplace rules and market monitoring

All participants on Nord Pool, EPEX Spot and Nasdaq Commodities must comply with specific regulations for trading on the respective trading venue. The rules apply in particular to the handling of price-sensitive information. Nord Pool, EPEX Spot and Nasdaq Commodities all have internal market monitoring functions for continuous monitoring of trading.⁸² The market monitoring functions at Nord Pool, EPEX Spot and Nasdaq Commodities also contribute to Ei's work, as any suspected breaches of the regulations must be reported to Ei.

Measures to reduce the risks of joint ownership in 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 the Ei, adopted common industry codes of conduct for the exchange of information between the companies. Independent observers are members of the boards of directors where the nuclear power companies are jointly owned by multiple power producers. The board members have a specific mandate to monitor

⁸¹ European Network of Transmission System Operators – Electricity.

⁸² 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.

compliance with the industry codes of conduct. Ei's task is to nominate one observer per board.

In 2023, the representatives of the boards of the jointly owned nuclear power plants in Ringhals and Forsmark reported to Ei in accordance with the Code of Conduct, and the independent observers did not report any deviations. At the end of 2022, joint ownership became relevant again in the Oskarshamn board. At the beginning of the year, an observer also took office on this board after Ei nominated a candidate, which the board then appointed. The independent observer on the Forsmark board was replaced by a new observer after several years of service. Each year, Ei publishes a monitoring report from each board, including any comments from the observer. The reports are published on our website.

2.3 The retail market for electricity

The Swedish retail electricity market has been open to competition since 1996, and prices are set by market participants. There are approximately 5.6 million electricity customers in Sweden, of which approximately 4.7 million are household customers⁸³.

Ei is tasked with working to strengthen the position of electricity customers by, among other things, enabling active choice with easily accessible information. Ei also promotes consumer rights in collaboration with the Swedish Consumer Agency. Ei and the Swedish Consumer Agency collaborate on issues such as those concerning electricity customers.

2.3.1 Monitoring of price trends, transparency and competition on the retail electricity market

Elpriskollen

Ei operates Sweden's only independent price comparison site for electricity contracts, Elpriskollen. Electricity trading companies that offer contracts to electricity users with a consumption of up to 100,000 kWh per year are required by Ei's regulations⁸⁴ to report the most common types of contracts to Elpriskollen. Elpriskollen makes it possible to compare different electricity trading companies and their current offers.

Many electricity trading companies – but some only operate locally

There are about 130 electricity trading companies on Elpriskollen. Some electricity trading companies only offer contracts in certain bidding zones and some smaller,

⁸³ Source: Statistics Sweden. The number of withdrawal points is based on data from 2022.

⁸⁴ The Swedish Energy Markets Inspectorate's regulations and general guidelines (EIFS 2020:4) on the obligation of electricity suppliers to provide information on prices and delivery terms applied to electricity users.

local electricity trading companies have chosen to operate only in the local area. Thus, an individual customer is not able to choose from all the electricity trading companies that exist in Sweden.

At the end of 2023, the three largest electricity trading companies had a combined market share of approximately 47 per cent⁸⁵ based on the number of customers, which is a decrease of 4 percentage points from 2022.

Customer activity

In total 10.26 per cent⁸⁶ of customers switched electricity trading companies in 2023, which is a decrease of about 5 percentage points compared to 2022. In terms of the number of renegotiated electricity contracts, 13.1 per cent⁸⁷ of all household customers renegotiated their contract in 2023. A trend that has been observed for several years is that most electricity contracts are renegotiated in the autumn and winter months. In 2023, October and November were the months in which most household customers renegotiated their electricity contracts.

However, switches and renegotiations do not give the full picture of how active customers are in a market. A customer can be active by choosing to remain in their contract because they consider the electricity trading company, the price or the contract terms to be good, for example.

The wholesale market affects retail prices

The largest proportion of the electricity price is the electricity trading companies' cost of purchasing electricity to cover customers' consumption. The electricity is purchased on an electricity exchange or via bilateral agreements with producers. In variable price contracts, the electricity trading company uses the spot price (the price on the day-ahead market) adjusted for the customer's withdrawal profile, while fixed price contracts are based on the electricity trading company's cost of buying electricity forward, adjusted for the customer's withdrawal profile. Fixed price contracts also sometimes include a cost for zone price hedging and risk management; read more about price hedging in section 2.2.1 The electricity trading system. In addition to the purchase price for electricity, there are costs for electricity certificates, guarantees of origin, administration and VAT.

System price trends

In 2023, the system price generally fell compared with the unusually high levels of 2022. The highest price was recorded in January, when the system price was 102.1 öre/kWh. The average system price in 2023 was 64.5 öre/kWh, compared with the

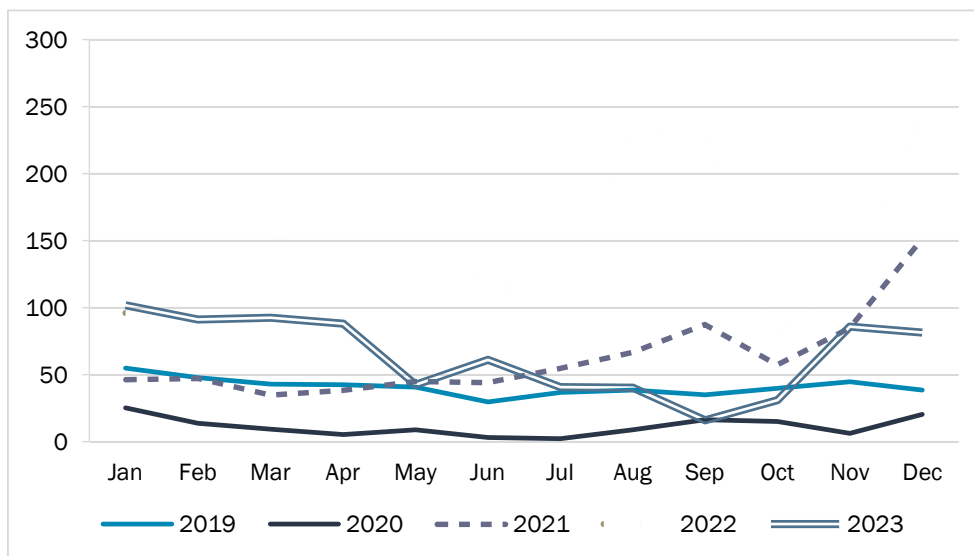
⁸⁵ Source: Energimarknaden. The number of withdrawal points is based on data from 2022.

⁸⁶ Source: Statistics Sweden. The number of withdrawal points is based on data from 2022.

⁸⁷ Source: Statistics Sweden.

average for 2022, which was 144.3 öre/kWh, and 2021, which was 63.3 öre/kWh. Read more about price trends on the wholesale electricity market in section 2.2.2.

Figure 11. System price Nord Pool, öre/kWh average per month 2019–2023



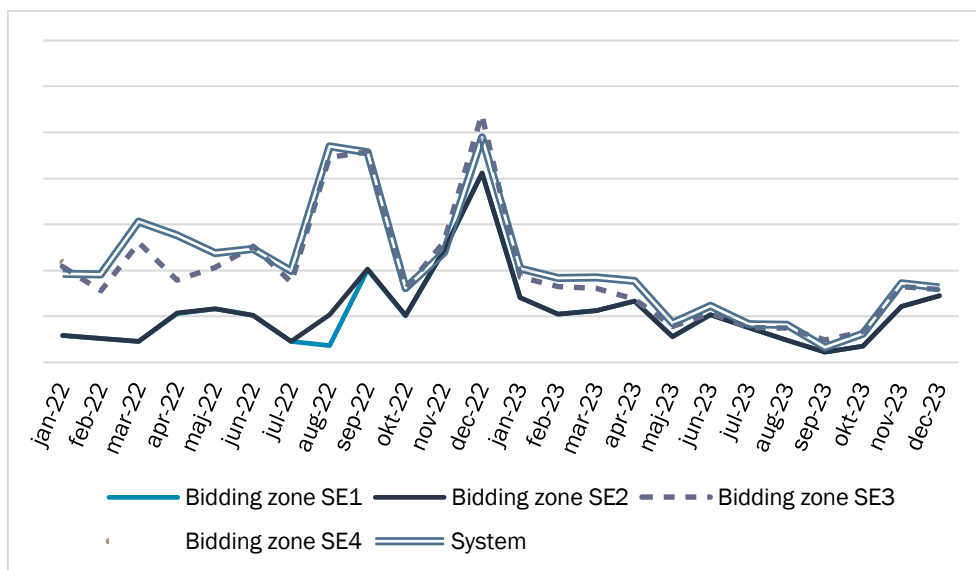
Source: Nord Pool

Price differences between bidding zones

Price differences between bidding zones were smaller in most months of the year than in the previous year. On average, the difference between bidding zones SE4 and SE1 was 28.8 öre/kWh in 2023, compared with an average of 161.1 öre/kWh in 2022. On average, the difference between bidding zones SE4 and SE3 was 15.3 öre/kWh in 2023, compared with an average of 22 öre/kWh in 2022.

In 2023, June was the month with the largest price difference between bidding zones, as bidding zone SE4 had a spot price that was on average 51.8 öre higher than in bidding zone SE1. The prices in bidding zones SE1 and SE2 were almost the same in 2023, which means that only one of the lines is visible for certain monthly values in the figure. In a comparison between SE4 and SE1/SE2, the lowest price difference was in July, when the difference was 4.4 öre.

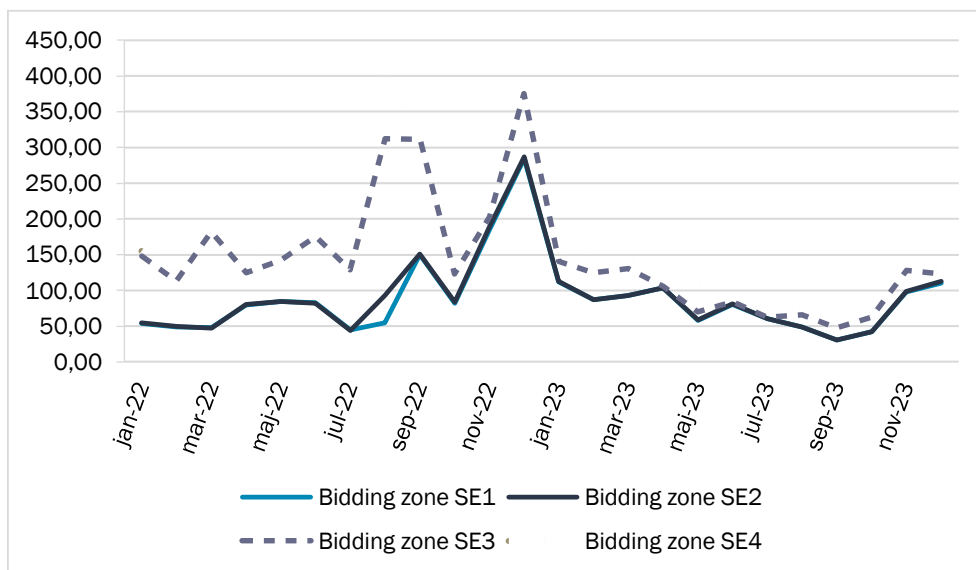
Figure 12. Spot price per bidding zone and system price 2022–2023, öre/kWh



Source: Nord Pool

Figure 13 on the next page shows that the retail prices in the different bidding zones follow the spot prices in each bidding zone. The price differences between the retail prices for monthly variable price contracts⁸⁸ between the four bidding zones were smaller in 2023 than in 2022. The prices in bidding zones SE1 and SE2 again form a common trend, where the price levels are largely the same throughout the year.

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

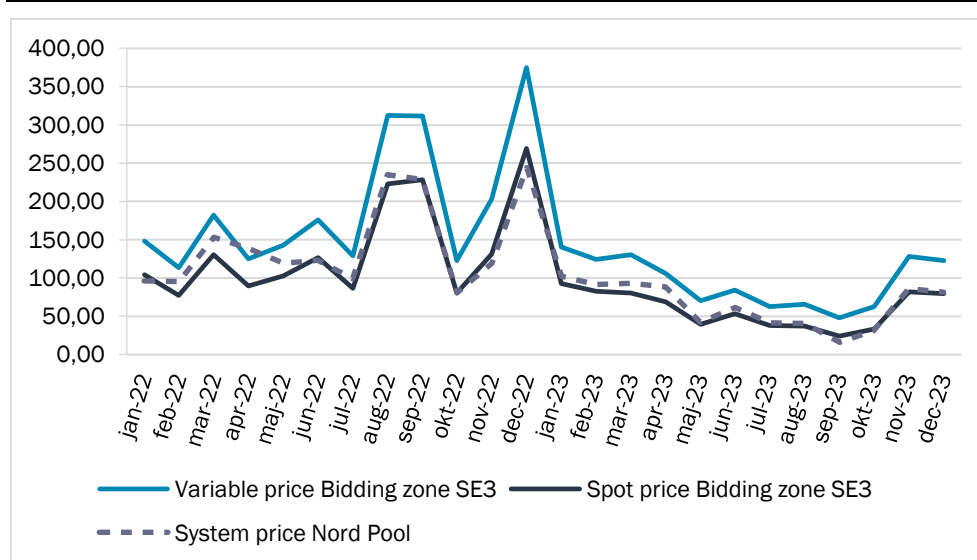


Source: Ei

⁸⁸ The price stated here is an average of all contracts with a variable price offered on 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 customer category 20,000 kWh/year in SE3 in relation to spot and system price, öre/kWh

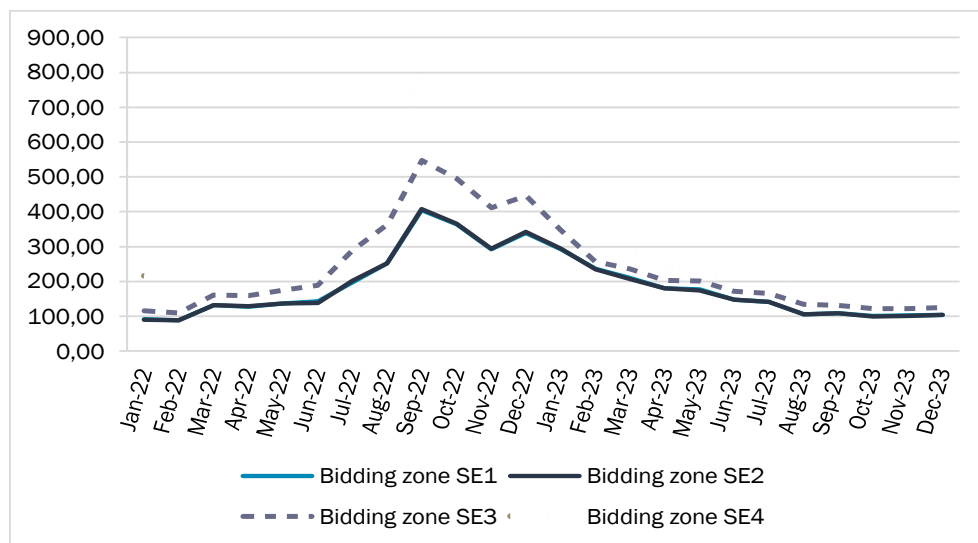


Source: Ei, Nord Pool

For electricity trading contracts with a fixed price and a lock-in period of one year, small differences can also be seen between the bidding zones compared with the previous year. Prices were consistently highest in SE4 throughout 2023, with the differences levelling out over the year. On average over the year, fixed price contracts with a lock-in period of one year were 69.4 öre more expensive in SE4 than in SE1. The biggest difference is seen in January, when a fixed price contract in SE4 cost 148.3 öre more per kWh than the corresponding contract in SE1; see Figure 15. Note that the prices in SE1 and SE2 are similar, making them difficult to distinguish from each other in the figure. The fixed prices are what customers were offered to contract for in that month, while the variable price is what customers with a monthly variable price paid.

The price of the fixed price contracts is usually based on the cost of the futures contracts and hedging contracts that the electricity trading company purchases for the respective bidding zone. The price of these, in turn, is determined by the expected future price of electricity. In a bidding zone with sharply fluctuating prices, there is a greater need for hedging, which results in higher costs for the 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 retail price for fixed price 1 year for customer category 20,000 kWh/year, öre/kWh

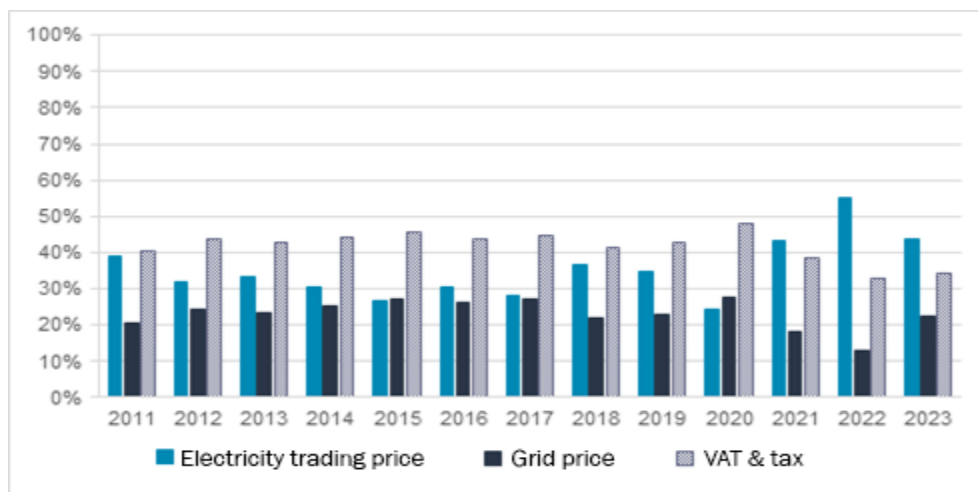


Source: Ei

Electricity trading accounts for most of the total electricity cost

The distribution between the various components of the total cost of electricity paid by a detached house with electric heating has varied in recent years. This is because the grid fee and electricity retail price levels have varied, while at the same time the energy tax has changed; see Figure 16. The energy tax is listed on and paid through the electricity grid invoice and was 32.9 öre/kWh in 2023. Most municipalities in bidding zones SE1 and SE2 have reduced energy tax, and in 2023 the energy tax in these municipalities was 29.6 öre/kWh. In 2023, the largest share of the electricity cost, 44 per cent, consisted of the electricity retail price. VAT and tax accounted for 34 per cent of the electricity consumer's total cost of electricity, while transmission in the grid accounted for 22 per cent, which is almost double the proportion in 2022; see Figure 16.

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



Source: Ei, Statistics Sweden

Total electricity cost for a consumer

The 2023 total electricity cost for customer in an apartment who has an annual consumption of 2,000 kWh per year and a variable price contract was SEK 5,750. In comparison, the cost for 2022 was about SEK 7,200. For a customer in a detached house who consumes 20,000 kWh per year and has a variable price contract, the electricity cost in 2023 amounted to about SEK 40,700. The prices are averaged and consumption is weighted according to consumption patterns for different months.

Table 6. Total annual cost in 2023, variable price, apartment customer in bidding zone SE3 2,000 kWh

	SEK
Electricity trade	1 936
VAT	484
Electricity trading incl. VAT	2 420
Electricity grid	1 880
Tax	784
VAT	666
Total	5 750

Source: Ei, Statistics Sweden

Table 7. Total annual cost in 2023, variable price, detached house customer in bidding zone SE3 20,000 kWh

	SEK
Electricity trade	16 324
VAT	4 081
Electricity trading incl. VAT	20 405
Electricity grid	8 380
Tax	7 840
VAT	4 055
Total	40 680

Source: Ei, Statistics Sweden

The total annual cost for a customer with a 1-year fixed price contract varies depending on when the customer signed the contract. For an apartment customer who consumes 2,000 kWh per year, the total annual cost in 2023 averaged between approximately SEK 5,491 and SEK 9,195, depending on which month of the year the customer signed the contract⁸⁹; see **Table 8**. For a detached house customer who consumes 20,000 kWh per year, the total annual cost in 2023 instead amounted to between SEK 37,871 and SEK 107,762; see **Table 9**.

⁸⁹ The price was calculated by multiplying the sum of annual consumption by the contract price for the month in which the contract was signed and one year thereafter.

Table 8. Total annual cost in 2023, 1-year fixed price, apartment customer in bidding zone SE3

Total electricity cost with 1-year fixed price, apartment customer 2,000 kWh	SEK
Electricity trade	2 161–5 865
VAT	540–1 466
Electricity trading incl. VAT	2 701–7 331
Electricity grid	1 880
Tax	784
VAT	666
Total	5 491–9 195

Source: Ei, Statistics Sweden

Table 9. Total annual cost in 2023, 1-year fixed price, detached house customer in bidding zone SE3

Total electricity cost with 1-year fixed price, detached house customer 20,000 kWh	SEK
Electricity trade	19 464–55 595
VAT	4 866–13 898
Electricity trading incl. VAT	24 330–69 493
Electricity grid	8 380
Tax	7 840
VAT	4 055
Total	37 871--107 762

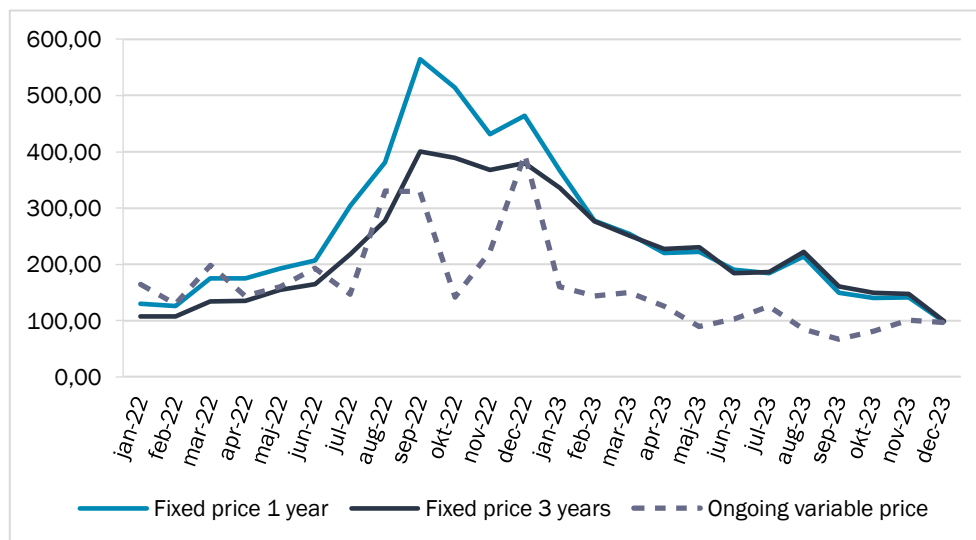
Source: Ei, Statistics Sweden

Prices for business customers

Since March 2021, electricity trading companies have also been reporting contracts offered to business customers with a consumption of up to 100,000 kWh per year to Elpriskollen. A slight decrease in prices was also seen for business customers in 2023, compared with the previous year; see Figure 17⁹⁰.

⁹⁰ The figures may differ from the previous annual report due to improvements in quality assurance.

Figure 17 Average prices for the contract types variable price on a running basis and 1-year and 3-year fixed price for a business customer with a consumption of 99,999 kWh per year in bidding zone SE3 in 2023⁹¹



Source: Ei

New contract type in the statistics

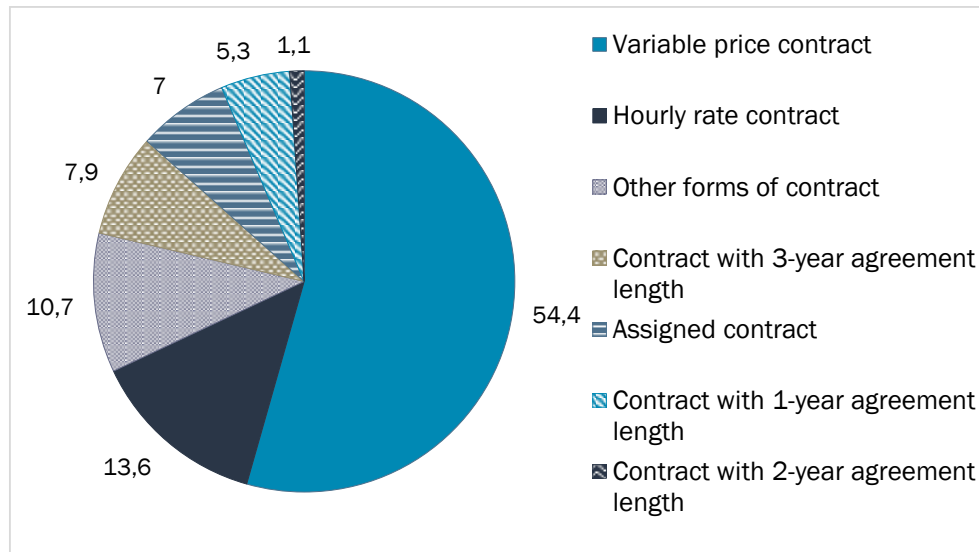
Variable contracts have long been the most popular type of contract. In 2023, a majority of customers still have a variable contract, although the proportion has fallen from 57.6 per cent in December 2022 to 54.4 per cent in December 2023; see Figure 18.

Since February 2023, Statistics Sweden has started publishing statistics on the proportion of customers with hourly rate contracts. Between February and December 2023, the proportion of customers with hourly rate contracts increased from 10.4 to 13.3 per cent.

Fewer customers than before have fixed contracts with a duration of 1, 2 or 3 years. The total proportion of customers with one of these contract types in December 2023 was 14.3 per cent, a decrease of 6.4 percentage points. However, the proportion of customers with other types of contracts has risen by 1.8 percentage points to 10.7 per cent.

⁹¹ Prices are exclusive of VAT and are shown in öre/kWh.

Figure 18. Breakdown of customers⁹² by contract type in December 2023, per cent



Source: Statistics Sweden

Customers with assigned contracts

Customers on the Swedish electricity market can choose the electricity trading company they prefer. The operators act in a free market in competition with other companies and with free pricing. If the customer does not make an active choice, the electricity grid operator is obliged to assign the customer an electricity trading company. In the long run, the price of assigned contracts is often higher than the prices of other contract types.

There may be various reasons why customers remain in the assigned contracts, despite the often high prices. Customers may be unaware that they have a type of contract that is more expensive than other contract types and that they can easily switch to another, cheaper, contract. In its regulatory activities, Ei has observed that the information provided to the assigned customers is inadequate. Some of the electricity trading companies that are assigned customers place them in standard variable contracts, in which case the electricity trading company's customers do not pay more simply because they did not choose an electricity trading company themselves.

The proportion of customers with assigned contracts has decreased by 1.9 percentage points from 8.9 per cent to 7 per cent since December 2022.

⁹² This includes both household and business customers.

2.3.2 International work

Work to strengthen customers in the Nordic region

During the year, Ei played an active role as, inter alia, a member of NordREG's Retail Market Working Group⁹³. The retail market group works to strengthen the position of customers in the Nordic retail electricity markets.

In November, the group organised the sixth NordREG Retail Market Workshop with the aim of exchanging knowledge and experiences in the regulatory field and identifying areas for cooperation, exchange of information and the need for further development of the regulatory framework. The discussion also included the impact on retail markets, consumer activity and consumer awareness in the wake of the 2022 energy crisis.

2.4 Security of electricity supply

If there is an imbalance between the production and the consumption of electricity, and the resources available on the balancing market are not sufficient, Svenska kraftnät has the option of activating a power reserve to cover the need. If the power reserve is not sufficient, Svenska kraftnät can, as a last resort, order what is known as manual disconnection of consumption. To date, manual disconnection of consumption has never been necessary. During the winter of 2023/2024, the power reserve was ordered to be able to start with two hours of standby 11 times and run at minimum power 4 times if it needed to be activated⁹⁴. However, the power reserve has never had to be activated due to power deficits in Sweden.

Svenska kraftnät is responsible for ensuring that the power reserve is available during the winter period, between 15 November and 15 March.⁹⁵ Svenska kraftnät procures the power reserve by contracting electricity producers to make production capacity available to Svenska kraftnät that can be activated in the event of a power deficit. Svenska kraftnät has contracted Karlshamnsverket as a power reserve until 2025, which will be able to supply 562 MW if necessary. The power reserve is valid by law until 15 March 2025. The law has been extended, most recently in 2016.⁹⁶ After 2025, any power reserve must be reviewed under the current EU Electricity Market Regulation.

Since November 2022, Sweden has had a defined reliability standard of 1 hour/year, based on Ei's proposal in the report *Ei:s förslag till tillförlitlighetsnorm för*

⁹³ Retail Market Working Group.

⁹⁴ [Aktivering av effektreserven fram till vintern 2025 \[Activation of power reserve through winter 2025\] | Svenska kraftnät \(svk.se\)](#) (Downloaded 22 March 2024)

⁹⁵ According to the Act (2003:436) on power reserve.

⁹⁶ SFS (2016:422).

Sverige [Ei's proposal for a reliability standard in Sweden]⁹⁷. In brief, the standard means that the production and import of electricity must cover the entire expected electricity consumption need 99.989 per cent of the time during a year. According to the Electricity Market Standard, a reliability standard must be adopted before a country can introduce what are known as capacity mechanisms. See section 2.4.2 for a more detailed description of how the reliability standard is 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. No permit from Ei is required to build a new electricity production plant in Sweden. However, permits are required under 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. Table 10 shows the installed capacity by production type, excluding thermal power.

Table 10. Installed capacity in Sweden's power stations 2016–2023, MW.

Type of power	2016	2017	2018	2019	2020	2021	2022	2023
Nuclear power	9 076	8 586	8 614	7 725	6 871	6 882	6 885	6973
Hydropower	16 181	16 301	16 315	16 328	16 334	16 286	16 302	16 416
Wind power	6 495	6 691	7 406	8 980	10 017	12 074	14 662	16 252
Solar power	185	254	435	690	1 090	1 593	2 384	3973

Source: Swedenergy – Energiföretagen Sverige

2.4.2 Resource adequacy and reliability standard for Sweden

The Electricity Market Regulation contains, among other things, rules on how resource adequacy on the electricity market – i.e. the measure of the extent to which production resources and other supplies of energy are able to meet the expected demand – is to be calculated and assessed within the EU. These rules state that Member States with resource adequacy problems should primarily achieve resource adequacy through well-functioning markets. Thus, Member States shall first develop their electricity markets to remove national barriers to the development of well-functioning electricity markets and review whether interconnections with neighbouring countries can be increased. It is only in certain circumstances and for a limited period of time that a country is allowed to take

⁹⁷ Ei:s förslag till tillförlitlighetsnorm för Sverige [Ei's proposal for a reliability standard for Sweden] (Ei R2021:05)

support measures in the form of capacity mechanisms⁹⁸ to achieve resource adequacy.

According to the Electricity Market Regulation, countries that have or intend to have capacity mechanisms must have a reliability standard, which shall specify the Member State's necessary level of security of supply in a transparent manner. The reliability standard shall be calculated according to a methodology developed by ENTSO-E and adopted by the EU Agency for the Cooperation of Energy Regulators (ACER).

The methodology describes how to calculate the reliability standard in terms of loss of load expectation (LOLE) in the unit hours/year. The LOLE is calculated using two key parameters, the value of lost load (VoLL) and the cost of new entry (CONE). The CONE is developed for a number of reference technologies, which may be production, storage, demand response or equivalent. The data and assumptions to be used for the calculation of VoLL and CONE are set out in a methodology developed by ACER.

In November 2022, the Government decided to set the reliability standard for Sweden at 1 hour per year, based on the proposal presented by Ei in the report *Ei:s förslag till tillförlitlighetsnorm för Sverige* [Ei's proposal for a reliability standard for Sweden] (Ei R2021:05)⁹⁹. In connection with the Government's decision, Ei was tasked¹⁰⁰ with annually calculating the reliability standard for Sweden, and, if necessary, proposing a new reliability standard. A report on the assignment is to be submitted to the Government Offices of Sweden no later than 1 January 2024 and 1 January 2025, respectively. In December 2023, Ei delivered the first report *Årlig uppdatering av tillförlitlighetsnormen för Sverige – avrapportering 1 januari 2024* [Annual update of the reliability standard for Sweden – 1 January 2024 report] (Ei R2023:19)¹⁰¹.

In December 2023, Ei decided – in accordance with Article 11(1) of the Electricity Market Regulation – to set the weighted VoLL at EUR 7,065/MWh using the 2023

⁹⁸ Capacity mechanism: a temporary measure to ensure that the desired level of required resource adequacy is achieved, through compensation to resources for their availability, excluding measures related to support services or congestion management.

⁹⁹ Swedish Energy Markets Inspectorate, *Ei:s förslag på tillförlitlighetsnorm för Sverige* [Ei's proposal for a reliability standard for Sweden] (Ei R2021:05), May 2021. Available: [Ei R2021:05 Ei:s förslag till tillförlitlighetsnorm för Sverige](#)

¹⁰⁰ Ministry of Rural Affairs and Infrastructure, *Fastställande av tillförlitlighetsnorm för Sverige och uppdrag att årligen beräkna tillförlitlighetsnormen för Sverige* [Adoption of reliability standard for Sweden and assignment to calculate the reliability standard for Sweden annually], 17 November 2022, I2022-103251.

¹⁰¹ Swedish Energy Markets Inspectorate, *Årlig uppdatering av tillförlitlighetsnormen för Sverige – avrapportering 1 januari 2024* [Annual update of the reliability standard for Sweden – 1 January 2024 report], (Ei R2023:19) December 2023. Available: [Årlig uppdatering av tillförlitlighetsnormen för Sverige \(ei.se\)](#)

price level. Ei also calculated CONE, expressed in fixed and variable costs, for a number of reference technologies.

Based on the CONE values of the different reference technologies and the VoLL value determined, a LOLE value was calculated for each reference technology. The reference technology with the lowest LOLE value, while at the same time having a capacity above the lowest capacity requirement (or highest possible power deficit), is the one that determines the size of the reliability standard. The lowest capacity need, or highest possible power deficit in Sweden, was assumed to be 1,450 MW based on data from Svenska kraftnät¹⁰². Demand response from residential heating was the reference technology that determined the value of the reliability standard again this year, but this time at 1.16 hours per year. A reliability standard of 1.16 hours per year corresponds to the ability of electricity production and imports to cover electricity consumption for 99.987 per cent of the time.

In addition to proposing and adopting a reliability standard, the Electricity Market Regulation also requires Member States to develop an implementation plan. The implementation plan must set out the measures to be taken by the Member State to remove regulatory distortions or market failures. Member States are also required to regularly assess resource adequacy in their country. If resource adequacy problems are identified, through the European Resource Adequacy Assessment (ERAA) or a national equivalent, they are to be addressed in the first instance by removing barriers and taking measures to improve the functioning of the market as set out in the Member State's implementation plan. As a last resort to address remaining resource adequacy problems, the Member State may then introduce capacity mechanisms.

In June 2022, the Government tasked Ei with reporting annually, up to and including 2025, on a number of measures that Ei proposed in 2020 in the report *Genomförandeplan med tidsplan för att förbättra elmarknadens funktion* [Implementation plan with timetable for improving the functioning of the electricity market]^{103 104}. The assignment for 2023 was reported through the interim reports *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]¹⁰⁵.

¹⁰² [Största möjliga effektförbrukning \(ei.se\)](#) [Largest possible power deficit] (Downloaded 22 March 2024)

¹⁰³ [2022-102491.pdf \(ei.se\)](#)

¹⁰⁴ *Genomförandeplan med tidsplan för att förbättra elmarknadens funktion* [Implementation plan with timetable for improving the functioning of the electricity market] (Ei R2020:09)

¹⁰⁵ [Uppföljning av genomförandeplan med tidsplan för att förbättra elmarknadens funktion \(ei.se\)](#) [Follow-up of implementation plan with timetable for improving the functioning of the electricity market] (Ei R2023:16)

The natural gas market



3 The natural gas market

Natural gas was introduced in Sweden in 1985 and today accounts for just over one per cent of Sweden's total energy consumption¹⁰⁶. Gas is mainly used as a process fuel and raw material in industry, for power and district heating production, as a vehicle fuel, and by households that use gas for heating and cooking.

In Sweden, gas is distributed through a large 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 LNG¹⁰⁷ terminals in Lysekil and Nynäshamn. Only the western Sweden gas network and the Stockholm gas network are subject to the Natural Gas Act (2005:403) and therefore also to Ei's supervision.

Sweden has no natural gas production of its own, and is instead 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, which is upgraded before being injected into the natural gas network.

The instructions for Ei state that the authority shall, within its remit, carry out tasks arising from 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). According to the Natural Gas Market Directive¹⁰⁸ and national provisions, the regulatory authority shall 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 the orders necessary to ensure compliance with the regulations and conditions covered by the supervision. Such an order may be accompanied by a fine. The law also states that the regulatory authority has the right to obtain, on request, the information and documents needed for supervision.¹⁰⁹

¹⁰⁶ Swedish Energy Agency, "[Slutlig energianvändning per energivara år 2022](#)" [Final energy use by energy commodity in 2022]

¹⁰⁷ Liquefied Natural Gas (LNG)

¹⁰⁸ A revised directive, namely "Directive (EU)2024/1788 of the European Parliament and of the Council of 15 June 2024 concerning common rules for the internal markets in renewable gas, natural gas and hydrogen, amending Directive 2023/1791 and repealing Directive 2009/73/EC" entered into force on 4 August 2024

¹⁰⁹ Chapter 10, Sections 2–3 of the Natural Gas Act

In addition to the above-mentioned regulatory framework, there are five EU regulations in the field of gas that relate to both the market and the network:

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 operational areas: transmission, distribution, gasification and storage. In transmission pipelines, gas is transported long distances under high pressure. Pressure is then reduced 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 Stenungsund in the north and a short distance eastward into Småland; see Figure 19. Just over 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 western Sweden natural gas network



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 the city of Stockholm as well as Solna and Sundbyberg. The production and input of gas to the urban gas network mainly takes place from a gasification plant in Stockholm to which both biogas and LNG (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 pipelines pressurised at dedicated regulating stations around the city. The 40-km-long vehicle gas network connects the gas production facilities of biogas suppliers 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. A common factor for the gas network in Stockholm and the small local gas networks around Sweden is that they are not connected to any transmission network. The networks covered by the provisions of the Natural Gas Act are the western Sweden gas network and the Stockholm gas network. 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 operators

Certification of system operators

The Natural Gas Market Directive¹¹⁰ and national regulations¹¹¹ require transmission system operators¹¹² to be certified. Ei certified Swedegas AB as system operator in July 2012. Certification is valid until further notice, but Ei can review the decision if the system operator does not comply with the certification requirements. In September 2021, Ei decided to recertify Swedegas AB in response to a change in Swedegas' ownership 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, in turn, is managed by First State Investment.

Functional unbundling of natural gas companies

In order to prevent cross-subsidisation between companies engaged in different types of natural gas activities, so-called functional unbundling of companies is required. This means that companies involved in the transmission of natural gas are not allowed to trade in natural gas. Moreover, a company that holds a storage facility may not engage in the production of or trade in natural gas. In a company that owns a storage facility, a board member, CEO or authorised signatory may not simultaneously hold any of these roles in a company engaged in the production of or trade in natural gas. However, there is no stipulation in Swedish law that a gas network operator may not be part of a group engaged in the production of or trade in natural gas.

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.¹¹³ The purpose of the monitoring plan is to ensure that

¹¹⁰ 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.

¹¹¹ Act (2011:711) on certification of certain natural gas companies.

¹¹² The term transmission system operator is synonymous with transmission network operator and transmission network company.

¹¹³ Chapter 3, Section 9 of the Natural Gas Act (2005:403).

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 also publish an annual report describing they have implemented.

3.1.2 Technical functioning of the gas network

The western Sweden natural gas network consists of several different types of networks. The largest pipelines that transport the gas under high pressure are transmission pipelines. Pressure is then reduced 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 is also responsible for system balancing. A few very large consumers are connected directly to the transmission network.

Biogas in the natural gas network

The natural gas and biogas markets in Sweden are to some extent integrated, as the natural gas network can also be used for biogas distribution. In 2023, biogas accounted for about 31 per cent¹¹⁴ of the gas in the western Sweden transmission and distribution network. Biogas upgraded to natural gas quality can, in most cases, be fed into 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 network¹¹⁵. Another three biogas producers are connected to the vehicle gas network of Gasnätet Stockholm AB. The largest proportion of biogas in the network is imported via Denmark. There is a milestone target in Sweden that by 2023 at least 75 per cent of food waste shall be treated biologically so that it can be utilised in the form of biogas and biofertiliser. In addition, the Government has decided that municipalities must have systems for collecting food waste by 31 December 2023¹¹⁶.

Natural gas balancing

As a transmission system operator, Swedegas (a subsidiary of Nordion Energi) 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 network and is responsible for short-term balancing of gas input and output.

¹¹⁴ Källa: Swedegas, "Gasbarometern" [Gas barometer], [Gasbarometern - Nordion Energi \(swedegas.se\)](https://www.swedegas.se/gasbarometern)

¹¹⁵ Source: The Swedish Energy Agency and Energigas Sverige – Produktion av biogas och rötresters och dess användning år 2021 [Production of biogas and digestate and its use in 2021]

¹¹⁶ Energigas Sverige, "Biogas och miljön" [Biogas and the environment], [Biogas och miljön – Energigas Sverige](https://www.enerdigas.se/biogas-och-miljon)

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

The system balancer may not enter into balancing responsibility agreements with individual balancers until the terms and conditions of the agreement have been approved by Ei. The Natural Gas Act stipulates that Ei must review the terms and conditions of the agreement to ensure that they fulfil the requirements of being objective and non-discriminatory. The latest balancing responsibility agreement was approved by Ei in autumn 2023. The terms and conditions of the agreement were amended to ensure that the balancers' storage of gas to such an extent that the Swedish gas storage filling level was achieved in accordance with the requirements of Regulation (EU) 2022/1032. At the end of 2021, Ei decided to approve balancing responsibility agreements where the amendments to the terms and conditions of the agreement at that time were linked to the upcoming connection to Baltic Pipe, which became operational on 1 October 2022 (read more about Baltic Pipe in section 3.1.4 Cross-border issues). The balancing markets for Sweden and Denmark have been integrated since 1 April 2019. The common balancing zone aims 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 (known as metering regulations) that contain provisions for pipeline owners regarding the metering and reporting of gas deliveries. 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 metering data 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 calculating the input and withdrawal quantities of energy.

Gas billing is based on the energy delivered. To calculate the quantity of energy, the volume of the gas, measured in cubic metres (m³), is multiplied by the energy content of the gas per unit volume, measured in kWh/m³. Energy content per unit volume is usually referred to as the calorific value, and the Swedish system uses a calorific value for the entire system. The calorific value can be given as either an

upper or lower calorific value depending on whether or not the products of combustion, flue gases in the case of natural gas, have been cooled to the same temperature as the gas before combustion started. Thus, for a plant that has equipment capable of utilising the energy of the flue gases, the energy content of the gas per unit volume is higher.

Connection to a natural gas pipeline

The owner of a natural gas pipeline is obliged to connect the natural gas pipelines, storage facilities and gasification plants of others under reasonable terms. However, this obligation does not exist if the pipeline has no capacity. When a connection is requested, the owner of the natural gas pipeline must provide written information on the fee and other conditions for the connection within a reasonable time.

Connection to storage facility and gasification plant

The owner of a facility or pipeline for natural gas storage or a gasification plant in the Swedish natural gas system is obliged to inject natural gas on reasonable terms and conditions on behalf of others, in order to store or gasify it. No such obligation exists if the facility has no capacity. When input is requested, the holder of a storage facility or gasification plant shall provide written information on the fee and other conditions for the input within a reasonable time.

Examination of conditions for connection to natural gas facilities

The methods for drawing up connection contracts for different types of natural gas facilities are approved by Ei before they are utilised. 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

Owners of a natural gas pipeline, storage facility or gasification plant must plan to be able to manage the operation and safety of their own facility in a crisis situation.¹¹⁷ Owners 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. Owners must also inform the government agencies and other relevant stakeholders of their plans.

3.1.3 Network charges for connection and transmission

Gas network charges and gas network operators' revenue frameworks

The income of gas network operators is regulated in advance in a revenue framework that spans a period of four years. The revenue framework sets an upper

¹¹⁷ Regulations are set out in the Swedish Energy Agency's regulations and general guidelines (STEMFS 2016:1) on security of natural gas supply.

limit for the total revenue that companies can collect from their network operations. The purpose of the revenue framework regulation is to ensure that the gas network operators work efficiently at low costs, that the network operators receive a reasonable return, and that customers receive a reasonable price for the network service. The revenue framework consists of capital costs, running controllable costs, and running non-controllable costs. Ei supervises the gas network operators and determines the network operators' revenue framework. The supervision of network operators' tariffs covers the operators connected to the Swedish natural gas system under the terms of the Natural Gas Market Directive.¹¹⁸

The revenue framework shall be calculated so that it covers reasonable costs, and since the gas network operators have a monopoly, there are no market mechanisms that naturally put pressure on efficiency improvements. For this reason, there needs to be an efficiency requirement in revenue regulation so that not all cost increases can be passed on to the customer base. Ei uses a general efficiency requirement and has calculated the controllable costs for the period 2023–2026 with an annual efficiency requirement of 1 per cent.

Ei sets a revenue framework for each gas network operator's natural gas operations prior to each regulatory period. As it is not possible to know all the information before the regulatory period begins, for example what investments the gas network operators will make during the regulatory period, Ei bases its decisions prior to the regulatory period to some extent on the operators' forecasts. The forecasts are reconciled with the actual outcome after the end of the regulatory period, in a reconciliation decision. Ei then decides what actual revenue framework the gas network operator has for the regulatory period. This decided revenue framework is then compared with the revenue that the gas network operators collected from their customers during the regulatory period in question. This is done in a separate decision, called a deviation decision. Any under- or over-withdrawal increases or decreases the gas network operator's revenue framework for the subsequent regulatory period. This means that Ei issues at least three decisions for each period: a decision before the regulatory period, a decision after the regulatory period and a deviation decision. Under certain conditions, a revenue framework may also be reviewed during the regulatory period.

When setting charges for the transmission of natural gas (network tariffs), operators must take into account in particular the number of connected customers, the geographical location of the customers, the amount of energy transmitted, the subscription costs for overhead lines, the continuity of supply and the pressure of

¹¹⁸ 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 pipelines. 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 party to whom the decision applies. The appeal is heard by the General Administrative Court.

For the 2019–2022 regulatory period, the operators applied for revenue frameworks totalling SEK 6.41 billion at the 2017 price level. In 2023, Ei took decisions on revenue frameworks after the regulatory period, which totalled approximately SEK 6.58 billion at the 2021 price level. At the turn of the year 2023/2024, Ei decided on revenue frameworks for the regulatory period 2023–2026. The decisions on revenue frameworks for the period 2023–2026 for the seven gas network operators totalled approximately SEK 6.02 billion at the 2022 price level.

Under the Natural Gas Act¹¹⁹, the gas network operators are required to draw up separate financial accounts 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, a complete income statement and balance sheet for each reporting unit. The annual report forms the basis for further supervision.

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

Review of revenue regulation for gas network operators

In autumn 2022, Ei developed a new method for calculating the revenue frameworks for natural gas operators for the period 2023–2026. The method produced an outcome, i.e. a revenue framework, which, according to Ei, better meets the objectives of the EU regulatory framework than the previous method. The new method meant, among other things, that the valuation principle for the capital base was changed from a capacity-preserving to a capital-preserving principle. The decisions were made in October 2022 and were appealed by all reporting units. In parallel with these court processes, there were also court processes concerning the electricity grid operators' reporting of data for decisions

¹¹⁹ Chapter 3, Section 3 of the Natural Gas Act (2005:403).

on revenue frameworks for electricity grid operators in Sweden for the regulatory period 2024–2027. When the Administrative Court of Appeal in Jönköping issued judgments in the cases concerning the electricity grid operators, Ei assessed that the prospects of success in the processes concerning the gas network operators were small. In view of this, Ei chose to allow the revenue framework decisions for the gas grid operators to be reversed and referred back to the authority for new decisions in accordance with the previous valuation principle for the capital base. On 10 October 2023, the Administrative Court announced that the decisions on the natural gas operators' revenue frameworks for 2023–2026 would be referred back to the Swedish Energy Markets Inspectorate (Ei) for reconsideration. This was in line with the opinion Ei submitted to the Administrative Court in September 2023.

In November 2023, a government inquiry proposed amendments to the legislation on gas network operators' revenue. The proposed amendments, if implemented in Swedish law, would enable Ei to change the methodology for calculating the operators' revenue frameworks. In anticipation of new legislation, Ei has begun work to review the revenue framework regulation for gas network operators for the regulatory period 2027–2030.

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 to develop the common market and how to improve security of supply in the Danish-Swedish area.

Cross-border cooperation aims to coordinate the rapid transposition of European legislation, and identify areas for development. Via the cooperation body ACER, Ei has, inter alia, participated in the work of implementing the European regulatory framework for the internal natural gas market.

Capacity allocation mechanisms in gas transmission systems

The Commission Regulation for capacity allocation mechanisms in gas transmission systems, also known as CAM, entered into force in 2017. CAM aims to 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 natural gas transmission networks) deal with rules for interconnection points. Since there are no such points in Sweden (the nearest is in Denmark), Ei does not carry out supervision under the regulations, nor does it implement any measures in response to the regulations. However, the rules in CAM and CMP are important for Swedish operators that trade in gas within the EU and transport gas from other EU countries to Denmark, and from Denmark to Sweden.

Ei therefore monitors the application of CAM and CMP by participating in the ACER working groups.

Interoperability and information exchange

The Commission Regulation containing rules on interoperability and information exchange (IO) entered into force in 2015. The IO Regulation aims to promote and facilitate gas trade and transmission within the EU through harmonised rules for the operational management 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 deliveries from Norway to Denmark and Poland and to end users in Central and Eastern Europe. With this pipeline, Denmark is now mainly a transit country for natural gas. Among other things, Baltic Pipe helps to secure the supply of gas and reduce dependence on Russian gas.

On 1 October 2022, the Swedish-Danish gas market was integrated with Baltic Pipe. Baltic Pipe brings an increased amount of gas into the system, which has an impact on both volume and flexibility. In light of this, the current balancing model has had to be reviewed. The biggest change in the balancing model involves hourly balance reconciliations during the 24-hour gas day. The revisions to the balancing model resulted in changes to the balancing responsibility agreement concerning the relationship between Swedegas and the Swedish gas operators and have been implemented.

3.2 The wholesale market for natural gas

Natural gas covers just over 1 per cent of Sweden's total energy needs and is thus a small energy source. However, in municipalities where the natural gas network is 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 trends, transparency and competition

The Danish gas platform Tyra has been back in operation since March 2024 after being under refurbishment since 2019. Production in the Tyra field exceeds domestic consumption in Denmark, which is why part of the Danish production is exported. A large part of the Danish market is also supplied by biogas, which

accounts for around 37 per cent of total consumption¹²⁰. Sweden also imports liquefied natural gas (LNG) via ships from countries such as the USA and Qatar. The gas is used, for example, in industries and in Stockholm's urban network. However, the LNG terminals are not connected to the western Sweden gas network.

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 on the Danish gas market. Since 2020, natural gas is mainly traded on the European Energy Exchange (EEX), where the trading platform PEGAS¹²¹ is integrated. Competition, price trends and transparency in the Swedish natural gas market are largely dependent on developments in Denmark and are monitored by Danish authorities.

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 use and total import capacity of natural gas in Sweden in the years 2016–2023.

Table 11. Transmission of natural gas in the western Sweden natural gas network 2016–2023¹²²

Year	Total energy consumption (TWh)	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	32
2023	6,5	32

Source: Energinet and Swedegas

Natural gas in Sweden is mainly used by industry and in combined heat and power plants, while only a small percentage is used in homes. There is therefore a strong link between weather conditions, particularly during the winter months, and natural gas consumption in Sweden. Natural gas consumption remained unchanged in 2023 compared with 2022.

¹²⁰ Energinet, "Biogas via gasnettet" [Biogas via the gas network], <https://energinet.dk/gas/biogas/>

¹²¹ Pan-European Gas Cooperation (PEGAS)

¹²² As a result of Sweden moving to a common balancing zone together with Denmark, the valve in Dragör was fully opened in 2019. This explains the higher import capacity on the Swedish side while energy use remained basically unchanged.

Trading in natural gas

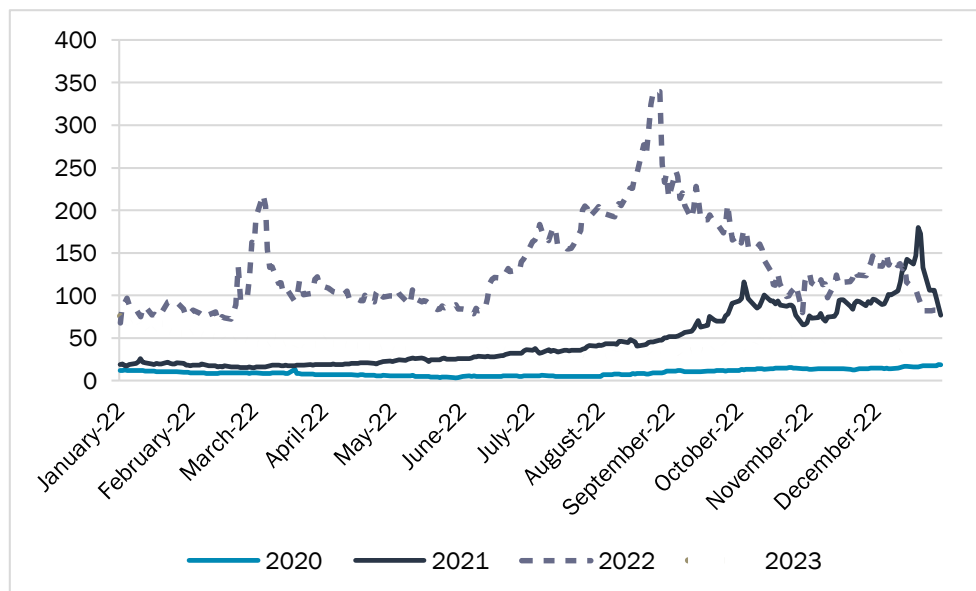
On EEX, a market participant can trade gas on the day of delivery, the day before, before the weekend and before the next month, as well as futures contracts with delivery up to 6 years ahead. To transport natural gas to Sweden, an operator needs to book capacity with Energinet, which is the transmission system operator for the gas network in Denmark. To be able 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 system's transmission capacity, there is no risk of bottlenecks in transmission with current consumption. Once in Sweden, the gas can be sold on to consumers such as industries and gas distributors.

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

Price trends in the gas market in 2023

2023 was characterised by some volatility as well as by falling natural gas prices. The natural gas price amounted to EUR 65.4/MWh in January 2023 and was halved during the year to EUR 32.6/MWh in December 2023 (see Figure 20).

Figure 20: Gas price (Dutch Month Front-Month Futures) 2020–2023 in EUR/MWh



Source: SKM Syspower

The increase in global natural gas demand has been fuelled by economic recovery since the easing of restrictions related to the COVID-19 pandemic. With the introduction of sanctions on Russian gas imports, Russia periodically shut down the Nord Stream 1 pipeline for maintenance and eventually closed it permanently. Between 2021 and 2023, the EU reduced the proportion of Russian gas from 41 per

cent to 10 per cent¹²³, made possible mainly by alternative import sources as well as demand reduction measures. By 2023, the proportion of Russian gas had fallen to 10 per cent of total EU imports, which was made possible by factors such as a significant increase in EU LNG imports and a 16 per cent decrease in EU gas consumption between 2022 and 2023¹²⁴. At the end of September 2023, the EU's gas stocks were at 96 per cent¹²⁵, the highest level ever.

Measures to cover peak demand or supply shortfalls

Peak demand and supply shortfalls from the balancers are handled through the balancing capacity available in the transmission pipelines, known as linepack. If additional measures are required, the system balancer uses market mechanisms to manage 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 security of supply has historically been high, the Swedish natural gas market is vulnerable, both in the short and the long term. The single supply point situation, together with the fact that Sweden has no natural gas production of its own, makes the Swedish natural gas market vulnerable to external disruptions and production outages in the Danish and Norwegian natural gas fields.

The Swedish Energy Agency is the regulatory authority under the Security of Natural Gas Supply Act (2012:273). In accordance with the requirements of the Natural Gas Supply Regulation¹²⁶, a national preventive action plan and a national crisis plan for security of natural gas supply were published in 2019.¹²⁷

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 factors such as increased growth in Asia. In the wake of the war in Ukraine, the European Commission launched a new energy plan, REPower EU, in 2022. It contains three elements that affect the gas market:

¹²³ EU Agency for the Cooperation of Energy Regulators (ACER), "[Analysis of the European LNG market developments –2024 Market Monitoring Report](#)"

¹²⁴ [Swedish Energy Agency, "Läget på de globala energimarknaderna-vecka 15 2024" \[State of the global energy markets – week 15, 2024\]](#)

¹²⁵ European Commission, "[Quarterly report on European gas markets-vol. 16](#)"

¹²⁶ 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.

¹²⁷ National crisis plan for Sweden's natural gas supply – according to Regulation (EU) 2017/1938 of the European Parliament and of the Council.

- 1 *Save energy*, in which the Commission proposed to increase the energy efficiency target in the Energy Efficiency Directive. The revised directive entered into force in October 2023 and included a target to reduce EU energy consumption by 11.7 per cent by 2030.
- 2 *Reduce dependence on Russian natural gas*, which in 2021 accounted for 44¹²⁸ per cent of EU gas imports, including through more LNG terminals to import more liquefied natural gas.
- 3 *Increase the pace of expansion of renewable energy production*, to promote climate-friendly solutions and hydrogen technology. A new Renewable Energy Directive was adopted in autumn 2023, including a target of 42.5 per cent renewable energy by 2030.

Gas prices are expected to remain volatile, creating challenges in terms of stockpiling, among other things. The relatively high prices and uncertainty in the market could potentially make operators reluctant to hold gas stocks, which in turn could lead to problems with security of supply. For this reason, the EU has decided to amend the Gas Supply Regulation to require gas stock levels from the winter of 2022/2023 until the end of 2025 to ensure security of supply in the EU.

From a Swedish perspective, the Danish gas field Tyra, which was put back into operation in March 2024, means increased security of supply for natural gas.

In December 2021, the European Commission presented a gas market package, consisting of a directive and a regulation. The Transport, Telecommunications and Energy Council decided on a general approach on 28 March 2023, and the trilogue negotiations with the European Parliament were concluded on 8 December 2023. The new gas market package reflects the increased ambition of the European Union's Green Deal and is part of the efforts to reach the 2050 climate neutrality target. The amendments aim to contribute to the harmonisation of the gas regulatory framework with the existing EU electricity market framework. The amendments 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' ability to make renewable and sustainable choices. This will be facilitated, among other things, by providing customers with basic information on their energy consumption and its origin, thus improving their ability to make active choices. A large part of the new rules consists of proposals for new regulation of hydrogen plants and an emerging hydrogen market. In 2023, the

¹²⁸ EU Agency for the Cooperation of Energy Regulators (ACER), "[Key developments in European gas wholesale markets – 2024 Market monitoring report](#)"

Government tasked Ei with proposing national rules on how the new gas market rules should be implemented in Sweden.¹²⁹

3.3 The retail market for natural gas

The Swedish retail market for gas is competitive and prices are set by market participants. The western Sweden natural gas network has about 27,000 household customers¹³⁰ as well as larger customers, such as large industries and combined heat and power plants. Stockholm's urban and vehicle gas networks have approximately 50,000 customers, most of which are household customers.

In 2023, there were a total of seven operators supplying gas to household customers¹³¹ on the Swedish natural gas market, including six operators in the natural gas network in western Sweden and one operator in Stockholm's city and vehicle gas network.

Ei is tasked with working to strengthen the position of natural gas customers by, among other things, enabling active choice with easily accessible information. Ei also promotes consumer rights in collaboration with the Swedish Consumer Agency. Ei and the Swedish Consumer Agency collaborate on issues such as those concerning customers.

3.3.1 Monitoring of price trends, transparency and competition on the retail gas market

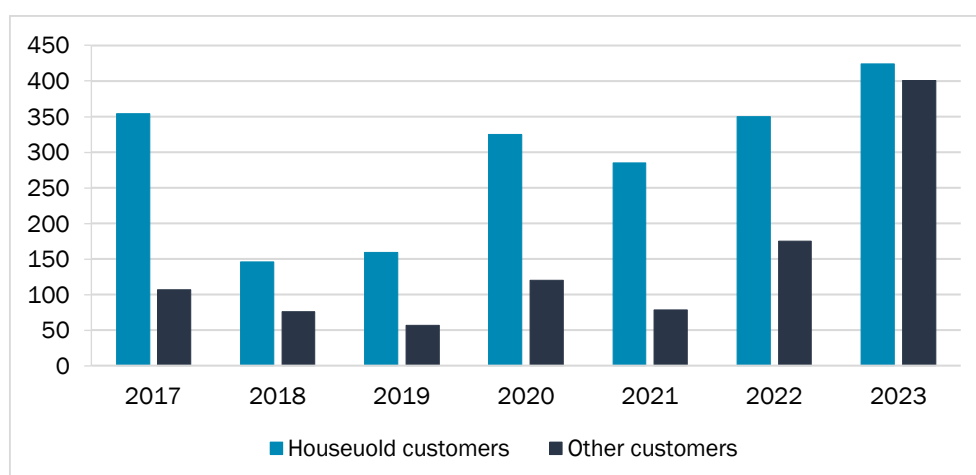
The gas trading market is competitive and customers in the western Sweden network are free to switch supplier. However, this is not possible in Stockholm as only one supplier operates there. Statistics on switching natural gas suppliers are shown in **Figure 21**. Ei receives few questions and complaints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

¹²⁹ Case number: 2023-104462.

¹³⁰ Source: Swedegas.

¹³¹ ApportGas, Eon Försäljning Sverige AB, Göteborg Energi, Kraftringen Energi AB, Varberg Energi, Öresundskraft, Stockholm Gas. Source: Swedish Consumer Energy Markets Bureau

Figure 21. Number of changes of natural gas supplier 2017–2023¹³²



Source: Statistics Sweden

Natural gas price trends on the retail market

As shown in Table 12 and Table 13, natural gas prices generally increased between 2018 and 2022 before dropping back slightly in 2023. Gas prices were unusually high in 2022 and have since fallen. This has also been reflected in retail gas prices. Read more about gas prices in section 3.2 *The wholesale market for natural gas*. Table 12. Prices in öre per kWh of natural gas for household customers 2018–2023¹³³, 5,500 - <55,000 kWh annual consumption

	Retail 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
2022 Jul–Dec	160,63	46,79	296,48
2023 Jan–Jun	126,79	39,42	248,19
2023 Jul–Dec	121,70	45,27	249,15

¹³² Statistics Sweden revised the number of customers in the category Other customers for reference year 2022 on 28 March 2024. Data on changes of natural gas supplier are reported by gas network operators, but in 2020–2022 this was reported by gas trading companies instead. The time series should therefore be interpreted with great caution.

¹³³ 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.

Table 13. Prices in öre per kWh of natural gas for household customers 2018–2023¹³⁴, <5,500 kWh annual consumption

	Retail price	Network price	Total
2018 Jan–Jun	42,92	68,23	174,04
2018 Jul–Dec	46,66	95,73	213,09
2019 Jan–Jun	49,90	103,48	227,55
2019 Jul–Dec	46,68	87,09	203,04
2020 Jan–Jun	48,62	62,47	175,22
2020 Jul–Dec	49,89	172,07	313,81
2021 Jan–Jun	57,80	159,37	308,18
2021 Jul–Dec	100,73	200,73	413,53
2022 Jan–Jun	125,02	184,48	424,08
2022 Jul–Dec	175,83	200,26	507,30
2023 Jan–Jun	131,95	178,77	428,82
2023 Jul–Dec	122,85	188,95	430,18

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 natural gas prices from natural gas trading companies in Sweden. Read more about the Swedish Consumer Energy Markets Bureau in section 4.4 *The Swedish Consumer Energy Markets Bureau* as a national contact point. The website also contains information on how to switch gas supplier and information on the different cost items in the gas price.

Regulations for natural gas operations

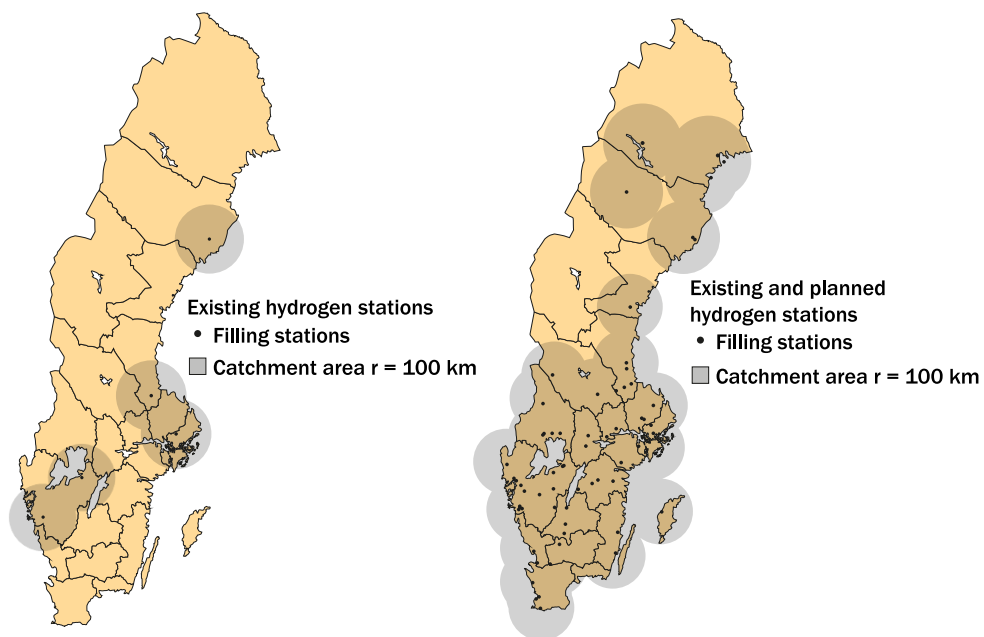
The Swedish Energy Markets Inspectorate's regulations for natural gas operations (EIFS 2022:12) apply to the reporting of gas network operations for an operator engaged in the transmission of natural gas in accordance with Chapter 3, Section 3 and Chapter 4, Section 3 of the Natural Gas Act (2005:403).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

¹³⁴ 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.

3.4 Development of hydrogen infrastructure

Hydrogen has an important role to play in the EU in reducing carbon dioxide emissions, particularly in industry and transport, as well as in the energy sector for energy storage and the use of gas turbines. According to the Swedish Energy Agency's action programme for charging and refuelling infrastructure for hydrogen (published in 2023), a number of new hydrogen refuelling stations will be added in the coming years. The financing of these is based in part on support from Klimatklivet. The following map illustrates existing hydrogen refuelling stations and those planned in the coming years:

Figure 22. Existing and planned hydrogen refuelling infrastructure in Sweden



Source: Swedish Energy Agency's action programme for charging infrastructure and hydrogen refuelling infrastructure, processed by the Swedish Energy Markets Inspectorate

Consumer protection



4 Consumer protection

Ei works to strengthen the position of customers in the energy markets, for example through customer information, consumer counselling and through Elpriskollen – Sweden's only independent comparison site for electricity contracts.

Ei also answers consumer questions and receives complaints via the Konsumentkontakt consumer contact function. Complaints and questions give Ei a picture of how the market works. The questions and complaints received via Konsumentkontakt can provide indications of whether there is a need for regulatory development and supervisory measures in an area.

4.1 Elpriskollen

To strengthen the position of customers, Ei offers the price comparison website Elpriskollen, where consumers and companies with an expected annual consumption of less than 100,000 kWh can compare prices and terms for electricity contracts from all electricity trading companies. There were just over 510,000 unique visitors in 2023.

The ability to compare prices and other factors that may influence the choice of electricity trading company is a prerequisite for being active on the market. Ei therefore works to constantly develop and improve the price comparison website to make it easier for electricity users and enable extended searches.

During the year, a great deal of work was done to make Elpriskollen more user-friendly for visitors. Elpriskollen has undergone development for several years, and a new version of Elpriskollen was launched on 1 June 2023. With an increased number of contract types on Elpriskollen, the visitor's need for guidance through the site has increased, and the new design of the site is intended to meet this need.

All electricity trading companies that target consumers and businesses with an expected annual consumption of less than 100,000 kWh are required to report prices and terms and conditions for such contracts, as set out in Ei's regulations on reporting¹³⁵. The offering on Elpriskollen must reflect the offering on the electricity market, and Ei regularly reviews the offering to ensure that the site covers as large a part of the market as possible.

¹³⁵ EIFS 2013:8.

Ei also carries out regular checks of the reported data to ensure that electricity trading companies are reporting correctly. When deficiencies were discovered, the electricity trading companies were asked to rectify them, which they did in all cases.

4.2 Konsumentkontakt

Konsumentkontakt is consumer contact function that, among other things, works to answer questions and receive complaints, primarily from consumers (private individuals), about how the electricity, gas and district heating markets work and what rules apply. The function aims to enable consumers to understand their rights and make active choices. It also aims to be an effective channel into the organisation to answer questions from the public. Ei also responds to questions and complaints from business operators.

Konsumentkontakt receives questions and complaints via email, forms on the Ei website, telephone and an online consumer forum. The consumer forum allows consumers to 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.

The Ei has a close cooperation with the Swedish Consumer Energy Markets Bureau regarding the handling of questions and complaints. Consumers with 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 2023, Ei had around 2,700 consumer contacts. These contacts were mainly in the areas of electricity grids, electricity trading and elpriskollen.se, but also in district heating, gas networks and gas trading. Consumer contacts are categorised as questions or 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 2023. Most of the questions and complaints received were related to electricity grids and electricity trading. Consumer contacts about network tariffs could, for example, be about the structure of the charges, as the introduction of power tariffs upset several consumers. Many consumers also wanted to switch to an hourly priced electricity trading contract and complained about the time it took for electricity grid operators to switch to hourly metering. Consumer contacts about electricity trading were often about contracts and terms, but also about self-generation, i.e. a consumer producing their own electricity through, for example, solar panels. In addition to asking questions about the energy markets, consumers can also report that a company is not complying with the provisions of the Electricity Act and the Natural Gas Act,

which Ei is responsible for. As the regulatory authority authority, Ei can then investigate whether the company is in breach of its legal obligations.

4.3 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.

There are also provisions in both the Electricity Act and the Natural Gas Act to protect consumers who are at risk of being disconnected from the electricity grid or natural gas network due to non-payment or other material breach of contract. These provisions require that the company carrying out the disconnection must first follow a certain statutory procedure. This includes, among other things, the consumer's right to correct information from the company, the possibility for the consumer to rectify the situation without disconnection taking place, and the company being required to send a notification to Social Services in the consumer's home municipality for a certain period of time before disconnection can take place.

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

Ei is one of five clients of the Swedish Consumer Energy Markets Bureau. It is an independent agency that provides information and guidance to consumers on issues related to the electricity, district heating and natural gas markets. The advice to consumers is free of charge. There is an agreement between Ei and the Swedish Consumer Energy Markets Bureau that defines the Bureau as 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 one million unique visits in 2023, almost half the number in 2022, when very high electricity prices were reflected in the Bureau's activities. Consumers can contact the Swedish Consumer Energy Markets Bureau by telephone and email. Around 4,100 cases were answered during the year, which was also a decrease compared to 2022. Even though electricity prices fell in 2023, most of the cases were about prices. Cases received by the Swedish Consumer Energy Markets Bureau revealed that changes in price, changes in terms and conditions, and automatic contract

renewals were unclear to consumers. Many complaints related to inaccurate metering and long connection times, for both consumers and micro-producers.¹³⁶

Where appropriate, the Bureau informs consumers that it is possible to report a case to the regulatory authority or request that a dispute be reviewed by the National Board for Consumer Disputes (ARN).¹³⁷

The Swedish Consumer Energy Markets Bureau publishes complaint information on individual electricity trading companies quarterly.¹³⁸ The purpose is to provide information to show which electricity trading companies are the subject of the most complaints and what the complaints are about, i.e. what problems customers have with these electricity trading companies¹³⁹.

During the year, the Swedish Consumer Energy Markets Bureau also continued to present summaries of consumer problems in energy markets to authorities and companies. This work has, among other things, created opportunities for companies to take action to reduce complaints. For Ei, when coupled with its own summaries of consumer complaints, this has made it possible to plan enforcement activities in areas where they are most useful.

4.5 Other consumer advice

Among the other authorities with consumer responsibility in the energy markets, the Swedish Consumer Agency deserves special mention. The Consumer Agency scrutinises, 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 centralised consumer information service called Hallå konsument¹⁴⁰ that covers all consumer markets, not just the energy markets. Consumers can contact Hallå konsument with questions about purchases, contract terms and complaints, for example.

Several other authorities, including Ei, are responsible for cooperating with the Swedish Consumer Agency in the development of Hallå konsument. The Swedish Consumer Energy Markets Bureau is responsible for answering questions referred by Hallå konsument and for certain information on the Hallå konsument website.

¹³⁶ Swedish Consumer Energy Markets Bureau Annual Report 2023.

¹³⁷ Swedish Consumer Energy Markets Bureau Annual Report 2023.

¹³⁸ www.energimarknadsbyran.se/el/dina-avtal-och-kostnader/valja-elavtal/klagomalsinformation/ Downloaded in April 2024.

¹³⁹ A description of how complaint information and the list of companies was compiled is available on the Swedish Consumer Energy Markets Bureau's website, www.energimarknadsbyran.se

¹⁴⁰ www.hallakonsument.se

In the electricity and natural gas markets, consumers can also turn to their home municipality for advice on various issues. There, consumer counsellors offer, among other things, pre-contractual advice and guidance in disputes. Budget and debt counsellors can offer advice and support in the event of payment problems, while energy and climate counsellors can offer, among other things, an analysis of energy use and advice on choosing a new heating source. Another advisory function is the Swedish Energy Agency's solar electricity portal, Solelportalen, where consumers can obtain information about solar panels and make calculations before deciding to purchase solar panels for their home.

4.6 Dispute resolution

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

4.6.1 Ei examines certain disputes

Ei checks that companies on the electricity and natural gas markets comply with the legislation, and in some cases also has a dispute resolution function for disputes between a consumer and a company. This applies to disputes concerning the obligation of electricity grid operators to connect an installation to the electricity grid, the cost of metering and calculating electricity, compensation for feeding electricity into the grid, and grid tariffs for small production facilities.

According to the provisions of the Electricity Act, the connection charge must be reasonable.¹⁴¹ If the consumer considers the cost to be too high, they can contact Ei, which will then examine it. If Ei finds that the connection charge is too high, the electricity grid operator must pay back 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. There is no charge for requesting a review by Ei and for appealing Ei's decision.

4.6.2 Dispute resolution support from the National Board for Consumer Disputes (ARN)

Consumers in the electricity and natural gas markets can report a dispute with a company to the National Board for Consumer Disputes (ARN). This process can be characterised as a quick and simple, yet legally compliant, alternative to the courts. ARN is a government agency that adjudicates disputes between customers and companies in the electricity and natural gas markets, among others, free of charge.

¹⁴¹ Chapter 4, Section 9 of the Electricity Act.

ARN does not conduct its own investigation of what happened. It is up to the parties to submit and present the documentation the Board will consider. When assessing a dispute, the Board bases its decision on current legislation and case law. In its decision, the Board makes a proposal on how the dispute should be resolved. 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 complaint must be received no later than one year from the date on which the company rejected the consumer's claim, and the claim must exceed the value limits of SEK 500, SEK 1,000 or SEK 2,000, depending on what the complaint concerns.

The consumer usually has to wait about 6 months for a decision in the case from ARN. Consumers can also turn to the general court to resolve a dispute with an electricity or natural gas company. A business operator can only turn to the general court to resolve a dispute, which carries certain risks as it can be a costly process.

