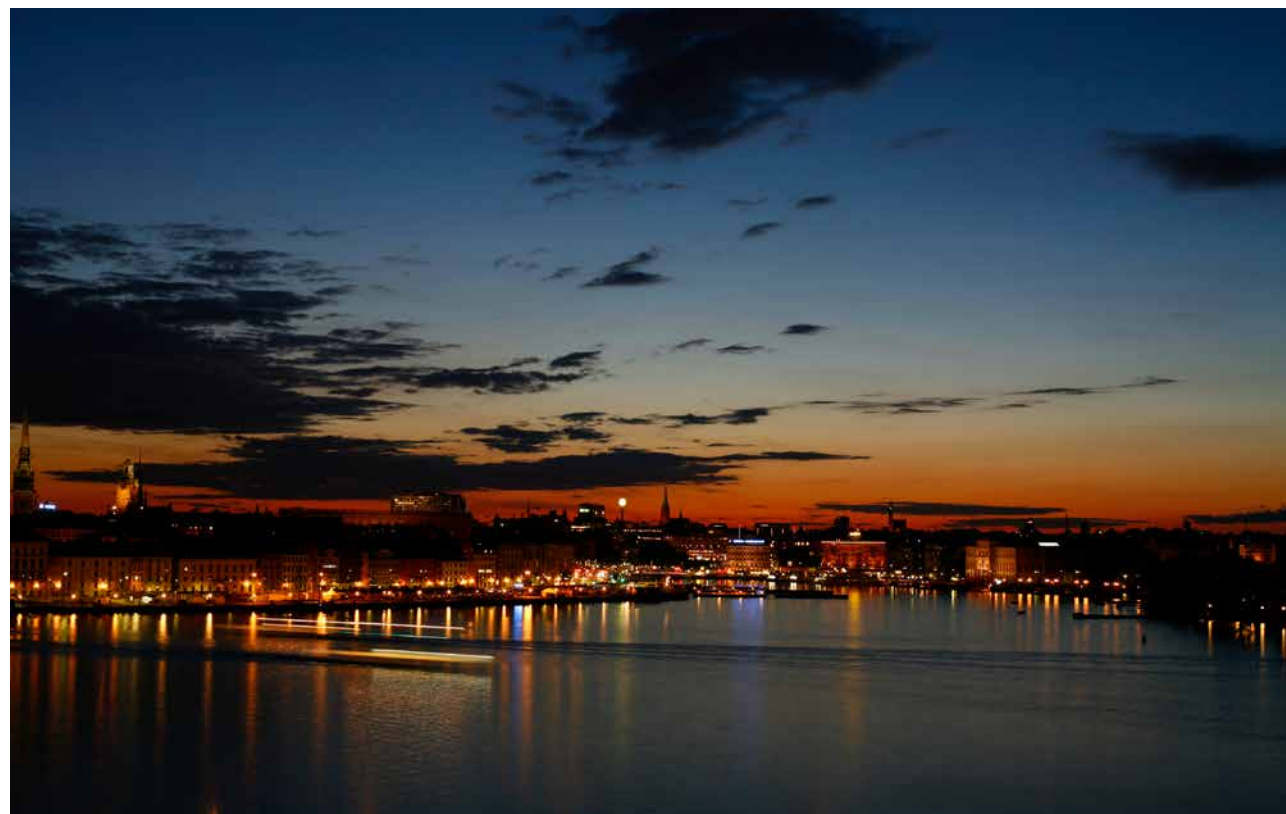


How the electricity market works

Electricity grids represent fundamental infrastructure in every modern society; it is through them that electricity is transmitted from the producer to the consumer. They need to be robust, comprehensive, modern and sufficiently developed to ensure that society can function and develop. The grids are also a prerequisite for more renewable energy and the electrification of transport and industries. In this sense, they play a key role in the climate transition.



The Swedish electricity network comprises the national grid, regional grids and local grids. The national grid, also referred to as the transmission grid, is owned by state-run Svenska kraftnät, while the regional and local grids are owned by some 160 electricity network companies. Ellevio, Vattenfall and E.ON are Sweden’s largest electricity network owners.

Due to the fact that it is not socioeconomically profitable to build parallel networks, the electricity networks are known as natural monopolies subject to governmental revenue regulation.

Electricity users and producers are connected to the grid where they live and work and thus become customers of the network company.

No other European country has as many network companies as Sweden. Many of them are small, municipally-owned and limited to individual municipalities and urban areas. Ellevio pursues an acquisition strategy, which entails growing the company by purchasing grids connected to our existing network. This creates interconnectivity benefits and gives customers access to our extensive investment programme which modernises, digitalises and expands the electricity networks. In 2022, Edsbyns Elnät AB in Ovanåker municipality in Hälsingland was integrated into Ellevio following an acquisition implemented the year before.

Regulated market

Electricity network operations are regulated. This means that Ellevio is monitored and reviewed by a public authority, the Swedish Energy Markets Inspectorate (Ei), which also decides what proportion of revenue we are allowed to charge our customers. This network regulation is based on the Electricity Act and seeks to ensure that the electricity grids provide high quality and security of supply.

Revenue frameworks in the regulation are to compensate network companies for reasonable costs linked to managing

Contents

- About Ellevio ⊕
- Market and drivers** ⊖
- > Electricity network market
 - Market conditions
 - Drivers and Ellevio’s response
- Strategy ⊕
- Employees ⊕
- Customers ⊕
- Investments and financing ⊕
- Owners ⊕
- Financial reports ⊕
- Corporate governance ⊕
- In-depth sustainability information ⊕

Market and drivers

their business and a reasonable yield on investments made. According to the Swedish Electricity Act, the prices that customers pay to the network companies should be fair, objective and non-discriminatory. Allowed revenues for network companies are decided in advance for periods of four years at a time. The current revenue regulation applies to the period 2020–2023. Conditions for the period 2024–2027 are to be presented by October 2023 at the latest.

Authority's decisions create uncertainty

The current revenue regulation entailed reduced revenue frameworks compared to the previous period and has been appealed by around 120 network companies, since it leads to insufficient investment to protect security of supply, growth and climate change.

The appeals focused in particular on the halving of the weighted average capital cost (WACC), as it was far from sufficient. In June 2022, a ruling by the Administrative Court of Appeal decided that the directive which had governed Ei's decision before the current regulatory period was in conflict with EU law. The ruling also stated that Ei does not need to consider the standard practice of previous judges when deciding on allowed revenue. Ellevio and the other network companies appealed the latter part of the ruling at the Supreme Administrative Court, but were not granted permission.

Ei's independence has been called into question by the EU Commission, and the Government has appointed an inquiry into the legislative changes required.

Contractors play important role

Contractors are a vital part of the Swedish electricity network market. They are responsible for maintaining and building the electricity network. Currently, Ellevio has no in-house employees who work in the field; all physical work on our network is carried out via contractors. It is thus of the utmost importance to have a close dialogue and collaboration with those contractors, not least on issues concerning the environment, personal safety at the workplace and cooperation to reduce our climate impact. Ellevio has a continuous and close dialogue with its contractors and sets out sustainability criteria in procurements.

→ Read more about the different operators on the electricity market at ellevio.se.

ENERGY MARKETS INSPECTORATE CONTROLS ELLEVIO'S REVENUE

According to the Electricity Act, customers should pay fair, objective and non-discriminatory fees. The state-run Energy Markets Inspectorate (Ei) monitors network companies and determines the level of their allowed revenue in advance and for four years at a time.

The allowed revenue consists of four parts: firstly, compensation that must cover the network company's interest on loans to enable investments and returns to owners ('compensation for capital costs'); secondly, compensation for aspects such as overhead networks, network losses and authority fees ('non-controllable costs'); thirdly, compensation for troubleshooting in the event of a power outage, customer service, operational monitoring, personnel costs and more

('controllable costs'); and finally a quality parameter which means that network companies can receive deductions to or increases in allowed revenues depending on the quality of their network operations.

Overhead networks are the electricity networks that deliver electricity to our grids; Svenska kraftnät's national grid is included in this along with the regional grids.

The cost of network losses refers to the costs we incur when purchasing electricity as compensation for network losses – in other words, the power lost during transmission. As a network company, we are also obliged to charge taxes and fees to customers and pass these on in full to the state.



Ellevio's view:

On electricity network regulation

Ellevio works to ensure that the electricity network regulation provides a reasonable long-term return on the investments we require to create the fossil-free, electrified society dictated by the climate targets.

The revenue regulation for the period 2016–2019 provided the necessary incentive for investments in the network, but the revenue frameworks were lowered for 2020–2023, which risks jeopardising the opportunity to develop the network. For this reason, Ellevio appealed the regulation together with 120 other network companies.

Contents

About Ellevio	+
Market and drivers	–
> Electricity network market	
Market conditions	
Drivers and Ellevio's response	
Strategy	+
Employees	+
Customers	+
Investments and financing	+
Owners	+
Financial reports	+
Corporate governance	+
In-depth sustainability information	+

Market conditions and trends in 2022

The fossil-free, electrified society of the future needs a smart electricity system with greater capacity and flexibility than today. Network companies play a decisive role in this, and the need for investment is huge. The market was challenged afresh in 2022 by the war in Ukraine, which caused an energy crisis throughout Europe.

2022 energy crisis

2022 proved to be a dramatic year for the electricity market. Russia's invasion of Ukraine led to a shortage of gas in Europe, while several nuclear power reactors in countries such as France and Sweden were taken out of operation at times when the availability of wind and hydropower was insufficient. This, combined with closed production facilities in southern Sweden and Germany, led to unusually volatile electricity prices in Sweden and large differences in electricity price area 1 in northern Sweden and area 4 in southern Sweden.

Prices reached record levels several times during the year, and even northern Sweden was affected later in the year by unusually high prices. According to statistics from the Swedish Consumer Energy Markets Bureau, the average price in price area 4 (southern Sweden) was 162 Swedish öre in 2022, compared with 82 öre in 2021. In price area 1 (northern Sweden), the average price was 63 öre in 2022, compared with 43 öre in 2021.

The high electricity prices also affected Ellevio, whose costs for purchasing electricity to compensate for network losses increased by 27 percent to SEK 555 million in 2022. This led to us needing to bring forward a price increase for local network customers averaging SEK 10–25 per month for an apartment and

SEK 50–150 a month for a detached home. To limit the impact of price fluctuations, Ellevio has hedged 80 percent of its electricity purchases.

Two government electricity bill support packages for Swedish customers were launched during the year. The first package, in spring 2022, was paid to households by the network companies – including Ellevio – during the second quarter. The second was approved during the autumn and was paid to both households and companies by Försäkringskassan.

Funds for the second support package were taken from the 'bottleneck revenue' Svenska kraftnät received due to the large differences in electricity prices between electricity price areas. Bottleneck revenue occurs if the price of electricity is lower where that electricity is produced than in the area in which it is consumed. This often happens in Sweden as we have extensive electricity production in the north, a denser population in the south and insufficient transmission capacity in certain places. In these cases, the customer has to pay a higher price for the electricity than the producer charges for it. The difference between these two prices is known as bottleneck revenue and accrues to Svenska kraftnät if they are the company who transmitted the electricity.

Contents

About Ellevio	+
Market and drivers	–
Electricity network market	
> Market conditions	
Drivers and Ellevio's response	
Strategy	+
Employees	+
Customers	+
Investments and financing	+
Owners	+
Financial reports	+
Corporate governance	+
In-depth sustainability information	+

Market and drivers

To reduce the need for further price increases, Svenska kraftnät decided during the autumn to remove the fixed tariff paid by the network companies for August–December 2022 – as a way of compensating for high electricity prices.

Risk of manual disconnection

In autumn 2022, warnings were issued that the winter could lead to electricity being manually disconnected if there were times when demand for power exceeded supply. In such a scenario, Ellevio and the other network companies receive orders from Svenska kraftnät for temporary disconnection of certain power lines, and such orders can be placed with 15 minutes' warning in the most urgent cases. If manual disconnection is required, the order of priority is followed in accordance with

the Styrel model produced by the Swedish Energy Agency. At the end of March, the measure had not needed to be taken.

Swedes radically reduced their electricity consumption as a result of the high prices and broad information campaigns from both the energy sector and the media. For example, Ellevio's household customers reduced their electricity consumption by around 15 percent between September and December, adjusted for temperature differences. The change in consumption among industrial customers was limited.

Major need for investment and greater demand for electricity

While the past year has entailed high electricity prices and the need to reduce electricity consumption in the short term, the


fact remains that climate change requires increased electrification of society. Sweden's electricity consumption has remained largely constant since the 1980s, but within 20 years demand for electricity is predicted to be over twice as high as today.

The future also requires solutions that can support households and companies in the energy transition. It is therefore important for Ellevio to collaborate with customers and partners to electrify Sweden together.

The business community is the driver of this transition. Major technological transformations are under way in areas such as basic industry, the steel industry in northern Sweden and the transport sector. The direction of travel is clear. The energy transition is progressing, and the electricity system needs to be expanded and modernised.

Ellevio's view:

Congratulations on the new job, Ebba Busch – here are your top priorities:

 In October 2022, Ebba Busch became Sweden's new Minister for Energy, Business and Industry and thus responsible for an area at the heart of societal developments. The climate transition, new industrialization, urban and rural development – all of these areas depend on a reliable supply of electricity. These are not issues that can be disregarded. If they are, Sweden will grind to a halt. Literally.

The electricity system is complex and requires many parallel investments, but some aspects are more critical than others.

Given the changes in the climate policy priorities of the transport sector, such as the removal of climate bonuses, tax breaks for petrol and diesel and the minimising of the greenhouse gas reduction mandate, it is vital for the Government to clarify how efforts to electrify the transport sector and industry will be accelerated. We lay out our list of priorities for Ebba Busch here – along with part of our response to the budget proposal from autumn 2022.


- Shorten lead times for permit processes. These can currently take 10–12 years for electricity network investments that are already needed tomorrow. Implement proposals from existing inquiries and review how access to land can be accelerated. The funding for the Swedish Energy Markets Inspectorate to shorten permit processes for electricity grids included in the budget proposal is much needed.
- Help foster a broad understanding that more power lines are required and that they need to coexist with areas of natural value, defence interests and the interests of land owners.
- Review how the energy system is to be funded, not least in terms of how electricity taxes are designed. Customers' costs must be reasonable and predictable.
- Produce a long-term, stable and predictable regulatory model for investments in the electricity network. The network

companies must be given the conditions to deliver society's targets and infrastructure needs.

- Offer support to customers who want to reduce their electricity consumption. We welcome the budget proposal's contributions to enhance the energy efficiency of detached homes heated by direct electricity or gas and an eased tax burden for CHP.
- The budget proposal contains targeted investments for charging infrastructure, including via the Climate Leap and Industrial Leap projects. Particularly important investments in this area include charging infrastructure for heavy goods vehicles, improved accessibility of charging points and greater charging capacity nationwide.

A holistic and long-term approach is the basis of the way forward. Good luck!

Contents


About Ellevio 


Market and drivers 


Electricity network market


> Market conditions


Drivers and Ellevio's response

Strategy 


Employees 


Customers 

Investments and financing 

Owners 

Financial reports 

Corporate governance 

In-depth sustainability information 

Ensuring the success of the transition to an electrified, fossil-free society thus requires major investments. Sweden currently has an ageing electricity network. Major parts of it have reached their technical service life and need replacing. Moreover, the transition requires a smart and more flexible electricity system, which is why network companies are making the largest investments in the electricity network since the 1960s and '70s.

In March 2022, Ellevio presented the report "Vad kostar framtiden?" (What will the future cost?), which laid out the investment requirements for new network infrastructure to enable twice as much electricity consumption in the next 20 years. The previous forecast of SEK 500 billion in electricity network investments was adjusted upwards to SEK 670 billion by 2045.

For this reason, Ellevio is working to ensure that Sweden's network companies have a stable network regulation that creates the conditions to make the necessary major investments, and which also promotes incentives for flexibility solutions.

Ellevio has a balanced investment programme focusing on sustainability, reliability and digitalisation. We have invested approx. SEK 16.6 billion between 2018 and 2022.

Long investment horizon

Network operations require a very long planning horizon, as we are responsible for infrastructure that needs to deliver for many decades to come. At the same time, network companies require extensive access to capital and need to take long-term responsibility. This places strict long-term planning demands on us, our owners – and not least the network regulation that sets the framework for the market.

Lengthy permit processes remain an obstacle

Time-consuming permit processes are slowing down the requisite investments in the electricity network. Lead times from decision to implemented project can be as long as ten years.

Already in August 2021, a new law took effect with the aim of shortening lead times for expanding the electricity network. Several important measures remain, however, and the budget from the newly-appointed Government in 2022 proposed further investments to shorten lead times.

Political initiatives and lobbying

Together with the sector, Ellevio pursues efforts to explain the importance of a long-term and predictable revenue regulation and appropriate conditions for the electricity network market. Several political initiatives and collaborations within the sector are also under way, both at an EU and a national level, to establish the framework for the future electricity market.

In early 2022, the then-government presented a national electrification strategy that aims to contribute to a rapid, smart and socioeconomically efficient process of electrification. The strategy was drawn up in collaboration with business, authorities and other operators in society and includes 67 measures for the period 2022–2024. In early 2023, it was unclear how the Government that took office in September 2022 views these measures. During the autumn, the new Government presented a number of new measures to support the electricity market, including measures to shorten permit processes, electricity bill support for households and businesses, tax breaks for CHP (combined heat and power) and investment support for greater energy efficiency of houses heated by electricity or gas.

Clean Energy Package to reduce fossil-fuel dependency

The EU's Clean Energy Package was processed in Sweden in 2022 and aims to make the EU a leader in the global transition to clean energy. The package contains reforms in areas such as energy security, the EU's internal energy market, energy efficiency, financial dependency on fossil fuels and grants for research and innovation.

For network companies, the Clean Energy Package entails adopting a partially new role – from being a network manager to being a system operator. Among other things, this means that there must be clear development plans for the electricity grids in various areas and that there will be significantly stricter connection requirements for owners of electricity grids at all voltage levels – be it the national grid, regional grids or local grids.

In Sweden, legislation has been adjusted to comply with the EU directive. The changes took effect on 1 July 2022 with a transition period in place until 31 December 2023, and Ellevio is adapting its operations accordingly.

Ellevio takes active steps to monitor and attempt to influence how the legislative proposals to be implemented in Sweden are formulated. We publish regular news items about this at www.ellevio.se/en/about-ellevio/newsroom/.

Heightened preparedness and sector collaboration

Protective security and preparedness were particularly high-priorities on the electricity market 2022. The geopolitical situation has deteriorated due to the war in Ukraine, which has entailed attacks targeting energy infrastructure. Ellevio has taken measures to enhance its ability to withstand antagonistic influence by collaborating with the energy sector and the public authorities. In 2022, cyber attacks have been averted with the help of security systems and an increased security competence of our staff.



Ellevio's view:

For network companies, the EU's Clean Energy Package entails adopting a partially new role – from being a network manager to becoming a system operator. Ellevio considers it highly important for the national revenue regulation to adapt to this changing role.

- About Ellevio ⊕
- Market and drivers** ⊖
- Electricity network market
- > Market conditions
- Drivers and Ellevio's response
- Strategy ⊕
- Employees ⊕
- Customers ⊕
- Investments and financing ⊕
- Owners ⊕
- Financial reports ⊕
- Corporate governance ⊕
- In-depth sustainability information ⊕



Presenting Sweden's longest and heaviest road transport

During the spring and summer, Ellevio's largest transformer to date was driven across Sweden. The transport convoy was a record size, and crowds built up along the way as many onlookers wanted to see the spectacular piece of equipment.

The huge transformer has a capacity of 850 MVA and will play a key role in what will become Sweden's largest cluster of wind farms south of Ånge. When fully developed, the cluster will be able to generate up to 1,500 MW of electricity – roughly the same as Stockholm's annual consumption, or 1–2 nuclear reactors – and the transformer will convert energy from the wind turbines into voltage that can be transmitted to the electricity grids.

This transformer, which alone weighs roughly the same as 80 elephants, will thus play a decisive role in achieving the requisite electricity production as Sweden transitions and electrifies areas such as industry and the transport sector.

The journey across the country entailed multiple challenges. Sweden's roads are not adapted for weights, lengths and sizes of this magnitude, meaning sections all along the route required reinforcement, widening or lowering. There were also five bridge crossings, with each crossing requiring extra axles to be fitted to the trailer, before being removed again once the bridge had been crossed.

Facts about the transport

- Transformer weight (during transportation): 390 tonnes
- Transformer weight (when installed): approx. 420 tonnes
- Length of transport convoy: approx. 110 metres, depending on assistance vehicles
- Total weight of transport: 750 tonnes
- No. of wheels: 256
- Speed of the convoy: between 5 and 15 km per hour

Contents

About Ellevio	+
Market and drivers	+
Strategy	+
Employees	+
Customers	+
Investments and financing	+
Owners	+
Financial reports	+
Corporate governance	+
In-depth sustainability information	+

Drivers – Sweden’s electricity system undergoing fundamental change

Over the past few years, entirely new conditions have emerged in Sweden’s electricity system. New types of power, new technology, large-scale electrification, capacity shortages and the climate crisis are just a few examples of drivers leading to a fundamental change in Sweden’s electricity system.

Drivers

Electrification of industries and transport

The climate crisis has started an industrial revolution in Sweden, and the solution is electrification. By 2045, electricity consumption is expected to increase from 145 TWh today to well over 300 TWh.

Industries and transport need to be electrified to ensure Sweden achieves its climate targets – but also to maintain its competitiveness. This means that the need for electricity will increase dramatically, which in turn requires the electricity system to be modernised and expanded.

The transition to an electrified transport sector is moving rapidly and many major vehicle manufacturers have ambitious targets. This trend is needed; the climate and environmental effects of an electric vehicle fleet will be huge.

In addition to reducing CO₂ emissions, the local environment will also be affected through better air quality and less traffic noise. However, for the transition to work, rapid and extensive expansion of charging points are needed, both for private vehicles and heavy, commercial traffic. Developments within the transport sector are moving incredibly fast and if the expansion of charging points falls behind then obstacles may risk hindering progress.

Rapid developments towards electrified processes are also under way within industry. Thanks to technological breakthroughs, Swedish industry is now heading for a comprehensive transition that could have huge positive effects on the emission of greenhouse gases. This kind of breakthrough is expected in the steel industry, with the aim of entirely fossil-free manufacturing by 2045. If it succeeds, emissions will be reduced while electricity consumption will increase sharply. Similar breakthroughs are underway in other sectors. Industry is simultaneously becoming increasingly efficient, which could also help curb the increase in electricity consumption.

New energy mix

The Swedish energy system is built to manage predictable electricity production from a limited number of large facilities based on hydropower, nuclear power and CHP. However, the reality looks somewhat different now.

Four out of ten Swedish nuclear power have been decommissioned since 2017. Nuclear power currently accounts for around 30 percent of Swedish energy production, and the six reactors currently in operation are expected to be in use for another 20 years or so. It will not be possible to expand one



An increasing number of households are producing and selling electricity via solar panels.

single type of power sufficiently to meet the rising level of electricity consumption alone. The Government which took office in 2022 has a more positive view of nuclear power than the previous one, but it takes time to make new reactors operational and the future of nuclear power in Sweden remains uncertain. Small-scale modular reactors are increasingly seen as a complement to more traditional, larger nuclear power plants.

At the same time, more and more electricity is being supplied from renewable energy sources: wind, first and foremost, but also solar power. Wind power has been expanded at a rapid pace in recent years, with growth mainly taking place on land but major investments also being made in offshore wind. The supply of these types of power varies greatly with the season and weather, which limits the possibility of controlling production.

About Ellevio	+
Market and drivers	–
Electricity network market	
Market conditions	
> Drivers and Ellevio’s response	
Strategy	+
Employees	+
Customers	+
Investments and financing	+
Owners	+
Financial reports	+
Corporate governance	+
In-depth sustainability information	+

Market and drivers

The electricity system must now be able to manage an irregular inflow, with rapid and sharp fluctuations in electricity production.

More “prosumers”

More and more consumers are producing and selling their own electricity by connecting solar panels to the network and transferring their surplus electricity. They are often referred to as “prosumers”. In late 2022, Ellevio had 19,000 customers who were micro-producers of solar electricity – an increase of 61 percent compared with the previous year. On specific days and at specific times, the network therefore needs to receive locally produced surplus electricity, while on other days it needs to distribute electricity from power stations far away. Greater flexibility is needed in the electricity system.

Use surpluses effectively

Managing surpluses is a key factor of the electricity system of the future. When more electricity is produced than is used, solutions are needed to take advantage of the surplus. These could include transferring the electricity to other parts of the country, exporting it or storing it. The technological development is fast, but the solutions are still young and often untested.



Expanded capacity and flexible consumption

At other times, the demand for electricity will be greater than the capacity of the networks can deliver. To manage this, more local production, more investment in national, regional and local grids and innovative, digital solutions for how the electricity system can be managed in a smarter way are all needed. Flexible consumption also needs to increase by giving consumers incentives and tools to consume electricity in a flexible way, thus reducing the maximum load on the grid.

Greater network capacity needed

A challenge facing the electricity system is that more and more people are living in cities. There is a lack of capacity in both Stockholm and other cities, which is mainly due to a lack of transmission capacity on the national network (owned by state-run Svenska kraftnät). The problems will increase on regional and local grids too, however, if the necessary investments are not made soon. Urban planning has long taken the electricity supply for granted without considering the need for expanding the electricity network. This risks threatening both growth and the climate transition.

Industrial establishments also require extensive investments in network capacity. One example is AB Volvo’s investment in a battery-cell factory in Mariestad presented in 2022. Battery production on that scale requires an enormous amount of network capacity, and Ellevio, which is responsible for supplying that electricity, is therefore facing major investments.

Cyber security risks – heightened preparedness

One of the most important aspects of the electricity network of the future is cyber security. Smarter electricity networks enable us to supply electricity in a more secure way, but this also entails new risks that need managing. Smart components can be attacked by individuals, organisations or foreign powers who want to damage networks. Just like banks, teleoperators and suppliers of critical functions, we at Ellevio work to maximise the opportunities afforded by digitalisation while minimising the risks for society, the electricity network and our customers.

Ellevio’s response

Extensive investments are therefore needed to meet the demands of tomorrow. Ellevio is working broadly to create the climate-smart electricity system of the future through:

- Major investment projects to modernise, digitalise, weather-proof and expand the electricity network and enable the connection of new fossil-free sources of production. See pages 34–37 for more.
- Installation of the second generation of smart electricity meters for all customers, see pages 31 and 90.
- Digitalisation through projects such as Vision 2030. See pages 20 and 86.
- Lobbying to create long-term and predictable market conditions, See pages 16, 22, 82 and 88.
- Investment in solutions to use electricity effectively and tackle the imbalance between supply and demand for electricity. In 2022, the business area Ellevio Energy Solutions AB (a subsidiary of Ellevio Holding 1 AB) was launched to develop these types of services alongside the regulated network operations. See page 33.
- Extensive investments to strengthen and increase capacity on the regional electricity grid in Stockholm, including the new 400 kV power line between Beckomberga and Bredäng, as well as the redevelopment of the switchgears in Värtan/Hjorthagen and Skanstull. See pages 35 and 37.
- Sector initiatives to increase flexibility, for example via the sthlmflex market place. See page 31.
- Development of digital services for energy efficiency and steering. See pages 30–31.
- Collaborations on expanded charging infrastructure, for example via the Electrification Pact See pages 31, 39 and 113.
- Promotion of new innovations through the Startup 4 Climate competition. See page 88.
- Major investments in cyber security and collaborations with public authorities and other operator. See page 86.

Contents

About Ellevio	+
Market and drivers	+
Electricity network market	
Market conditions	
> Drivers and Ellevio’s response	
Strategy	+
Employees	+
Customers	+
Investments and financing	+
Owners	+
Financial reports	+
Corporate governance	+
In-depth sustainability information	+