

SVENSKA KRAFTNÄT'S STRATEGY FOR 2030

# Working together to accelerate electrification



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## Our mission

Svenska kraftnät is a system responsible authority, tasked with commercially managing, operating and developing a cost effective, reliable and environmentally sound power transmission system. This includes 400 kV and 220 kV power lines with substations and interconnectors.

Svenska kraftnät is responsible for developing the transmission grid and the electricity market so as to meet society's need for a secure, sustainable and economic electricity supply. This means that Svenska kraftnät also plays a key role in climate policy.

# For a sustainable and secure Sweden

A secure and well functioning energy and electricity supply is a basic requirement for any welfare society or industrial nation. It must be possible to supply electricity 24 hours a day, all year round, in both normal conditions and in periods of crisis. This is widely understood by those of us in the energy sector, but it may not be something that the general public gives much thought to.

But this has changed. In recent years, energy issues have come into focus in a way that few anticipated. Climate change, decarbonisation, the electrification of existing and new industry, the need for new electricity generation and increased grid capacity are issues that have been, and still are, high on the agenda. To that can be added the deteriorating security situation and an increased need to protect critical infrastructure.

Svenska kraftnät is central to this development, as we must ensure a reliable and safe electricity supply, while also ensuring that the necessary expansion of the transmission grid occurs at a pace and cost that does not hinder progress.

Our mission can be briefly summarised as follows:

The transmission grid must be swiftly modernised, upgraded and reinforced to support widespread electrification. At the same time, it must meet growing requirements for

environmental sustainability, resilience, and cost-efficiency.

The power system's security of supply must be consistently maintained at a high level throughout the year, despite a growing proportion of weather-dependent generation and a greater dependence on imports.

The growing reliance on operationally critical IT systems and European electricity market solutions driven by increased regulation must be designed to ensure that the security of the power system is not compromised. Data management, digitalisation and the increasing reliance on IT must evolve in a secure and resilient manner.

This strategy outlines how we will meet this challenge. The strategy is based on energy and climate policy goals and our mission from the government. It addresses the impact of external factors on our mission and how we integrate these considerations into our operations. In certain areas, we have identified the need for focused development, which we refer to as key transition areas. These key transition areas are not confined to specific departments or divisions within Svenska kraftnät, but require close collaboration across the organisation and with external stakeholders.

This strategy serves as a roadmap for our operational focus in the coming years. It is intended not only for Svenska kraftnät's employees and Board of Directors but also for all stakeholders invested in the development of this crucial area for Sweden. By sharing our strategy publicly we aim to foster dialogue and deepen understanding of our perspectives, while emphasising the importance of collaboration - on both macro and micro levels.

Together we accelerate electrification.



**Per Eckemark**

Director General, Svenska kraftnät



# A power system in transition

**Developments in society are more dynamic and complex than ever. Digitalisation, market evolution and technological innovation are driving development. At the same time the effects of climate change are becoming increasingly dramatic and the pressure to phase out fossil fuels to reduce CO<sub>2</sub> emissions is intensifying. The energy transition is central to addressing the climate challenge and Svenska kraftnät, together with other stakeholders in the sector, is playing a crucial role in meeting climate targets.**

## **A deteriorating security situation presents new demands**

The global and regional security landscape has grown more uncertain, increasing the need for better security and civil preparedness. A reliable electricity supply is essential for society to function, making it a potential target for adversaries. In response, authorities and businesses are working together to strengthen civil defence. For the power system, this means adapting to withstand severe disruption, potentially including war. The electricity supply must be fortified to handle and recover from attacks on both infrastructure and IT systems.

## **The energy transition is driving increased electricity demand**

An increase in electrification is the primary measure for phasing out fossil fuels, especially for sectors with major climate emissions such as industry and transport. This applies both in Sweden and globally. To reduce fossil dependence, a lot of fossil free electricity is required, forecasts point to a doubling of Swedish electricity consumption by 2045. The transition creates new opportunities for business and industry, but also poses major challenges, not least for the power system.

## **Supply is not keeping pace with market demand**

Low electricity prices and secure electricity supply are an important part of Sweden's competitiveness and are in high demand from both industry and citizens. While industrial transition is rapid, plans are not always in step with the long lead times that the expansion of the electricity grid and new generation facilities require. Despite an increased understanding of the need for reliable and adequate infrastructure in the form of the electricity grid, conflicts arise between local environmental considerations and global climate goals. In order to satisfy needs and not hinder development, the pace of expansion needs to increase, lead times need to be shortened and permit processes need to be simplified.

## **New generation is required to meet demand**

Increased electricity consumption requires more generation. In the right location. Despite the addition of large quantities of solar and wind generation to the European electricity market in recent years, the ability to satisfy the demand for power at any given time is challenging. Several countries, including Sweden, are becoming increasingly dependent on imports. A greater share of renewable, weather-dependent energy in

the energy mix challenges the reliability of the power system and increases the need for additional market and technical solutions. This can take the form of rotational energy and reactive power for example.

### **Flexibility and sector integration are important tools**

Different types of flexibility and storage solutions are becoming increasingly important in securing the supply of electricity, with technology advancing at a swift pace. Fossil free hydrogen is expected to play an important role in the future European energy system. There are ambitious plans to expand the hydrogen grid in Sweden and in the rest of Europe. In Sweden, discussions are ongoing as to how industry is to access fossil free hydrogen, and on the importance of increased joint planning of the energy system, not least to ensure flexibility and the optimal utilisation of resources.

### **EU governance and regulation of the energy sector is intensifying**

For several years now, the EU's governance and regulation of the energy sector has been increasing. The regulatory intensity and rate of change are accelerating with the EU's increased level of ambition in the energy field. The member states have successively strengthened the European energy market through common regulations and objectives. As the system responsible authority and transmission grid owner, we are very much affected by the directives and regulations that

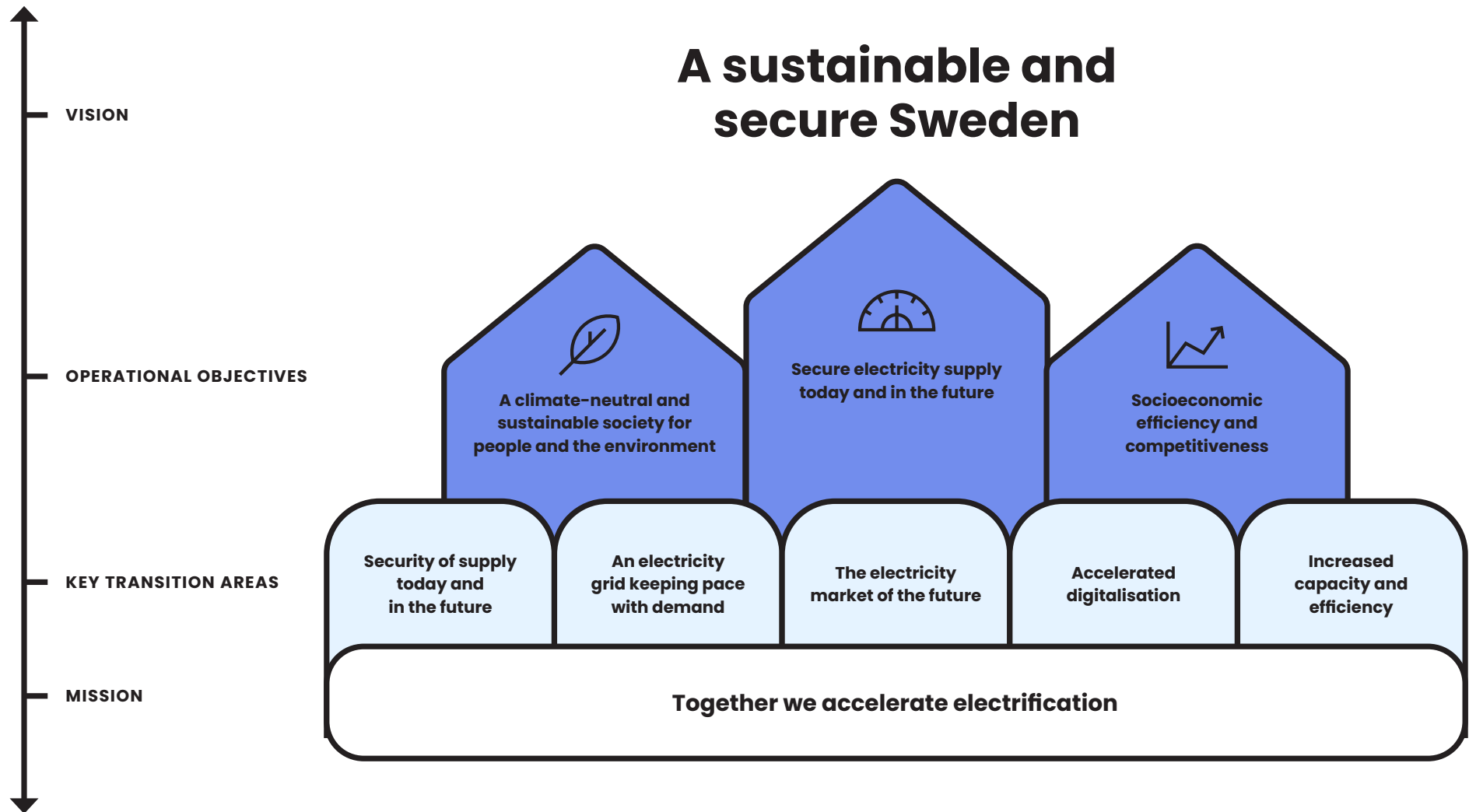
apply to all European transmission grid owners, including the introduction of new methods. Other regulations, for example in the environmental field, also have a major impact on the electricity system and our mission.

### **Digitalisation and data exchange create opportunities but also risks**

The digitalisation of society and specifically the energy sector continues apace. A growing number of tasks and operations are automated, and in line with this the demand for correct and quality-assured input data is increasing. In an ever more fast-paced world, increased digitalisation creates new opportunities. IT solutions are often complex. In order to develop systems that are resilient, secure and scalable, a high degree of competency is required and well-proven techniques must be used. In addition, the requirements for transparency and the exchange of data between transmission system operators, other project stakeholders and citizens are becoming increasingly important.



# Strategy





An aerial night photograph of a city, likely Stockholm, Sweden. The image shows a large bridge spanning a body of water, with city lights reflecting on the water's surface. In the foreground, there are modern buildings with illuminated windows. The overall scene is a vibrant urban landscape at night.

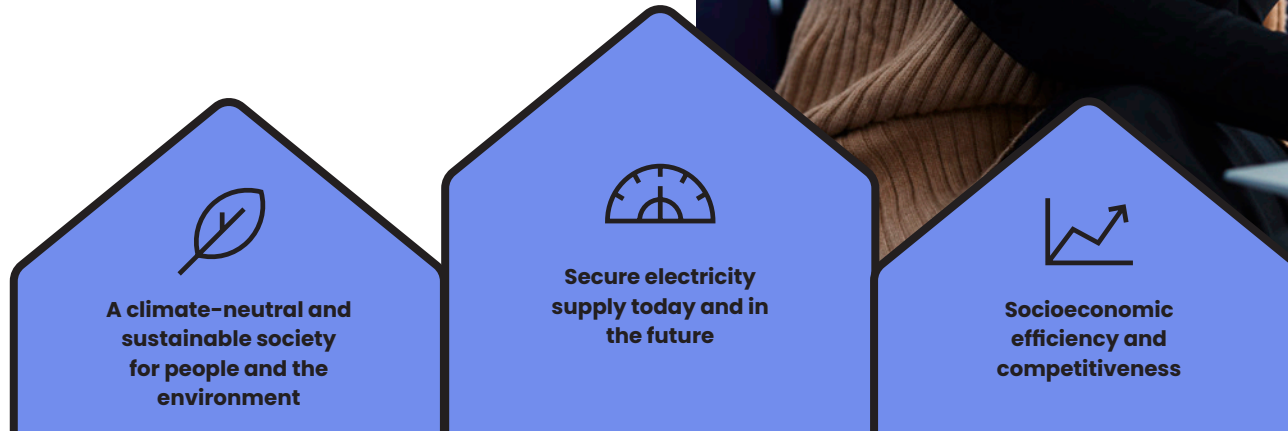
○ Vision

# A sustainable and secure Sweden



## Operational objectives

The social benefit that Svenska kraftnät's mission contributes is based on the foundations of energy policy, and our activities aim to help achieve energy and climate policy objectives. Both energy cooperation within the EU and Swedish energy policy are based on the same three keystones: to reconcile security of supply, competitiveness and sustainability. One of Sweden's goals is that by 2045 we will have no net greenhouse gas emissions, and that we will then achieve negative emissions. Our essential sustainability considerations are integrated into the strategy and contribute to the global sustainable development objectives of Agenda 2030.







## Secure electricity supply today and in the future

A secure electricity supply means that the general public, industry and other sectors have access to the electricity they require, without power outages or other disruption that could threaten socially important functions or the population's everyday lives. This must be managed for both current consumption and for a future scenario with a sharp increase in electricity consumption. A secure electricity supply also means that Svenska kraftnät, together with electricity supply project promoters, have the ability to supply electricity even in the event of a crisis and heightened civil preparedness, so that society continues to function and total defence can be maintained.



## Socioeconomic efficiency and competitiveness

Socioeconomic efficiency means that all our investments and activities must be based on a socioeconomic analysis where the effects of an action are clear and opposing interests are weighed against each other. Competitive electricity supply means that it must contribute to society's welfare, employment and growth. The electricity market must be open to project promoters competing on equal terms, and prices are to be governed by supply and demand for the benefit of electricity customers. An open and transparent electricity market contributes to increased competitiveness both in Sweden and in the rest of Europe.



## A climate-neutral and sustainable society for people and the environment

A climate-neutral and ecologically sustainable society means using resources in a way that allows the needs of future generations to be met. Electrification is an important part of the solution to the climate issue, and, through its mission, Svenska kraftnät contributes to the transition of the energy system and the path to climate neutrality. The goal is to contribute to a sustainable society for people and the environment, indirectly through our mission, and directly by undertaking our operations and investment in a sustainable manner, as well as taking account of our impact on health and the environment.

The development of the electricity grid and other infrastructure may involve clashes of objectives. Our mission is always to strive for the greatest possible benefit for society from a national, Nordic and European perspective. This must occur through the responsible balancing of the three dimensions - security of supply, competitiveness and ecological sustainability.

## ○ Key transition areas

In order to fulfil our mission and achieve our long-term goals, we need to focus on a number of key areas where great leaps of development are needed. We call these key transition areas. This is an area where we need to reinforce and develop our capabilities and delivery. Our strategy and strategic direction toward 2030 are founded on these key areas for change. They provide our employees, project promoters and stakeholders with a clear understanding of our priorities and how we will address future challenges.

**Security of supply  
today and in  
the future**

**An electricity  
grid keeping pace  
with demand**

**The electricity  
market of  
the future**

**Accelerated  
digitalisation**

**Increased  
capacity and  
efficiency**





# ○ Security of supply today and in the future

To achieve the transition to a fossil free energy system, the use of electricity will increase radically. A large proportion of this increased consumption is expected to come from the electrification of industrial processes. Other examples of new, large consumers are data centres and battery factories.

Electricity generation and consumption occur in more and new geographical areas, resulting in changing power flows in the grid. In addition, we are moving towards an energy system with an increased amount of weather-dependent electricity generation from wind and solar. This new electricity generation is increasingly connected at lower voltage levels, which means further changes to system requirements. Together with an exposed international security situation in which there is an increased requirement for security and civil preparedness, these changes will lead to new challenges for the power system.

In order to maintain a good security of supply today and in the future, Svenska kraftnät must:

## **Develop our supply capacity in all operating states – from normal to restoration**

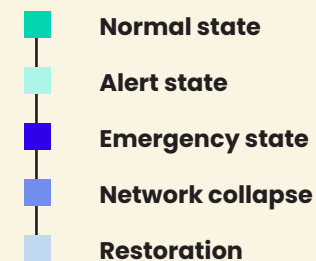
We shall increase our ability to return to normal operation as quickly as possible in situations where we have failed to maintain the desired frequency, voltage and power flows. We must develop our analytical abilities in both the short and the long-terms. We need to increase our long-term, forward-looking work, more tools for monitoring and control, better support for follow-up and forecasting, increased data collection and clear requirements for affiliated parties.

## **Take advantage of new opportunities and strengthen our collaboration in Sweden, the Nordic region and Europe to jointly create the energy system of the future**

We will take a leading role in the national planning of the electricity system. We will increase awareness of where generation, resources for flexibility and consumption should be connected. Together with others, we will develop joint system plans at a regional, national, Nordic and European level, and produce qualitative data that will help investors and decision makers make the right



## System states



System states define the status of the system by indicating where the system is in relation to set operational safety limits. They simplify communication and provide clarity on the actions needed to return the system to the normal state.

decisions. We see the need for more coordinated energy planning in which we have a natural role in the joint planning of electricity and hydrogen infrastructure. We will also take a more active role in European cooperation so as to contribute to the development of regulations, methods and objectives.

**Reinforce the security and civil preparedness of our organisation and that of the electricity supply**

The increased threat to Sweden and its energy supply means that security, resilience, redundancy and restoration capacity are becoming increasingly important. We will reinforce capacity by applying the correct design and scaling to the power system, operations, markets and supply chains, as well as through proactive regulation in the areas of security and civil preparedness. We must continue to develop and strengthen cybersecurity in order to meet the new risks and vulnerabilities inherent in digitalisation.

**Ensure that facilities have a high degree of availability performance through efficient administration**

We shall take a life cycle perspective in the management of our electricity grid to ensure that it is continuously maintained, renewed, revised and reinforced. We will work to ensure that grid outages are as short as possible. We will achieve this using new working methods and technical advances that will minimise impact on electricity

producers and consumers. We will reduce the number of unplanned outages by systematically working with nonconformance management, risk-based maintenance and innovative monitoring solutions.





# ○ An electricity grid keeping pace with demand



The extensive electrification and increasing consumption of electricity in the coming years require significant new investment in the electricity grid. At the same time, large parts of the existing grid need to be renewed and reinforced. The rate of expansion is historically high. Svenska kraftnät is planning to build 7,000 kilometres of high voltage line over the next 20 years.

The lead times for this type of investment are long. In addition to extensive and time-consuming permit processes, there is a major risk of bottlenecks both in terms of access to personnel and to materials. This is because regional and local grid owners also have extensive expansion plans. A corresponding expansion of the electricity grid is also taking place throughout Europe. Efficient supply chains and partnerships are therefore becoming increasingly important. Additional challenges include licensing legislation, conflicts of interest and changing requirements from society and the general public. These all affect the rate of expansion in different ways.

Svenska kraftnät aims to halve the lead time for expansion projects and to achieve this, Svenska kraftnät will:

## **Lead and coordinate project promoters in order to meet demand through the rapid and efficient expansion of the transmission grid**

Svenska kraftnät will take a leading role in coordinating societal actors and stakeholders to shorten lead times. Through proactive communication with regions, municipalities, generators and large consumers, we will develop partnerships, increase our local knowledge and create the conditions to keep pace with demand. Proactive grid planning, exploiting synergies between different energy carriers such as electricity and hydrogen, and confidence-building collaboration and dialogue with other stakeholders and citizens are some of the tools we will use.

## **Utilise standardisation, technological development and proactive environmental work to achieve efficient, sustainable expansion and better grid utilisation**

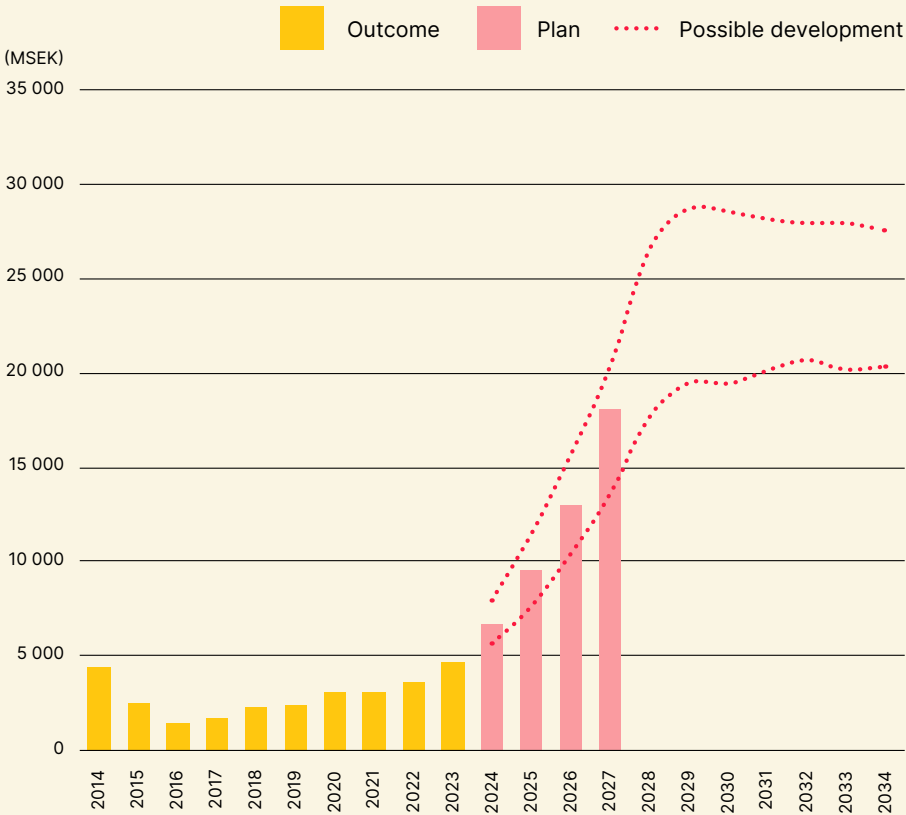
We will develop and use technology, market solutions and innovative contractual forms for a more efficient use of existing and future grid expansion. This gives us a broader toolbox with which to address capacity-related problems and provides

us with alternatives to line reinforcement. We will use established standards and supplier technology to build our grid as efficiently as possible. We will work to reduce the negative climate and environmental impact of our expansion projects, to increase biodiversity and will use environmentally friendly, safe and sustainable raw materials and resources.

**Develop business models and partnerships to increase the capacity of the supply chain**

We will develop new working methods for structuring, procuring and implementing our construction projects. We will promote healthy competition, work with responsible suppliers, and promote good supplier partnerships. We will increase our attractiveness as a customer through strategic partnerships and improved business models.

# Grid investment plan – outcome and assessement of future development





# ○ The electricity market of the future

The electricity sector plays a central role in the transition of society in order to achieve climate goals. To accelerate this transition, electricity markets need to evolve, and as the power system changes, the design of the market also needs to change. Future electricity markets must:

- Provide long-term signals to ensure the necessary investment in carbon-free generation, flexibility resources and grid development.
- Ensure the efficient use of generation and consumption resources and stimulate flexibility throughout the energy system.
- Support the operation of a stable and reliable electricity system by providing market participants with incentives consistent with the capacity of the physical grid and overall system requirements.
- Provide sustainable electricity to customers at competitive prices through well-designed contracts and supply offers.

Svenska kraftnät alone cannot address all of the necessary components of a well-functioning electricity market, but we have an important and unique role to play.



The future power system will have major elements of weather-dependent electricity generation. These will require a great deal of flexibility in order to manage variations in both production and consumption. The need for flexibility is not new, but changes in the power system will change the requirements related to the type and volume of the flexibility needed.

To create the electricity market of the future, Svenska kraftnät must:

**Develop market design for the optimal use of the power system's resources**

We will bolster our ability to anticipate and develop the markets of the future. Well-integrated markets in the Nordic region and Europe are becoming increasingly important for the efficient use of sub-markets and power system resources. For the efficient management of transmission constraints, we will introduce a new calculation method for cross-zonal capacity (flow-based). We will continuously review the Swedish and Nordic bidding areas and analyse further measures to increase transmission capacity. Tariff structure and connection terms are to be improved to allow the efficient use of the grid and to provide proper incentives to generators and consumers.

**Strengthen long-term investment signals for adequacy and flexibility**

We will contribute to creating long-term investment signals and ensuring the efficient use of

production and consumption resources using various forms of incentive such as capacity mechanisms and financial instruments. We see a need for new market solutions, and will clearly communicate the market solutions required to promote investment in production, flexible utilisation and energy storage.

**Create new incentives for the system capacity required in a more volatile energy system**

We will develop existing and new support services and other remedial measures that the system needs to maintain a stable and reliable electricity system. Requirements and new incentives for project promoters, will ensure the availability of the necessary capacity in the power system. We will implement the transition to a 15 minute trading and settlement period to create better opportunities for project promoters to trade in balance and for us to balance the system.



**Electricity market**

Physical trading in electricity takes place on the day-ahead, intraday and balance market. During the operating hour, Svenska kraftnät is responsible for balancing and purchasing support services as needed on the balancing market.



# ○ Accelerated digitalisation

The digitalisation of society and specifically the energy sector continues apace. In an ever faster and more complex world, increasing digitalisation creates new opportunities for informed, data-driven decisions and efficient processes. Increased digitalisation and automation are also crucial to ensuring security of supply in an energy and power system with smaller margins.

A growing number of tasks and operations are automated, and in line with this the demand for correct and quality-assured input data is increasing. By sharing data nationally, within the Nordic region and at a European level, we will create new opportunities. However, this also involves risk, not least security-related. Vulnerability to external threats also increases as ever more IT systems become operationally critical. Automated processes are necessary for managing the needs of a power system in transition, and digital innovation capability is critical to meet tomorrow's challenges. The requirements on our digital support and collaboration tools are increasing to enable effective working methods and internal and external collaboration.

In order to accelerate our digitalisation, Svenska kraftnät will:

## **Build resilience and integration to increase the capacity of the electricity system through digitalisation and automation**

We will promote digitalisation and innovation, and collaborate with others to help create new national, Nordic and European industry solutions. We will increase digitalisation and automation in our control room in order to boost our ability to control and monitor the power system. Our facilities will be digitised so that we can more easily monitor and optimise available capacity. We will modernise and standardise our communication systems. In order to meet the growing threat landscape, we shall ensure continuity and the availability of our own critical IT solutions.







**Secure reliable and easily accessible data to support decision making and create new opportunities for ourselves and others**

Data is essential to our business. We will manage data as a strategic resource and take advantage of the value that this information creates. We shall meet the need for analysis and the requirement to share information in a transparent way with stakeholders and other transmission grid owners. We will create effective support for decision making by using AI and automation to manage processes that require ever faster responses. In partnership with other actors in the industry, we will promote increased digitalisation, innovation and data sharing, and contribute to the creation of new services and products for the market.

**Develop our potential in the digitalisation and utilisation of modern digital technology to streamline processes and approaches**

We will strengthen and develop our digitalisation capabilities and pursue digital innovation in a structured manner. We will do this by increasing our skills and working in new ways. We will also increase our efficiency and bolster our internal and external partnerships by using the appropriate digital support and collaboration tools. We will create a flexible and digital work environment, and meet the increased demands and expectations of our employees for a modern, digital workplace.



# ○ Increased capacity and efficiency

In order to cope with the energy transition, we need to increase our ability to innovate and to find new solutions, approaches and partnerships. This must be undertaken with a scope and a rapidity that far exceeds anything we have experienced before. To meet increasing demands, we need to continue to do what we have always done, but more efficiently and using new working methods and tools.

Our competent and committed employees are our most important resource. They are the basis for our meeting society's expectations. We are in a period of strong growth and the energy sector's skills supply is a challenge, both for Svenska kraftnät and for the sector in general. Labour market mobility is at a high level, and the competition for employees, contractors, and consultants is intense. The high recruitment rate reflects an organisation in transition, with many new colleagues joining as we tackle increasingly complex tasks. At the same time, we must ensure our work is conducted sustainably. As the pace of change accelerates and complexity grows, the risk of accidents and other work environment issues increases, both directly within our organisation and indirectly among our partners. A good working environment is and should remain our top priority.

To meet our future challenges, Svenska kraftnät must:

## **Grow our implementation capacity and efficiency in order to effectively address future challenges**

To keep pace with rapid changes in society, we must boost our efficiency and strengthen our ability to deliver results. Objectives, strategy and areas of focus must be clear and understood so that all employees can contribute to the desired outcomes. We must plan and make decisions more effectively, and be able to adapt quickly when we are faced with new or changing conditions. We must refine our risk management strategy so that we can better weigh risks against each other when determining what action to take. We must address complex tasks by cooperation across organisations, and by implementing a high degree of innovation and continuous development.



**Cultivate our skills supply to cope with growth**

To ensure that we have the right skills and to manage growth, we must continue to cultivate our skills supply. We will strengthen our brand, enhance our appeal as an employer, and encourage more individuals to pursue training and careers in the energy sector. We aim to provide a workplace where our employees find satisfaction in their work, feel engaged, and have the opportunity to grow through meaningful and inspiring tasks. Our culture should be defined by trust, exemplary leadership, and a shared sense of employee engagement, based on the basic values of central government authorities.

**Safeguard a sustainable and safe work environment for ourselves and our partners**

Our workplace must be sustainable and enable a good work-life balance for all employees. We remain committed to prioritising safety and work environment initiatives, fostering a workplace that supports the physical, mental, and social well-being of every individual. Vision zero is and will remain our guiding principle.





# Summary

## Security of supply today and in the future

- Develop our supply capacity in all operating states - from normal to restoration
- Take advantage of new opportunities and strengthen our collaboration in Sweden, the Nordic region and Europe to jointly create the energy system of the future
- Reinforce the security and civil preparedness of our organisation and that of the electricity supply system
- Ensure that facilities have a high degree of availability performance through efficient administration

## An electricity grid keeping pace with demand

- Lead and coordinate project promoters in order to meet demand through the rapid and efficient expansion of the transmission grid
- Use standardisation, technological development and proactive environmental work to achieve efficient, sustainable expansion and better grid utilisation
- Develop business models and partnerships to increase the capacity of the supply chain

## The electricity market of the future

- Develop a market design for the optimal use of the power system's resources
- Strengthen long-term investment signals for adequacy and flexibility
- Create new incentives for the system capacity required in a more volatile energy system

## Accelerated digitalisation

- Build resilience and integration so as to increase the capacity of the electricity system through digitalisation and automation
- Secure reliable and easily accessible data to support decision making and create new opportunities for ourselves and others
- Develop our potential in the digitalisation and utilisation of modern digital technology to streamline processes and approaches

## Increased capacity and efficiency

- Cultivate our skills supply to cope with growth
- Grow our implementation capacity and efficiency in order to effectively address future challenges
- Safeguard a sustainable and safe work environment for ourselves and our partners

