Statnett

System Development Plan

2025

The world is changing rapidly. As the transformation of the Norwegian and European power systems continues at a high pace, we face increasing uncertainty around us. There is a serious security situation globally, and war in Europe.

This has accelerated Europe's transition to emission-free energy solutions, to ensure energy self-sufficiency and strengthen competitiveness. In a more unstable world, it is even more important that the power system is resilient and prepared for the future.

This is the second edition of Statnett's System development plan. Since 2023, we have reached important milestones, but we are also facing new and growing challenges. The most significant changes since the publication of the 2023 System Development Plan include a deteriorating security situation, high price growth in a demanding supplier market, increased system operation costs, and greater uncertainty in the development of consumption and generation.

Meanwhile, many customers still want to connect to the grid, there are large price differences within Norway, and imbalance prices remain high.

These developments are central to Statnett's strategy ***Electrification for a New Era***. Statnett's mission is to provide secure electricity supply and facilitate the energy transition and value creation in Norway. We aim to increase the utilisation of the power system, construct the grid faster and more efficiently, and enhance resilience and preparedness in operations and development. We will do so efficiently, without compromising sustainability and security.

The System Development Plan 2025 builds on the 2023 plan and specifies how we will deliver on Statnett's strategy and priorities in the coming years. The plan addresses the full scope of Statnett's mission and tools by considering the development of the transmission grid, market solutions, and system operations in a holistic manner.

To succeed in the work ahead, we depend on close and efficient collaboration within Norway, the Nordic region, and the rest of Europe. In Norway, we must continue to strengthen cooperation on power system development in dialogue with local authorities, industry, producers, businesses, distribution system operators, and other stakeholders.

Norway's power system is closely connected to neighbouring countries and to the rest of Europe – both physically through interconnectors and through shared market solutions and regulations. The Nordic region constitutes one common synchronous area. We are therefore completely dependent on one another to ensure stable and efficient operation of the power system. Going forward, we will cooperate even more closely than before.

With the System Development Plan 2025, we aim to promote transparency and predictability in an uncertain time.

Elisabeth Vike Vardheim, CFO

Gunnar Løvås, EVP System Planning & Customers

Electrification for a New Era

Executive Summary

The energy system in Norway and Europe is changing rapidly, driven by the EU's goal of achieving net zero emissions by 2050 and an increased focus on energy security and competitiveness.

Statnett's role is to provide secure electricity supply. A strong transmission grid, and the continued development of system operation and market solutions, enables the energy transition and value creation in Norway.

In a time of growing geopolitical tensions, a resilient power system is more important than ever. More extreme weather, increased digitalization, and an aging grid make the system more vulnerable.

Statnett's strategy for developing the power system:

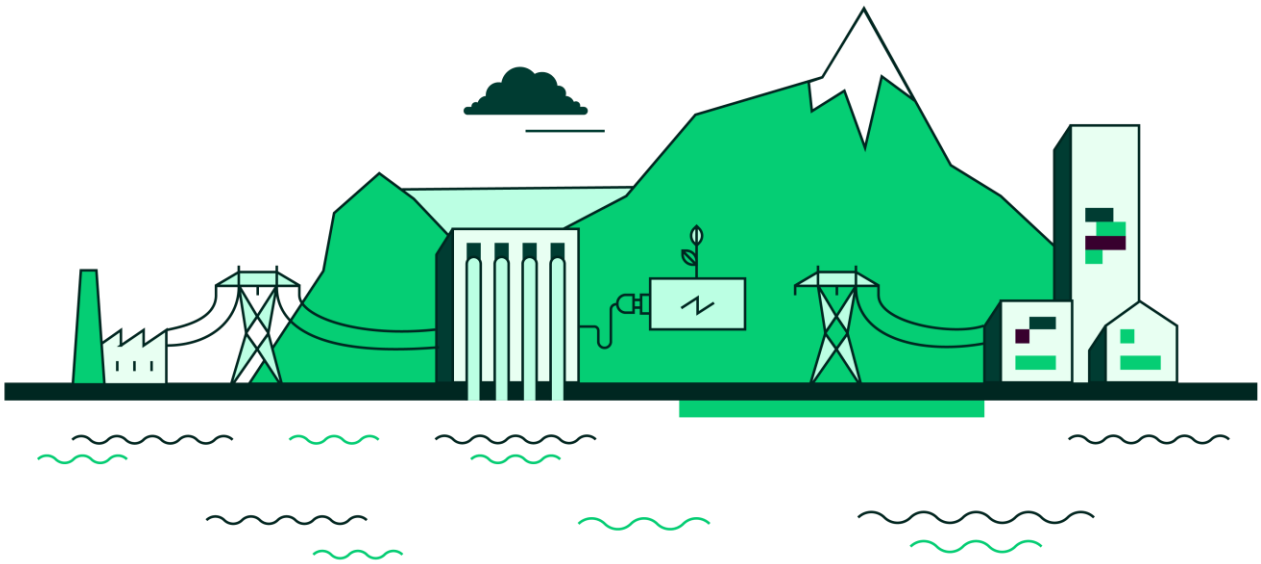
- Increase the capacity of the existing grid and the power system
- Construct the grid and power system faster and more efficiently
- Enhance resilience and preparedness in operations and development

The plan means that Statnett will significantly increase its level of activity.

We must make sound, long-term decisions while also increasing our pace. For Statnett, this means being:

- **Sustainable**. We will heed nature, the climate, and people through our choices of technology, materials, and grid development.
- **Safe**. Everyone working for Statnett must return home safely. Prioritizing time, cost, or quality must never come at the expense of personal safety.
- **Efficient**. The societal benefits of the chosen solutions must outweigh their costs and drawbacks. We will carry out our responsibilities in a cost-effective manner.

As the system operator, transmission grid owner, and power system planner, Statnett bears a great responsibility – but success can only be achieved working together. Developing a power system that is resilient and future-ready requires contributions from many stakeholders and strong collaboration across sectors.



1. Increase the capacity of the existing grid and the power system

There is significant need for increased grid capacity, but developing new transmission infrastructure takes time, is costly, and affects people and nature. Therefore, we must make the best possible use of the existing power system. This requires measures both in the physical infrastructure and in how we plan and operate the system.

Making better use of existing assets

Statnett owns and operates more than 14 000 km of transmission lines and 230 substations. To maximise the use of existing grid assets, we will:

- Increase transmission capacity by upgrading the temperature rating of approximately 100 overhead lines during the next 15 years.
- Establish more accurate power limits, including through using dynamic capacity determination on transmission lines.
- Increase monitoring, data-driven maintenance and renewal activities to extend asset lifetimes and ensure high capacity and availability.
- Minimise inconveniences caused by outages related to maintenance and construction activities.

Making capacity available to customers

We have reserved capacity for around 7 700 MW of new consumption and approximately 7 300 MW of new generation. Demand is high, and more customers are requesting capacity. To address this, Statnett will:

- Offer more customers non-firm connection to enable reservation of additional capacity for consumption and production.
- Set stricter requirements for project maturity and progress to ensure that capacity is allocated to, and retained by, projects with a high probability of realisation.
- Consider applying for exemption from the connection obligation when the socio-economic profitability is very low or highly uncertain.
- Implement a new tariff model where capacity is given greater weight than before, and work to ensure that customers with reserved capacity contribute financially for this reservation.

Developing system operation and market solutions

Statnett has the overall responsibility for coordinating the operation of the power system. Larger variations in power generation and flows increase the complexity of system operations. To maintain secure and efficient operations, we must continue to develop system operation and market solutions. Significant progress has been made in recent years, but further changes are needed. Statnett's key priorities going forward are to:

- Further develop flow-based market coupling for the day-ahead market and introduce flow-based capacity calculation in the intraday market. This will provide more accurate capacity assessments and improved system utilisation. We will also provide market participants with more information about flow-based capacities.
- Improve automated balancing and congestion management, and connect to European balancing platforms.
- Reduce imbalance prices and contribute to greater predictability for balance responsible parties and providers of balancing services.
- Improve market design in reserve markets and help increase liquidity to reduce system operation costs.
- Develop operational solutions to enable greater use of system protection schemes.
- Enable distribution system operators to manage bottlenecks within their own grids and increase local flexibility and grid utilisation.

2. Construct the grid and power system faster and more efficiently

The transmission grid needs reinforcement and renewal. We are already experiencing large price differences, high demand for new connections, and operational challenges. At the same time, large parts of the grid are old and approaching the end of their technical lifetime.

Upgrading the grid to 420 kV

In cooperation with regional grid companies, we have developed ten regional plans describing needs and measures in different parts of the country. These measures will reduce price differences, increase capacity for consumption and generation, and improve security of supply.

- We are renewing older 300 kV assets and upgrading voltage and capacity. Much of this work must be carried out regardless of the growth in electricity consumption.
- We are also building new 420 kV transmission lines and substations.
- Our long-term goal is a 420 kV target grid capable of handling significantly higher power flows than today's system, facilitating a doubling of power consumption and generation in Norway towards 2050.

Reducing price differences

We have extensive plans for grid development. Projects are prioritised by socio-economic benefit:

- Increased capacity in key transmission corridors – to connect regions and equalise electricity prices.
- Security of supply in major cities and in Finnmark.
- Capacity to meet known growth in electricity consumption.

In addition, critical renewals are given high priority. Where possible, these are combined with capacity increases.

Prioritised transmission corridors

- A. North–South, Western Norway, NO5–NO2
- B. Southern–Eastern Norway, NO2–NO1
- C. Central Norway–Oslo, NO3–NO1
- D. Helgeland–Sweden, NO4–SE2

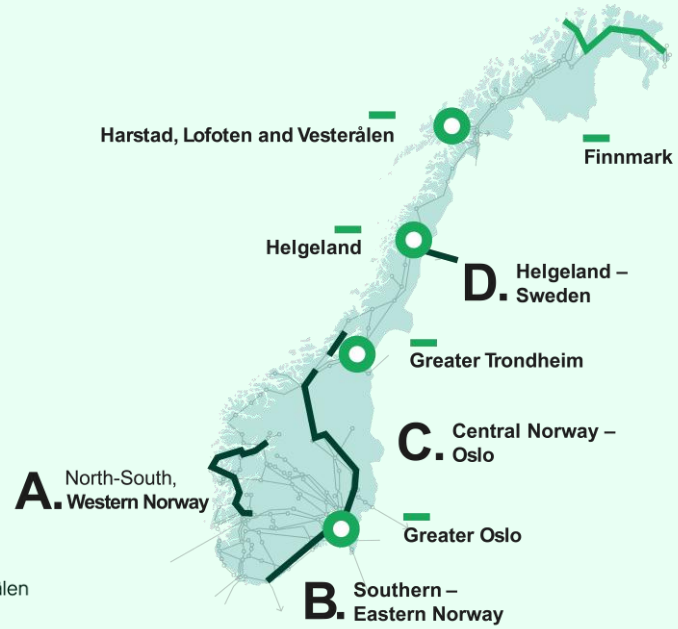
Prioritised areas

- Greater Oslo
- Greater Trondheim
- Helgeland
- Harstad, Lofoten and Vesterålen
- Finnmark

Collaborating for better solutions

Statnett's grid expansion will reach record levels in the coming years. Several major grid projects are already under construction, and many more are in the planning phase. To accelerate progress, limit costs, and safeguard people, the climate, and nature, we will:

- Improve the efficiency of our project execution.
- Scale up the use of new technology and collaborate with suppliers and innovation partners to develop the solutions of the future.
- Choose sustainable materials and solutions – throughout the entire value chain.
- Engage in early dialogue with local stakeholders to facilitate participation and involvement.
- Coordinate the development of the transmission and regional grids in close cooperation with regional grid companies.
- Work together with the Norwegian Water Resources and Energy Directorate (NVE) and the Ministry of Energy to streamline licensing processes.



3. Enhance resilience and preparedness in operations and development

Society is entirely dependent on electricity. Statnett's responsibility is to ensure a robust power system, be prepared for unforeseen events, and maintain stable operations under all conditions.

Strengthening security and preparedness

Our physical and digital infrastructures are exposed to increasing stress and threats. At the same time, growing automation and digitalisation place high demands on backup solutions to ensure that we can manage situations where automated systems fail. Statnett will:

- Take into account climate change and assess high-impact scenarios when planning the future development of the power system.
- Actively support Norway's total defence, both in the short and long term.
- Strengthen our ability to restore normal operations after incidents by securing access to spare materials and equipment, supply chains, and personnel.
- Enhance cybersecurity and the resilience of our systems against unwanted events and ensure our ability to recover effectively.

Ensuring system stability

The power system relies on certain fundamental technical properties to operate. The Norwegian and Nordic power systems have historically been based on the characteristics of hydropower and nuclear power. Wind and solar power have different technical properties. Together with new large-scale consumption, this affects system stability and quality of supply. Statnett will:

- Ensure that the power system functions regardless of generation technology, and that all new installations have the necessary technical characteristics.
- Define and enforce functional requirements to ensure that all market participants contribute to a stable and reliable power system.
- Develop advanced tools to manage system stability in both the planning and operational phase.

Photo: Johan Wildhagen

4. We are increasing our level of activity

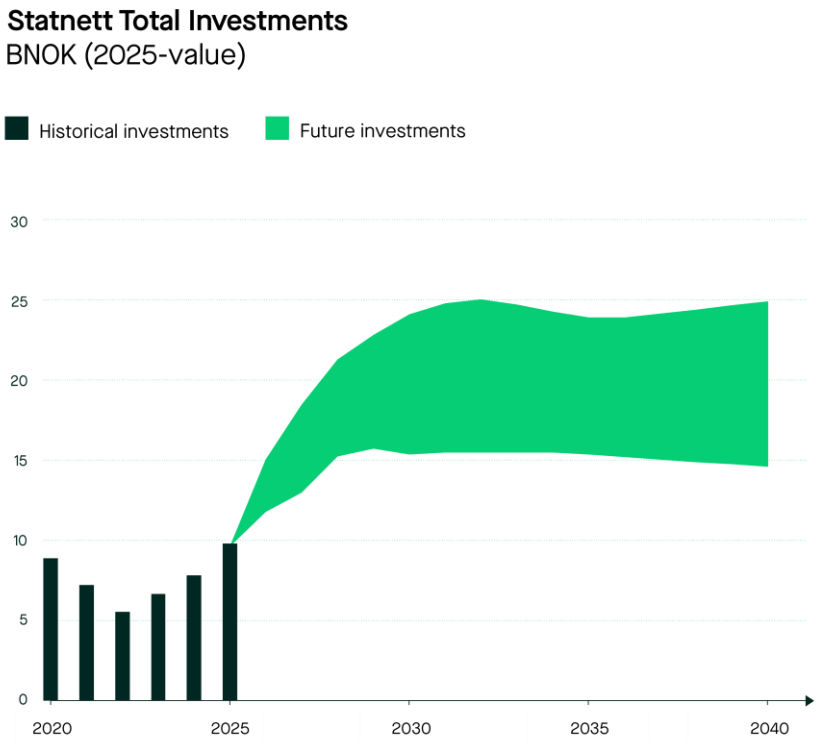
Statnett estimates planned investments in the range of NOK 150–200 billion over the next decade (2025–2034). Changes in needs, technical solutions, and market prices will influence the overall investment level.

Statnett's responsibilities are carried out using public resources. An increasing and sustained high level of activity will, over time, result in higher grid tariffs. We have a responsibility to manage this in a cost-effective way. Our goal is to deliver socio-economically profitable solutions by initiating the right projects at the right time, while simplifying, standardising, and automating our processes.

Our suppliers play a crucial role in enabling us to deliver. We will increase the use of external suppliers and portfolio-based procurement. To achieve this, we will place greater emphasis on standardisation. We will also combine multiple measures to enable more efficient project execution.

Our social responsibility includes caring for individuals, local communities, the climate, and nature. We set high standards for ourselves and for our suppliers. We will:

- Reduce greenhouse gas emissions by choosing solutions and materials with a lower carbon footprint.
- Minimise our impact on nature by conducting early assessments of potential consequences.
- Involve affected stakeholders, minority groups, and Indigenous peoples early in the process to ensure participation and reduce negative impacts.



5. A joint effort

The major changes taking place in the energy system affect the entire society and create a need for holistic planning. To succeed with the energy transition – and to maintain momentum amid increasing uncertainty and global instability – joint efforts and closer cooperation are essential. Norwegian authorities define the framework for the long-term development of the energy system.

There is a need for increased power generation and close coordination

Without sufficient growth in power generation, new consumption will reduce the domestic power surplus and slow down further electrification and industrial development. Favourable location of new generation and consumption reduces the need for new grid infrastructure and enables faster connection. Authorities at different levels play a key role in enabling new power generation and ensuring coordinated development of the grid, generation, and consumption.

- Statnett has identified suitable areas for offshore wind, solar power, and nuclear power, and provides input on how new generation can be efficiently integrated into the power system.
- Expanding the capacity of existing hydropower plants is important for maintaining generation adequacy and has high value for the power system.
- Offshore wind connected through hybrid inter-connectors provides the highest socio-economic profitability for offshore wind development and can be realised with the lowest need for subsidies. Offshore wind helps reduce electricity prices.

Energy efficiency and flexibility create a more efficient system

Energy efficiency and flexible consumption make power use more efficient, free up grid capacity, and strengthen security of supply. This also benefits consumers.

- Energy efficiency reduces consumption peaks and relieves stress on the grid. District heating and excess heat from industry and data centres can be utilised more effectively.
- By adjusting consumption and generation according to price signals, market participants can reduce both energy and grid costs.
- Batteries can help balance fluctuations between consumption and variable generation, while strengthening local energy resilience.

Energy cooperation is more important than ever

Geopolitical uncertainty and new security threats increase the value of cross-border cooperation. Through the EEA Agreement, Norway is part of the common European electricity market. A shared market and close cooperation with neighbouring countries make the power system more efficient and more resilient. The ability to exchange power is economically beneficial for Norway and strengthens security of supply during dry years.

- The interconnections with Sweden are crucial for security of supply and system operation in Norway. Statnett and Svenska kraftnät are assessing reinvestment in the transmission link between Nordland and Sweden.
- Statnett and Energinet are evaluating reinvestment in the Skagerrak 1 and 2 cables between Norway and Denmark, as these are approaching the end of their technical lifetime.
- Statnett and Fingrid are looking into different technical solutions to better control the flow and increase cross-border capacity between Finnmark and Finland. This is important for security of supply in Finnmark.

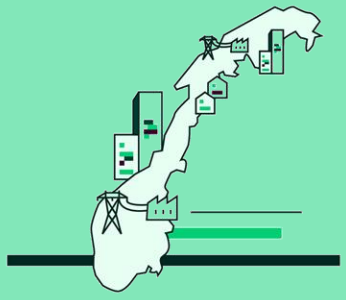
Recent milestones

Extensive changes in system operations

- **Flow-based market coupling** in the day-ahead market
- **Automated balancing** and congestion management
- **15-minute time resolution** in the intraday and day-ahead markets

Increasing activity in grid development

- The 420 kV transmission line between Sogndal and Aurland was **commissioned** in autumn 2025. We have also carried out temperature upgrades on a large number of transmission lines.
- **Construction has started** on several major grid projects, including Blåfalli–Gismarvik (Southwest Norway), Surna–Viklandet (Central Norway), Skaidi–Hammerfest (Finnmark), Liåsen substation (Greater Oslo), and Øygarden substation (Bergen area).
- Several other projects are in the **planning phase**, and we have submitted notifications and licence applications for several of them. We have also received the final licence for the new 420 kV transmission line between Skaidi and Lebesby (Finnmark).



Updated plans for all of Norway

- All ten grid development area plans were updated in 2024/2025. Through regional dialogue meetings, we have received input from customers, grid companies, authorities, and other stakeholders.

Increased North–South capacity

The new 420 kV transmission line between Aurland and Sogndal replaces the existing 300 kV line and provides significantly higher transmission capacity between Central Norway (NO3) and Western Norway (NO5).

The line contributes to improved security of supply and more equal power prices across Central Norway, Western Norway, and Eastern Norway.

Aurland–Sogndal is one of several projects that will provide substantially greater north–south transmission capacity in Norway towards 2040.

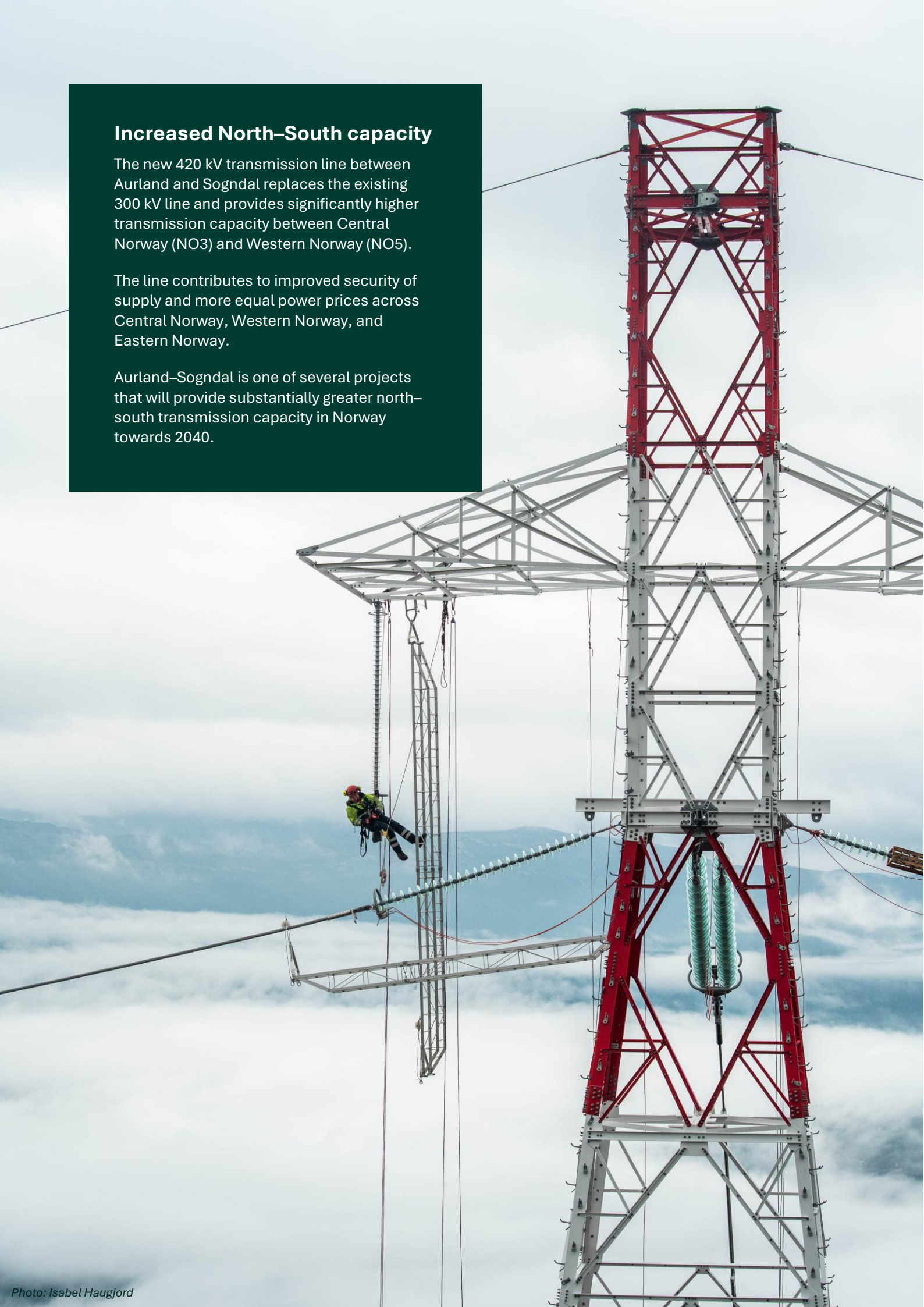
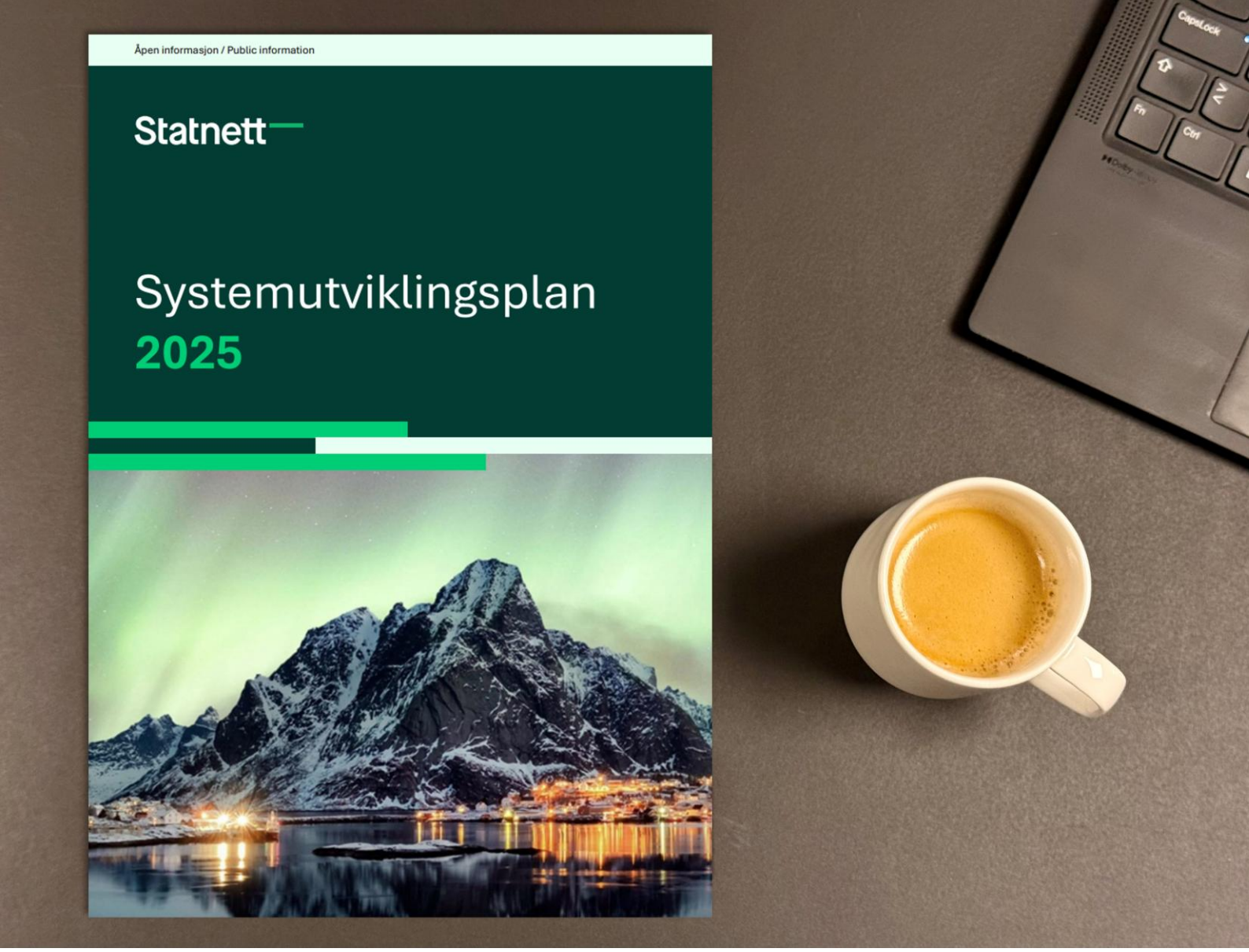


Photo: Isabel Haugjord



Statnett's Systemutviklingsplan 2025

full report in Norwegian

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