

**Statnett**

# **System Development Plan 2023**



**Statnett** is the system operator of the Norwegian power system. We own and operate the transmission grid and maintain the balance between consumption and production, providing reliable power supply at all times.

***Our mission:***

**Secure power supply.** Statnett maintain security of supply through operation, development, monitoring and emergency preparedness.

**Value creation.** Statnett contribute towards creating value for customers and communities.

**Electrification.** Statnett enables electrification and development of renewable energy, helping Norway realise our climate targets.



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The 2023 System Development Plan is Statnett's strategic plan for the development of the power system. The plan describes what needs to be done to ensure a successful transformation of the energy system towards a sustainable future.

To succeed, we need dialogue and collaboration with regional grid owners, power producers, policymakers, regulators, local communities, and other stakeholders.

The 2023 System Development Plan outlines Statnett's role in the green transition. Together with our ten grid development area plans, this document provides a foundation for ongoing dialogue and collaboration.

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President and CEO



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Markets & System Development



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Nord • Helgeland og Salten • Midt • Sogn til Sunnmøre  
• Bergensområdet og Haugalandet • Sør-Rogaland og Agder • Telemark og Vestfold • Oslo, Akershus og Østfold • Hallingdal og Ringerike • Innlandet

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# Executive summary

## The path to a climate-neutral energy system

We are in the midst of a radical transformation of the European and Norwegian energy system. There is a surge in electricity demand from customers who wish to electrify, expand, or establish new businesses. For Statnett, this means that we must increase grid capacity faster.

Rapid and major changes create a need for more holistic planning of the energy system. Transmission grid expansion, market and system solutions, and changes in power generation and consumption must all be assessed in the context of the long-term needs of society. Increased geopolitical tensions and extreme weather events are examples of factors which, in various ways, expose the need for a resilient energy supply based on renewable energy sources.

**Statnett contributes to zero emissions in 2050 by facilitating accelerated electrification and value creation**



We are upgrading the transmission grid. This enables a doubling of energy consumption by 2050 and the connection of 15 GW of offshore wind by 2040.



We are developing new solutions to secure operations in a system with a larger share of intermittent wind and solar power.



**We are committed to delivering a secure, efficient, and sustainable energy supply. This implies making good long-term decisions, while at the same time accelerat-**

**ing the pace of execution.**

Our planning is based on these principles:

- The transmission grid must have sufficient capacity to enable zero emissions by 2050.
- It is crucial for society that we deliver on time. We are preparing for high growth, because it is easier to scale down than to scale up.
- We need more generation, flexibility and energy efficiency, as well as a balanced development of generation and consumption within each region.

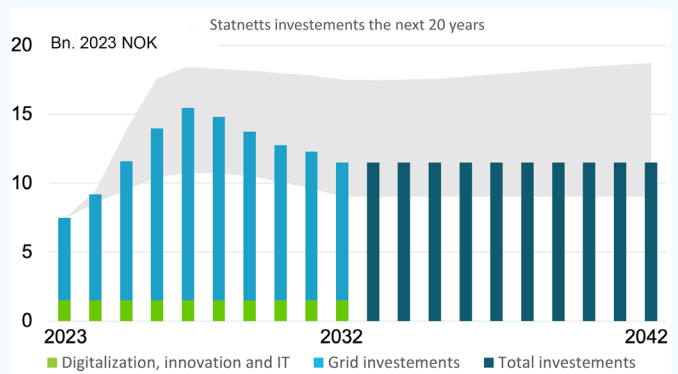
- Consumption must, to a larger extent than now, adapt to generation and grid capacity. More volatile electricity prices will increase the benefit of flexibility in energy and balancing markets.

To succeed, we depend on public acceptance. We will plan and build in a way that limits our impact on our surroundings. Hence, we must efficiently utilise the existing grid and the areas we already occupy. It is essential to balance consideration for local communities, indigenous people, nature, climate, value creation and security of supply.

*Points 1–6 below describe focus areas for Statnett in the coming years.*

## 1. Accelerating grid development

A strong transmission grid is essential to reduce emissions and promote economic development. Statnett is developing a 420 kV grid and is increasing investments across Norway. Several projects are reinvestments where we increase capacity by upgrading the existing 300 kV grid. Many of these reinvestments are necessary regardless of the future growth in consumption



- Over the last decade, Statnett has invested NOK 70 billion in the domestic power grid and digitalisation. The next decade, we will invest NOK 100–150 billion in the grid and on digitalisation, with the possibility of additional investments in an offshore grid.
- The increased investments are a result of our commitment to accelerating grid development and allocate more resources to digitalisation and innovation. Additionally, costs are rising due to increased prices, and supply chain pressures.
- To ramp up grid development, Statnett relies on collaboration with suppliers and more efficient licensing processes.

## Increased capacity within and between regions

The measures outlined in the System Development Plan will increase the security of supply, the capacity to connect new consumption and generation to the grid, and the transmission capacity between regions.

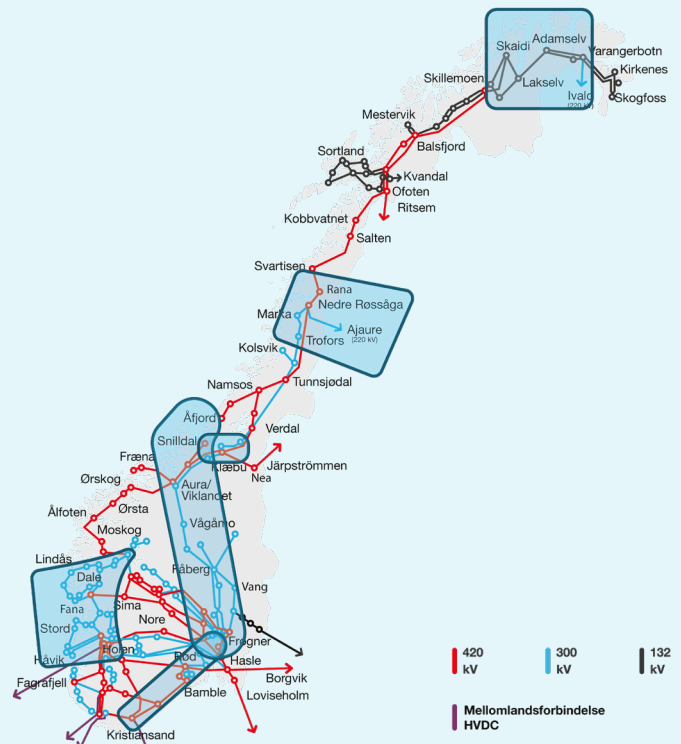
The projects in Western Norway are the most urgent. We are strengthening the transmission grid from north to south in this region, and to the Bergen- and Haugesund areas.

Ensuring progress in grid development in the following regions is also particularly important:

- Between **Southern** and **Eastern Norway**, including various measures in Grenland, Vestfold and to Oslo
- From **Mid-Norway** to **Oslo**, including projects around Oslo
- Greater **Trondheim** region
- **Helgeland**: The Rana region and connection to Sweden
- **Finnmark**: From Skaidi to Hammerfest and eastwards to Varangerbotn and Finland

Ten grid development area plans describe needs and measures covering the whole of Norway.

Areas where progress in grid development is particularly important



## 2. Allocating more capacity to customers

Statnett has reserved capacity for approximately 6800 MW new consumption and approximately 3900 MW new generation, of which 3000 MW offshore wind (2018–Q3 2023). We are working hard to offer more capacity to customers.

- We reserve capacity when doing so is operationally viable, for customers who are sufficiently mature.
- Throughout the connection process, we gradually elevate the requirements regarding project maturity and progress. Customers with insufficient progress lose their reservation, freeing up the capacity for other customers.
- We reserve more capacity than available in the existing and planned grid because we do not expect all plans to be realized. We also anticipate that improved methods and tools will increase grid utilisation in the future.
- The measures described in the area plans will enable a doubling of power consumption, given increased generation and more flexible consumption

## 3. Making the best use of existing infrastructure

The current power system is already highly utilised. To keep up with rapid growth in consumption we need to increase utilisation further. Statnett is carrying out an array of measures to provide increased capacity for consumption and generation, while continuing to operate the system securely:

- We increase the capacity of existing infrastructure. This includes temperature upgrades and Dynamic Line Rating (DLR).
- We accept more N-0 operation, heavier utilisation of existing assets, and increased use of special protection schemes (when these are automated).
- We offer non-firm connections. This means that customers agree to reduce their consumption or generation in periods when grid capacity is limited.
- The introduction of flow-based market coupling in the Nordic region is planned for 2024.
- Adjusting price areas is also considered in the event of permanent changes in generation, consumption, or the grid.

## 4. Automating system operation

As a greater share of power generation becomes variable, we have to change the way we operate the system. Statnett and the other Nordic TSOs are automating key operational processes, including balancing and congestion management. The new Nordic Balancing Model (NBM) represents a major change in the way the Nordic power system is operated.

- Finer time resolution in the energy markets is an efficient measure to reduce structural imbalances that must be managed in real time operation.
- Improvements in operational planning processes are a prerequisite for more automated operations.

Automation must be implemented gradually to maintain system security and efficient markets, and to comply with regulatory requirements. The EU defines guidelines and requirements which also apply to Norway.

## 5. Preserving power system stability

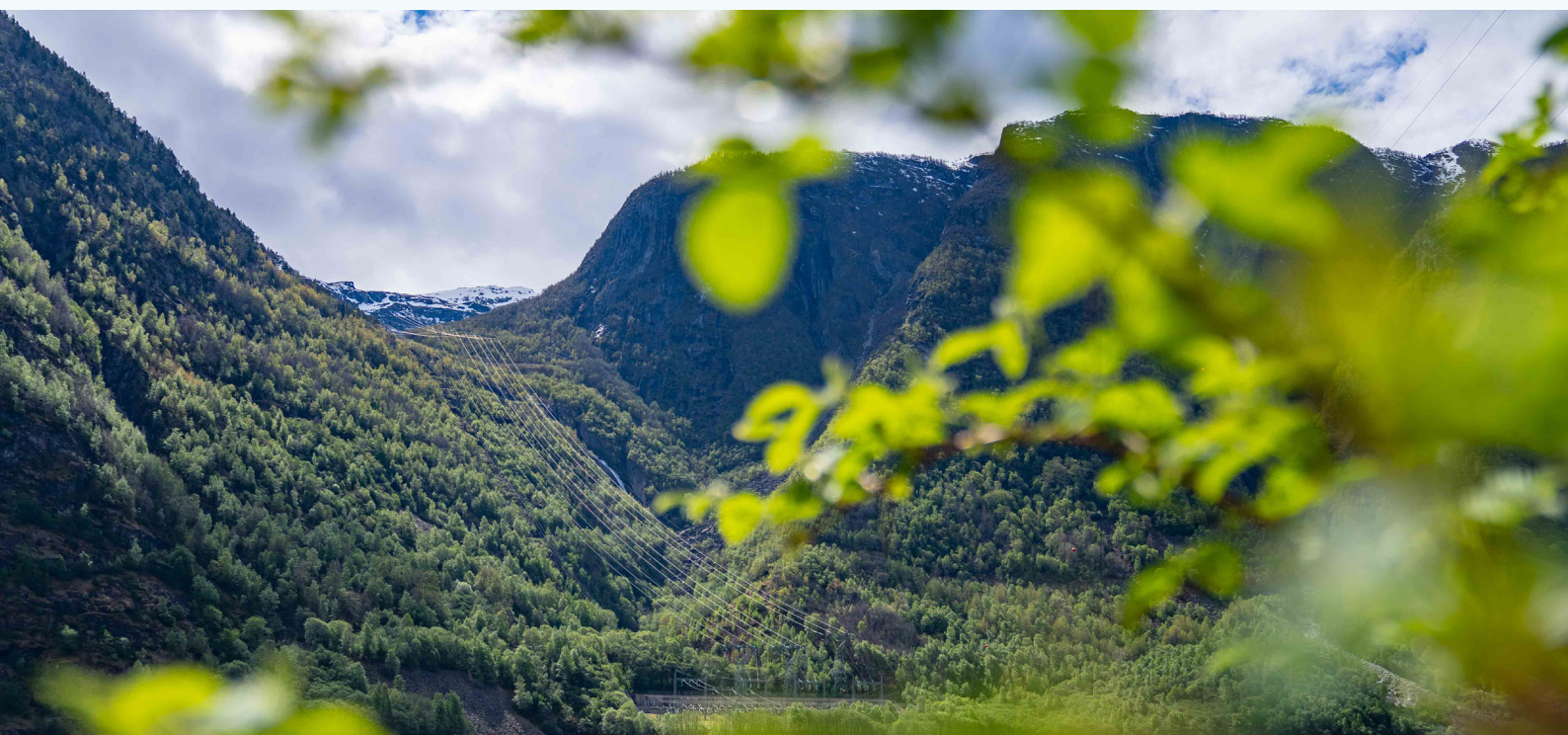
It is Statnett's responsibility as a TSO to ensure that power generation and consumption are balanced at all times. Maintaining this balance is increasingly challenging due to more intermittent generation and more variable flow. We need more reserves to balance the power system of the future.

The system characteristics of the Nordic power system will fundamentally change due to the large increase in wind and solar power generation. The TSO must ensure stable and secure power system operations, also during periods when wind and solar cover a large portion of the supply.

## 6. Facilitating offshore wind

Offshore wind is important to secure sufficient supply of energy in Norway and in Europe. Statnett has recommended points of connection for the first two offshore wind farms announced by the Norwegian government, Utsira Nord and Sørlige Nordsjø II. The government's ambition is to allocate areas for 30 GW offshore wind by 2040.

- Statnett is preparing to connect 15 GW offshore wind by 2040.
- We have identified areas suitable for connection of offshore wind along the entire Norwegian coast. Co-location of offshore wind and consumption makes it possible to integrate a large volume offshore wind in the power system.
- Statnett investigates potential hybrid grid solutions for offshore wind production in the North Sea. If such solutions are chosen and approved by the government, Statnett will build, own, and operate them.
- The offshore and onshore transmission grid will be part of a single integrated power system. As far as possible, the same regulations should apply offshore and onshore. This includes offshore bidding zones.



**The energy transition affects the entire society, and we must work together to succeed. Policymakers, regulators, power producers and consumers must all contribute.**

## **7. Policymakers and regulators must provide clear direction and a productive framework**

Achieving the climate goals requires doing a lot in a short time. Consequently, we must establish dedicated national targets and effective governance.

Important steps include:

- Stimulation of investments in socio-economic profitable grid development and new power generation.
- Well-coordinated development of grid infrastructure, power production and consumption.
- Efficient licensing processes.

## **8. Norway needs more power generation**

There is a need for more energy to cover consumption growth, and more installed generation capacity to accommodate the peaks. During the next few years, power consumption will increase more rapidly than generation, resulting in a weaker energy balance in Norway.

After 2030, we expect that much of the new demand for energy will be covered by offshore wind, with contributions from hydropower, onshore wind and solar. The power system must also have sufficient capacity to cover consumption during periods with little wind or sun. Norway is well positioned for this challenge thanks to flexible hydropower. Increased capacity in existing hydropower plants will make an important contribution to the power balance.

A significant increase in power consumption depends on an increase in power generation. Offshore wind may play an important role, given sufficient cost reductions.



Foto: A Energi

## **9. A larger share of consumption must be flexible**

More weather-dependent power generation results in greater and more frequent power fluctuations. A larger share of the consumption must help keeping the system balanced by adjusting to the generation. This is imperative to the system and profitable for consumers.

- New industry considering locations for their operations, should choose areas with good access to power.
- Petroleum, and other facilities to be electrified, should accept non-firm connection, and maintain their own power supply as backup or tolerate possible interruptions.
- Hydrogen electrolysis facilities should have flexible power consumption.
- Increased generation is particularly important in power deficient regions.
- Measures for energy efficiency which reduce load on the power grid should be prioritized.

## **10. The power market provides efficient price signals that must be allowed to work**

Correct prices help to ensure efficient utilisation of energy resources, security of supply, and provide investment signals to power producers and consumers. The prices in Europe, including the Nordics, is expected to fall from current levels following lower gas prices and increased renewable energy generation. Meanwhile, we will experience larger and more frequent price fluctuations than in the past. Occasionally, price differences between the Norwegian bidding zones must be expected..

- A single market and close collaboration with the rest of the Nordic region and Europe gives a more efficient and resilient power system.
- Marginal pricing is important for an efficient, well-functioning day ahead power market.
- More demand side flexibility is needed. It is therefore important that consumers are exposed to short term price signals. Fixed-price contracts should not reduce incentives for flexibility.
- The tariff system should promote efficient utilisation of the grid.
- Currently Statnett sees no need to introduce a capacity market in Norway.

# Statnett

The power system is facing a period of unprecedented growth. Statnett is a key player in the energy transition and has embarked on an ambitious investment program that will enable electrification and green industries. Achieving net zero also requires a collaborative effort, including clear policy and efficient regulation.

