
Nordic co-operation when meeting System challenges

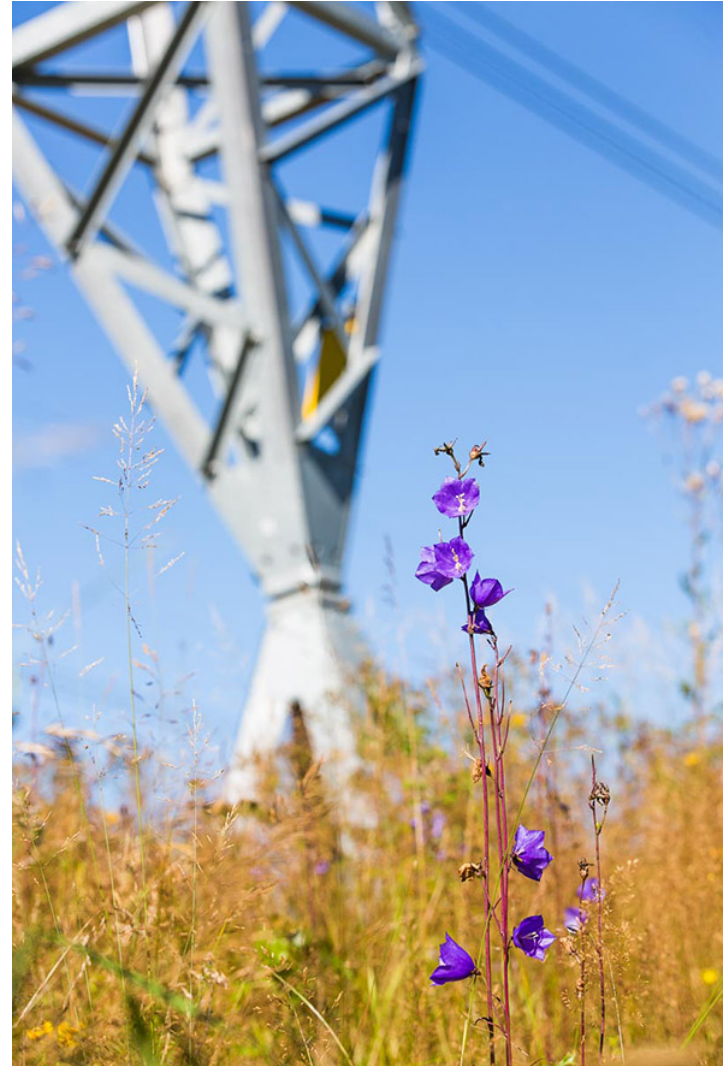
Evolving the market conference

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CEO



Agenda

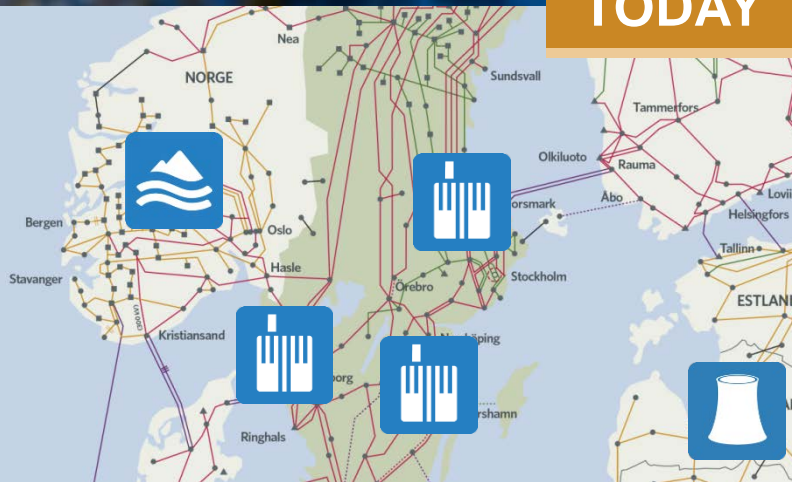
- > System challenges
- > System development plan
- > Strategies
- > Grid development
- > Tariff development



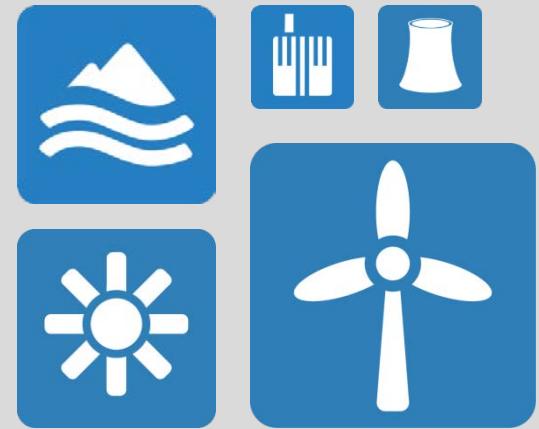
The Nordic power system is changing – more weather dependent and decentralized



TODAY



TOMORROW



Challenges and
Opportunities
for the Nordic
Power System

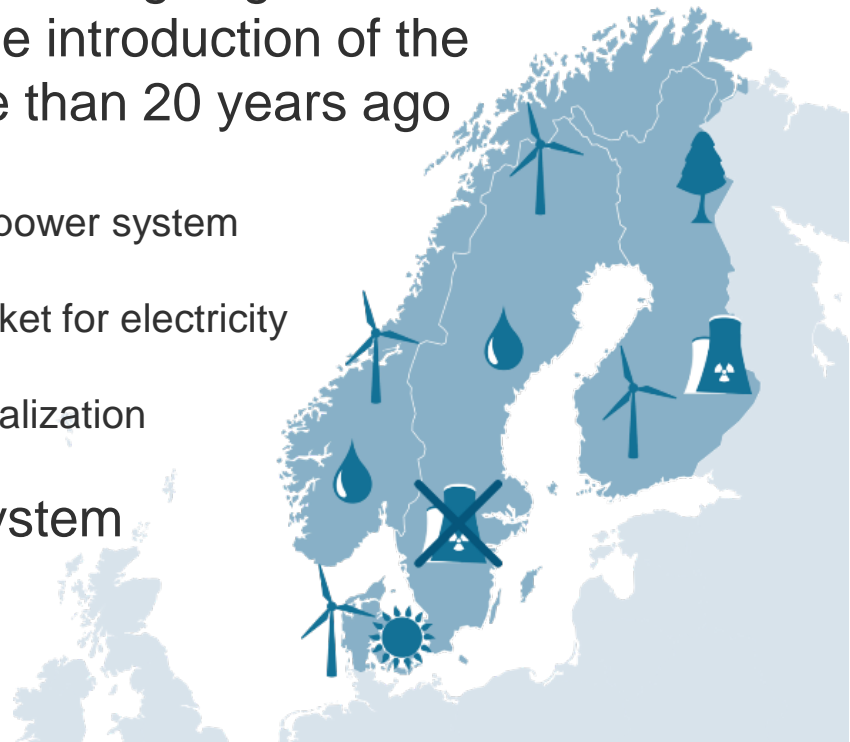


15 augusti 2016

The Way Forward

– Solutions for a changing Nordic power system

- > The Nordic power system is undergoing its most substantial changes since the introduction of the common power market more than 20 years ago
 - > Towards a sustainable and green power system
 - > Creation of a single European market for electricity
 - > Technology development and digitalization
- > The result is a new power system



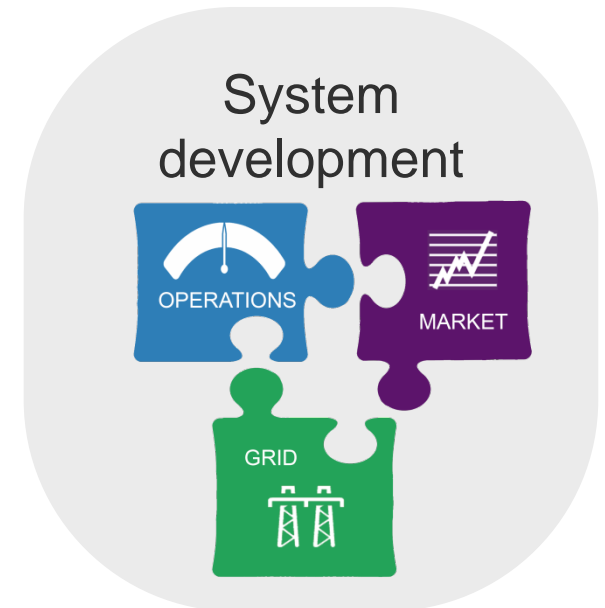
Svenska kraftnät's System development plan 2018–2027

Why a System development plan?

- > Highlight the challenges and opportunities resulting from the transformation of the energy system
- > The focus must shift from grid development to system development
- > Clarity and consensus on the roles and responsibilities will be crucial
- > Svenska kraftnät has a central role – *we do more than build power grids*

Whom do we address?

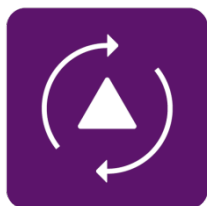
- > Major transmission grid customers and balancing responsible parties
- > Major service suppliers
- > Authorities and government offices



Main challenges for the power system

Challenges

System stability is challenged by declining inertia and distributed generation.



Balancing must cope with a lower share of dispatchable production



Grid capacity during the transition, ongoing urban growth and simultaneous grid renewal



Generation adequacy – major structural changes in the production segment



Assumptions

Roles and responsibilities need to be clarified and supplemented



European and Nordic co-operation – convergence and increased interconnection



Strategies



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New strategy to ensure power system stability

System stability is challenged by declining inertia and distributed generation. This calls for fundamental changes, a new comprehensive strategy needs to be developed.

Frequency stability:

- > Develop tools to measure the inertia
- > Develop requirements for existing and new ancillary services for the frequency containment

Voltage stability:

- > Develop new dynamic voltage regulation requirements for connected facilities
- > Increasing investment in separate facilities for dynamic voltage control

Rotor angle stability:

- > Develop techniques and tools to improve system monitoring
- > Develop new measures to reduce oscillations

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New strategy to ensure the balancing

The balancing needs to handle a lower share of dispatchable production – more flexibility will be needed. Svenska kraftnät is now developing a new Nordic balancing concept with Statnett and Energinet.

System design and development:

- > Reservation of transmission capacity to allow for increased exchange of balancing services
- > Identify obstacles and opportunities for electricity demand response and energy storage facilities

Planning and operation:

- > Increased collection of real-time metrics from networks and production facilities
- > Develop IT support for an enhanced system overview and MACE-control

Settlement:

- > Imbalance Settlement Period to be shortened to 15 minutes for a more effective balancing
- > More accurate price signals by changed margin pricing and the calculation of imbalance pricing

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Grid development that manages transition and metropolitan growth while at the same time renewing the network

Connection:

- > The transition involves a large increase of wind connections, mainly in northern Sweden

Market integration:

- > Increased need for interconnectors between the Nordic countries, and between Nordic countries and the continent

System reinforcement:

- > Secure the power supply to metropolitan regions where large consumption increases take place
- > Strengthening North-South as a result of nuclear decommissioning and location of new production

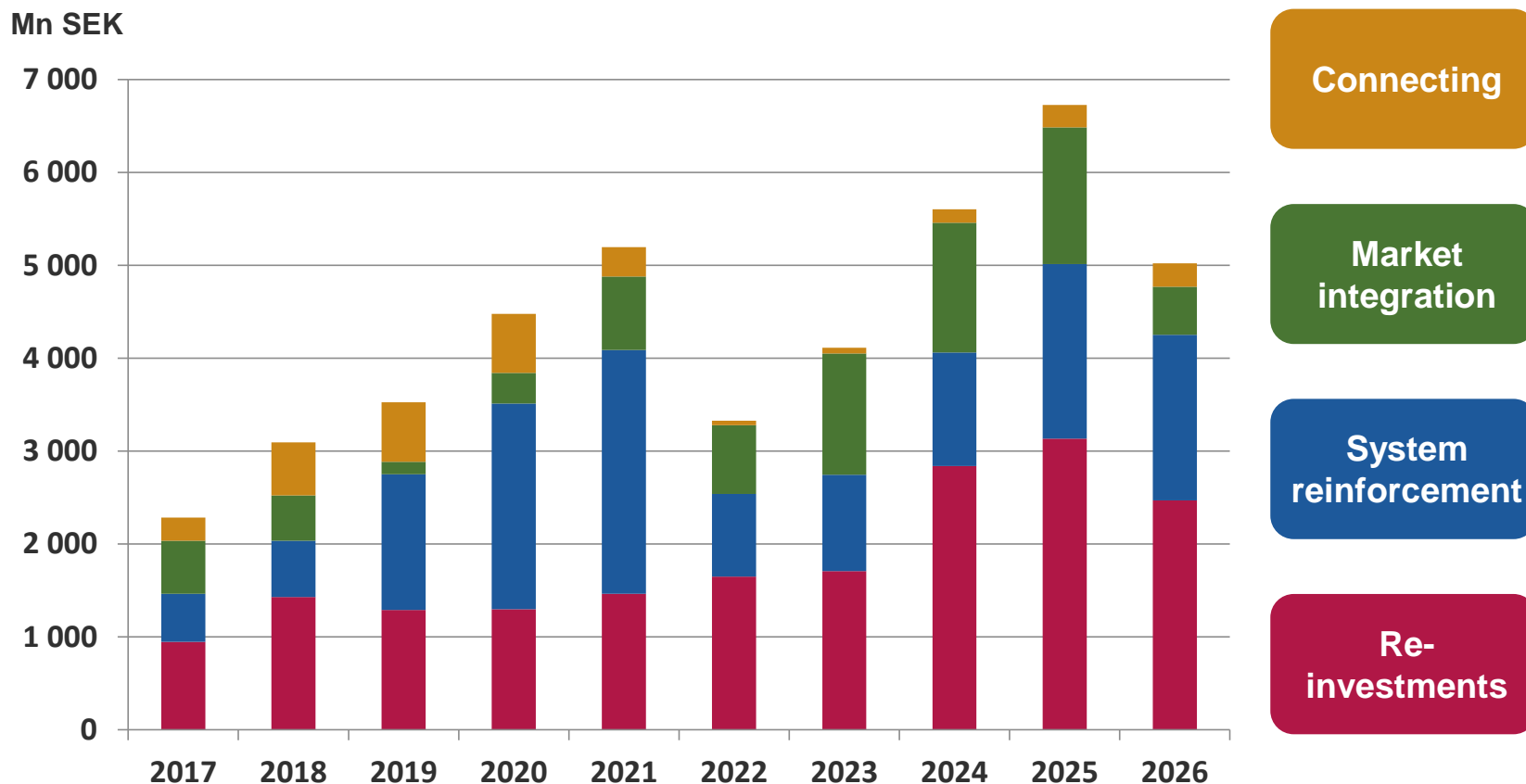
Reinvestments:

- > Large parts of the grid are approaching their technical lifespan and need to be renewed

Challenges:

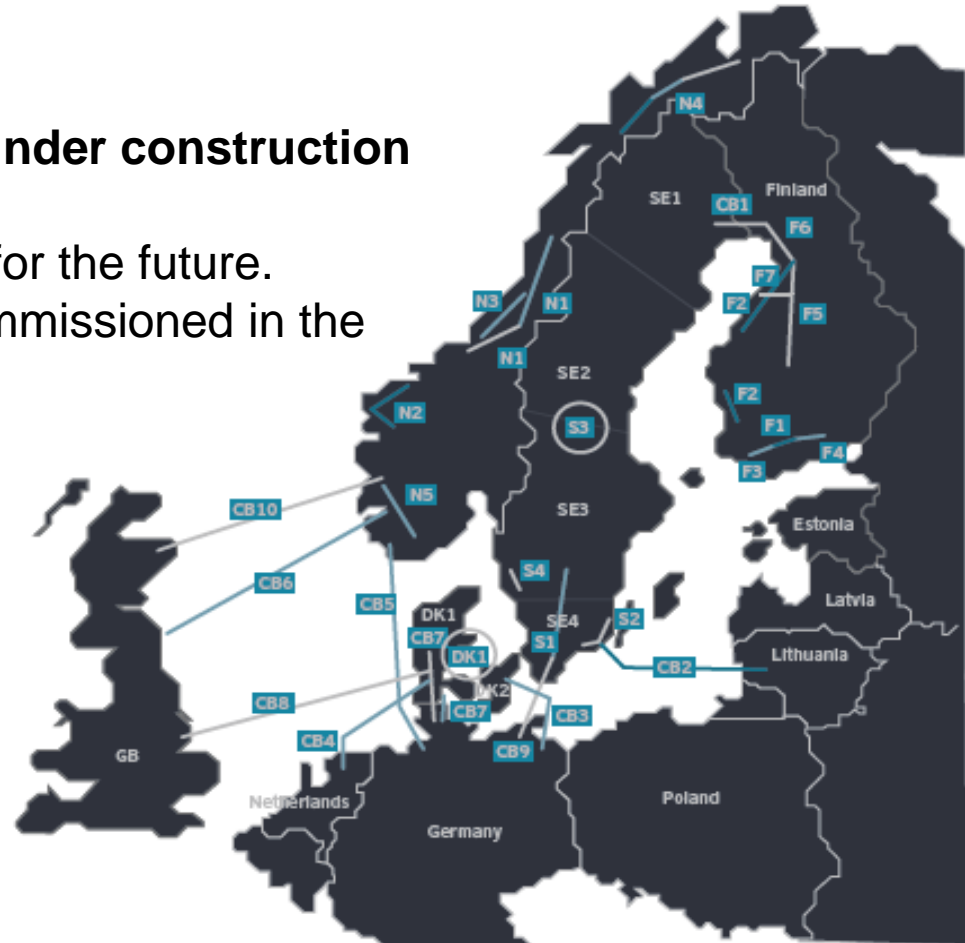
- > Long lead times in the permit process
 - > Insufficient holistic community planning results in difficulties to meet the need for reinforcements
 - > A greater amount of planned outages will lead to increased negative effects in the electricity market
-

Investments per year and drivers (Sweden)



Nordic Grid Development plan 2017

- > **Projects in planning or under construction**
- > Nordic TSOs are building for the future. Several projects being commissioned in the coming years.
- > Historically high Nordic investment-level.



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The transformation of the energy system creates challenges for future generation adequacy

Reference scenario "Power system 2040":

- > A reference scenario for the year 2040 has been developed in order to demonstrate the system challenges
- > The scenario exhibits an annual power shortage in southern Sweden during approximately 400 hours by the year 2040
- > Svenska kraftnät therefore examines how increased electricity demand response, energy storage or new flexible production can help improving the generation adequacy

Svenska kraftnät's responsibility and contribution to generation adequacy:

Svenska kraftnät is not responsible for ensuring the generation adequacy, but still contributes indirectly to its strengthening. Part of Svenska kraftnät's mission is to "promote an open Swedish, Nordic and European electricity market". Examples of measures to this end:

- > Building interconnections to reinforce links with the European power system
- > Implement a deeper European integration of the intra-day market which is expected to provide a better opportunity for market participants to trade their balances
- > Introduce maximum price of the strategic reserve according to the price cap in the day-ahead market for clearer price signals and enhanced flexibility

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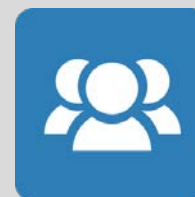


Generation adequacy – major structural changes in the production segment



Assumptions

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European and Nordic co-operation – convergence and increased interconnection



Clarity and consensus on roles and responsibilities in the power system will be crucial to address the challenges

Today, there is not a sufficiently coherent picture of the roles and responsibilities in the electricity market to ensure long term security of supply

Svenska kraftnät's roles as Network owner and System operator:

- > As network owner Svenska kraftnät is responsible for the transmission grid having sufficient transmission capacity
- > In the role as system operator Svenska kraftnät ensures the power balance in the short term

Vagueness surrounding the security of supply:

- > There is no single operator responsible for power system security of supply and there is no defined target
- > Nor is there any party directly responsible for sufficient generation capacity being built to meet the needs in the longer term
- > Svenska kraftnät believes that the Government should establish a national target for security of supply.

Change in other roles in the power system:

- > The distribution network operator role needs to be reviewed and developed to include subsystem responsibility

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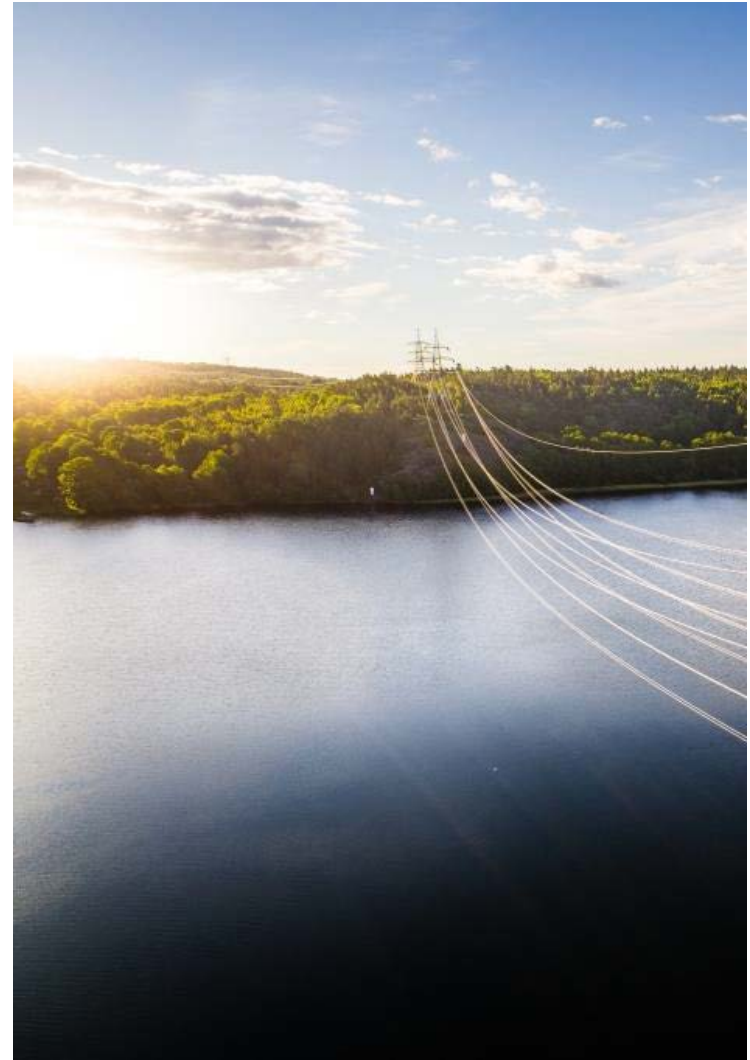
European and Nordic co-operation – harmonisation and increased integration

- > International climate policy and European energy policy have an increasingly greater impact on the power system and Svenska kraftnät's operations
- > Svenska kraftnät must fulfill European legislation in the form of network codes and guidelines of the Commission, which take precedence over national law
- > Network codes are in many cases decided and are now in the implementation phase

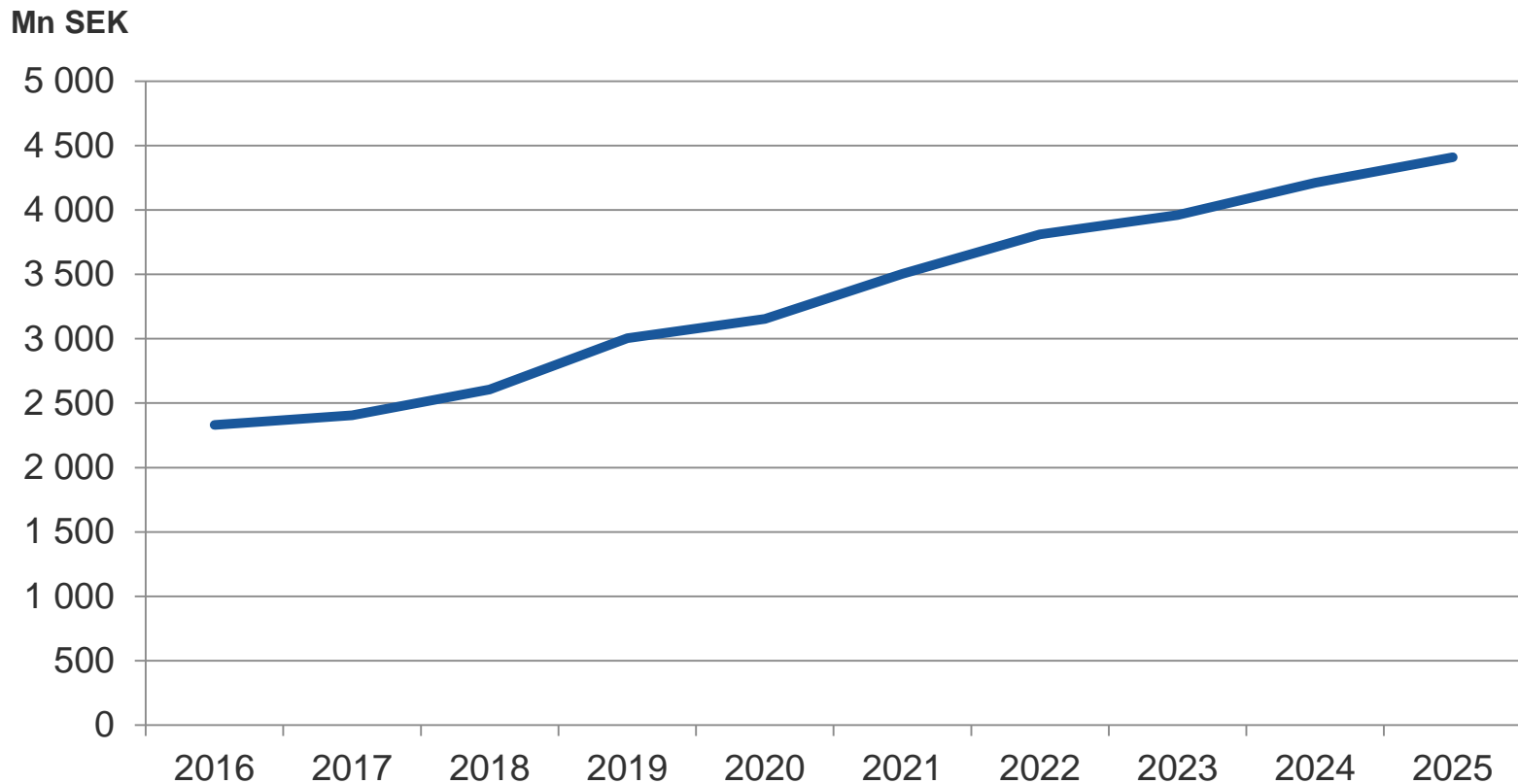
Clean energy for all Europeans



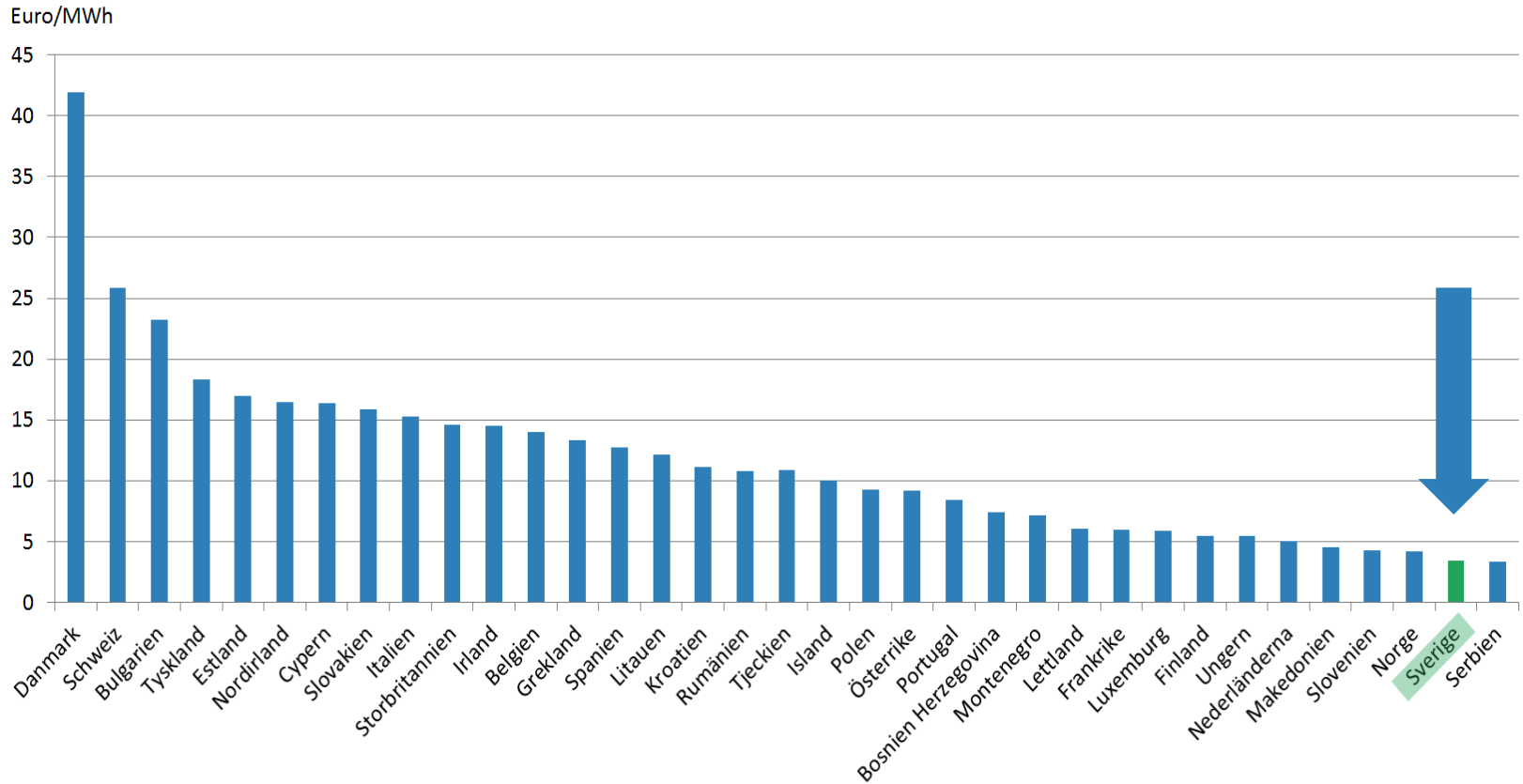
National Grid tariff




Increase of the tariff for the capacity part



Tariffs in Europe





Thank you
for your
attention

