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The Norwegian Energy
Regulatory Authority -RME

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National Report 2021

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Tore Langset and Hege Holte Nielsen



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National Report 2021

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Summary: The Norwegian National Report 2021 describes the development of the electricity and gas markets in 2020. The report is based on the reporting requirements pursuant to the Electricity Directive 2009/72/EC article 37.

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The Norwegian Energy
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National Report 2021

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period 2020 unless otherwise stated.

PREFACE

The Norwegian electricity market is a part of the European electricity market. It opened for competition when the Energy Act entered into force 1 January 1991. The regulatory activities are ensured by the Norwegian Energy Regulatory Authority (NVE-RME). NVE-RME has played an active role as energy market regulator in the development of network regulation, real market access for all customers, simplified supplier switching procedures, securing security and quality of supply and an efficient regulation of the energy system operation in Norway. The purpose of this report is to describe the development of the electricity and natural gas market in 2020.

Norway is a member of the European Free Trade Association (EFTA) and is a part of the European Economic Area Agreement (EEA). Consequently, the EEA procedures regarding the adoption of new EU legislative acts is applicable to Norway. The Electricity Directive 2009/72/EC was approved in the EEA Committee in May 2018. This report is based on the reporting requirements pursuant to the Directive 2009/72/EC article 37.

NVE-RME is a member of the Council of European Energy Regulators (CEER), the Agency for the Cooperation of Energy Regulators (ACER) and the organisation for the cooperation of Nordic Energy Regulators (NordREG). In 2020, NVE-RME has continued its efforts to contribute to the work of ACER, CEER and NordREG to obtain a well functional electricity market.

The Norwegian National Report 2020 is subject to common reporting structures developed by CEER. This report and the National Report of the EU member states will be available on the CEER website www.ceer.eu.

Oslo, 13 October 2021



Tore Langset

Acting Director
The Norwegian Energy Regulatory Authority

1. THE NORWEGIAN ENERGY REGULATORY AUTHORITY

The Norwegian Energy Regulatory Authority (NVE-RME) is the national regulatory authority for the electricity and natural gas market in Norway. Its main statutory objective is to promote socioeconomic development through an efficient and environmentally sound energy production, as well as promoting efficient and reliable transmission, distribution, trade and efficient use of energy.

NVE-RME regulates areas such as economic and technical reporting, network revenues, market access and network tariffs, non-discriminatory behaviour, market conduct and transparency, customer information, metering, settlement and billing as well as system and market operation. The Energy Act regulates the main frame of the Norwegian electricity and gas market and NVE-RME has the power to enforce many of the provisions in the Energy Act. NVE-RME is a separate legal entity with its own budget set by the Parliament and has the authority to act within the scope of its competences.

NVE-RME has a cooperation agreement with the Competition Authority (concerning i.e. market surveillance) and the Financial Supervisory Authority of Norway (concerning the financial markets for electricity derivatives). NVE-RME also cooperates with the Norwegian Consumer Council. NVE-RME is a member of the Council of European Energy Regulators (CEER), the Agency for the Cooperation of Energy Regulators (ACER) and the organisation for the cooperation of Nordic Energy Regulators (NordREG).

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2. MAIN DEVELOPMENTS IN THE ELECTRICITY MARKET

2.1 Norway – strong hydrological balance, low available export capacity and all time low prices

The electricity production in Norway was 154.2 TWh in 2020, which represents an all-time high annual production volume. Hydropower contributed with 92 percent of the total electricity production in Norway in 2020, and the Nordic electricity system is therefore highly influenced by the hydrological situation. 2020 was a wet year with much snow in the winter and rain during the fall. This resulted in significantly more inflow than normal, especially during the spring and summer when the snow melted. The reservoir levels were mostly above normal throughout 2020, and in the last half of the year the reservoirs were above historical maximum levels¹ for several weeks. The gross consumption in 2020 was 133.7 TWh and the annual net export was 20.5 TWh.

The average available transfer capacity for export from Norway was 61 percent in 2020. This is a reduction of 10 percentage points from 2019. In combination with the strong hydrological balance this contributed to historically low power prices in 2020. The average power price in Norway was 9.2 EUR/MWh in 2020. This is 75 lower than in 2019 and 54 percent lower than last all time low in 2015.

Norway experienced negative power prices for the first time in 2020. The three southern Norwegian bidding zones got negative prices for one hour in July, but for NO2 and NO1 this also occurred for four hours in November.

2.2 All trading licenses renewed by using a business rule engine to handle applications

All companies who trade physical power or operate electricity networks, must have a trading license from NVE-RME. Currently there are approximately 650 companies that holds a license. The licenses are given for a pre-defined period set by NVE-RME. The previous period was from 2015 to 2020. All the companies are obliged to apply for a renewal of their license before the licensing period expires. Ahead of the renewal process in 2020, NVE-RME made a thorough revision of the terms set in the licenses to ensure a proportionate and consistent regulation of the license holders. Furthermore, NVE-RME improved the application process by creating an interactive application form that guide applicants to the right responses. This allowed 90 percent of the applications to be processed by a business rule engine, allowing applications to receive their license minutes after applying. The remaining 10 percent were from actors who operate small networks or engage in limited trading activity, and therefore required individual decisions to determine their rights and obligations.

2.3 Interconnectors from Norway to Germany and Great Britain under construction

In 2020 two interconnectors were under construction from Norway, both with a capacity of 1 400 MW. The North Sea Link (NSL) to Great Britain is scheduled for operation 1 October 2021, and the NordLink to Germany was operative from December 2020.

¹ Historical maximum and minimum are calculated from the last 20 years.

2.4 Changes in the existing regulation and public consultations in 2020

Updated security requirements for smart metering systems

NVE-RME proposed a set of updated security requirements for smart metering systems in a public consultation April 2020. The proposed requirements are more detailed than the previous requirements and will improve the protection of the meter data value chain. Well formulated security requirements are necessary to be able to use smart metering data in market processes and are becoming more important. The updated requirements are applicable to smart metering systems at all voltage levels, for all production, consumption, and exchange between grid areas. The public consultation ended August 2020. NVE-RME has advised the Ministry of Petroleum and Energy to adopt the updated requirements with some minor amendments. NVE-RME has proposed that the updated requirements should enter into force 1 January 2021 for smart metering systems connected to final customers in the low voltage grid, and 1 July 2023 for the remaining smart meters.

Legal and functional unbundling in secondary legislation

Legal and functional unbundling was introduced for DSOs with more than 100 000 customers in 2007. An amendment to the Energy Act in 2016 imposes legal and functional unbundling for all DSOs, irrespective of size. The amendment entered into force 1 January 2021. A proposal to exempt DSOs with less than 10 000 customers from functional unbundling has been on a public consultation in 2020 and entered and entered into force 4 February 2021. The Ministry of Petroleum and Energy also adopted supplementary secondary legislation on legal and functional unbundling in 2020, which entered into force 1 January 2021. Furthermore, secondary legislation mandating separate branding of network operations and all other commercial activities was adopted in June 2020. The regulation will enter into force 1 January 2022.

Economic regulation of transmission networks

In 2020, NVE-RME suggested to strengthen the TSO's incentives for cost efficiency. The strengthening includes introducing an efficiency analysis that compares the TSO's annual costs to its own historical cost level. The relative development in costs will be measured against the relative development in a calculated output variable, which basically accounts for all the TSO's grid assets. The efficiency result from this analysis is to be multiplied by the TSO's cost base, to calculate the TSO's cost norm. In addition, we suggested to implement a productivity requirement of 1.5 percent of the cost norm, which is meant to capture an expected increase in productivity, as well as proven inefficiencies in the historical cost data. However, when we decided upon these changes (April 2021) we concluded to increase the suggested productivity requirement to 2 percent.

Capacity-based tariffs

NVE-RME has recommended changes in the tariff structure to facilitate better utilization of the grid and a more equitable distribution of grid costs between customers. The introduction of capacity-based tariffs in the distribution network will reward smart use of electricity and reduce the need for network investments.

The recommended changes involved a change from volumetric to more capacity-based tariffs and that income from the volumetric energy charge cannot exceed 50 percent of the income from each customer group. The tariffs for customers with a consumption lower than 100 000 kWh/year should consist of only two charges, either a fixed charge – differentiated based on the customers demand for capacity, or an energy charge that maximum covers 50 percent of the income from the customer group. The energy charge may be time differentiated (ToU). The recommendations were approved by the Ministry OF Petroleum and Energy and will enter into force 1 January 2022.

Non-firm connections

In 2020 Norway made an amendment to its regulations that made it possible for the grid companies to give customers a non-firm connection to the grid. This non-firm connection enables the grid companies to curtail consumption on terms that are agreed upon between the parties. The amendment makes it possible to connect customers faster and postpone or avoid grid investments. The changes apply from 2021.

Network Codes and Guidelines

In 2020, NVE-RME prepared the implementation of Guidelines on Capacity Allocation and Congestion Management (CACM), Guideline on Forward Capacity Allocation (FCA), System Operation (SO) and Guideline on Electricity Balancing (EB). The aforementioned network codes/guidelines were implemented in the Norwegian legislation 1 August 2021.

NVE-RME has also been working on the technical requirements of the connection codes on demand connection (DCC), grid connection of generators (RfG) and on grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC). Statnett has reviewed the connection codes in cooperation with the stakeholders and has made preliminary proposals for national specifications.

Changes in the regulation on quality of electricity supply

A change in the regulation on quality of electricity supply entered into force 1 July 2020. Requirements regarding reporting voltage quality data for measurements in the medium and high voltage grid was transferred from the regulation on quality of electricity supply to the regulation relating to system responsibility in the power system. The regulation on quality of electricity supply still contains the requirements on registration of voltage quality parameters.

Changes in the regulation relating to system responsibility in the power system

In November 2019, changes in the regulations on system responsibility and quality of electricity supply were approved. The changes entered into force 1 July 2020. The responsibility for the national database for reported data on voltage quality was transferred from the NRA to the TSO. In addition, the regulation was amended, so that the TSO is required to make guidelines for the remaining articles in the regulations relating to system responsibility.



Illustration: NVE-RME, Simon Oldani.

3. THE ELECTRICITY MARKET

3.1 Network regulation

3.1.1 *Unbundling*

In Norway, there is only one TSO, the publicly owned company Statnett, which has been legally unbundled since 1992. Statnett has applied for TSO certification in accordance with section 4-10 of the Energy Act, a provision which implements the requirements of article 9 of the Electricity Directive 2009/72/EC. This includes an assessment of whether requirements of separation between transmission and production and supply in section 4-8 of the Energy Act are met. RME is currently considering Statnett's application for certification.

Today, DSOs with more than 100 000 connected customers in Norway are legally and functionally unbundled. In 2020, the seven DSOs in this category represented 64 per cent of the total connected customers, an increase of 8 per cent from 2019. In addition to the unbundling requirements, these companies are subject to participation in a compliance program according to the Electricity Directive and Norwegian regulation. The participants of the program are obliged to produce an annual report to NVE-RME that enables NVE-RME to monitor the DSOs fulfilment of the regulations regarding legal and functional unbundling.

By the end of 2020, there were 89 Norwegian DSOs with less than 100 000 connected customers. These DSOs are exempted from the regulations regarding legal unbundling. However, in the event of a merger or acquisition, NVE-RME can require a DSO that also has activities in generation or supply to reorganise into separate legal entities. Of the DSOs with less than 100 000 customers, 75 are organised in a legal entity devoted entirely to managing the grid. This is an increase of 24 per cent from 2019. All 96 DSOs are under regulation concerning neutral and non-discriminatory behaviour when it comes to the DSO's management of the information to customers, supplier switching, metering data and billing. These regulations are subject to supervision by NVE-RME. The majority of the Norwegian DSOs are publicly owned.

Secondary legislation mandating separate branding of network operations and all other commercial activities was adopted in June 2020. The regulation will enter into force 1 January 2022. Separate branding is assumed to increase the competitive pressure in the end-user market by making it easier for the end-user to identify electricity suppliers and DSOs.

From 1 January 2021, all DSOs must have a separate customer database from other companies. Typically, integrated DSOs and retailers shared a customer database. Separate databases ensure that customers data does not flow from the DSO to market affiliated market participants and will ensure that all retailers compete on an equal footing. In 2020 NVE-RME processed applications from several DSOs who were struggling to implement the regulation in time. NVE-RME granted some dispensations of short duration and required that the DSOs inform NVE-RME about the progress.

3.1.2 Technical functioning

Quality of electricity supply

NVE-RME has extensive legal powers on the regulation of the quality of electricity supply. The Norwegian regulation² on the quality of supply applies to those who wholly or partially own, operate or use electrical installations or electrical equipment connected to the Norwegian electricity system.

This involves establishing requirements for all parties connected to the Norwegian electricity system. This includes network companies, the performance of any activities subject to competition (production, energy trade and/or supply), Statnett, electricity producers and end-users regardless if they hold a license according to the Energy Act or not.

Voltage Quality

The Norwegian Quality of Supply Regulation includes minimum requirements for voltage frequency, supply voltage variations, voltage dips, voltage swells, rapid voltage changes, short- and long term flicker since 2014, voltage unbalance and harmonic voltages including total harmonic distortion (THD). If considered necessary, NVE-RME has the power to set minimum requirements for other voltage disturbances, such as transient over-voltages, interharmonic voltages and main signalling voltages.

Statnett and the DSOs have to continuously register dips, swells and rapid voltage changes in their own characteristic high and medium voltage network since 2006. In addition, they have been obliged to register total harmonic distortion (THD)³ and flicker. Statnett and the DSOs were also obliged to report the above-mentioned voltage quality parameters (except rapid voltage changes) to NVE-RME since 2014. From 2019 the DSO and Statnett are also obliged to register and report data on supply voltage variations (r.m.s. voltage), measured as an average over 1 minute. The purpose of these required registrations is that Statnett and the DSOs have an obligation to provide information about the expected quality of their network from existing and possible new customers on request. I.e. the first reporting of voltage quality to NVE-RME was in February 2015. NVE-RME has established a database for all the reported data.

In case of a customer complaint regarding power quality, Statnett and the DSOs will do the necessary investigation in order to verify compliance with the requirements in the regulation. If the complaint concerns voltage quality, and there is not an obvious cause, on-site measurements must be performed according to relevant EMC-standards (The IEC 61000-series). The minimum duration for such measurements is seven days, longer if necessary. The network conditions in the measurement period (coupling picture, load, production and seasonal conditions) must, as far as possible reflect the conditions of the network at the time of the complaint. If the measurements prove non-compliance to limits set in the regulation, Statnett and the DSOs must identify the reason for this and identify the responsible party for the violation. The responsible stakeholder must rectify the situation without undue delay. In cases where a customer (end-user, prosumer, producer or other DSOs) is identified as the responsible party, they are exempted from the requirement to rectify if, and only if, no other stakeholder is affected by the voltage violation. If Statnett or the DSOs have done the investigations mentioned above without reaching an agreement with the customer, the case can be brought forward to NVE-RME for decision.

² Norwegian Regulation 30 November 2004 No 1557 on the Quality of Supply in the Power System

³ A THD-value expresses a value calculated from all the individual harmonic voltages. A THD-value beyond limits gives an indication that one or more individual harmonic voltages may be beyond limits. If one or more individual harmonic voltages are beyond limits it can be challenging for users of the grid and may cause malfunction or damage to equipment connected to the grid.

Interruptions

NVE-RME publishes annual statistical reports on interruptions providing continuity of supply levels at a country level, county level, company level, end-user level and voltage levels. Incidents on all voltage levels have been reported since 2014, including voltage levels below 1 kV.

Statnett publishes an annual report on operational disturbances containing reliability levels for the system.

In Norway, the network companies have been obliged to report specific data on interruptions since 1995. In the beginning, the data was reported with reference to specific reporting points in the network. A reporting point used to be a distribution transformer or an end-user connected above 1 kV. Since 2014, a reporting point is defined as an end-user connected to any voltage level, above or below 1 kV. NVE-RME used “Energy not Supplied”, (ENS), as input to the incentive based regulation on continuity of supply from 2001. The incentive regulation is based on adjusting the income cap for the utilities due to ENS (CENS, in Norwegian “KILE”), among others. Until 2009, this quality adjusting was based on calculating the amount of energy not supplied, and hence a standardised method for calculating ENS was needed. This was introduced from 2000. During 2001-2008, it was a linear relation between ENS and CENS.

After 2009, a new method for calculating CENS was introduced, which is based on the interrupted power (kW) at a reference point of time and then adjusted for the actual interruption time (hour, weekday and month). Calculation of CENS from 2009 is therefore no longer as straightforward as it was when it could be directly derived from CENS.

Even if ENS is no longer used for calculating CENS, it is still an important indicator when making interruption statistics (for instance for making historical statistics for the reliability of the power supply).

The interruption data also included end-users from 2005. The main reasons for introducing this was to make it easier to understand for non-technical customers and to compare with other countries.

The data is reported according to the following definitions:

- For long (> 3 min) and short (≤ 3min) interruptions (ref reporting point + ref end user from 2005)
- Duration (ref reporting point + ref end user from 2005)
- Interrupted power (from 2006)
- Energy not supplied (ENS)
- SAIDI, SAIFI, CAIDI, CTAIDI, CAIFI (from 2005)
- CENS (from 2009)
- Notified and non-notified interruptions

Common indices with reference to customers are presented in Figure 1 and Figure 2. Figure 1 represents long interruptions and Figure 2 represents short interruptions (Tables with corresponding figures are enclosed in the appendix).

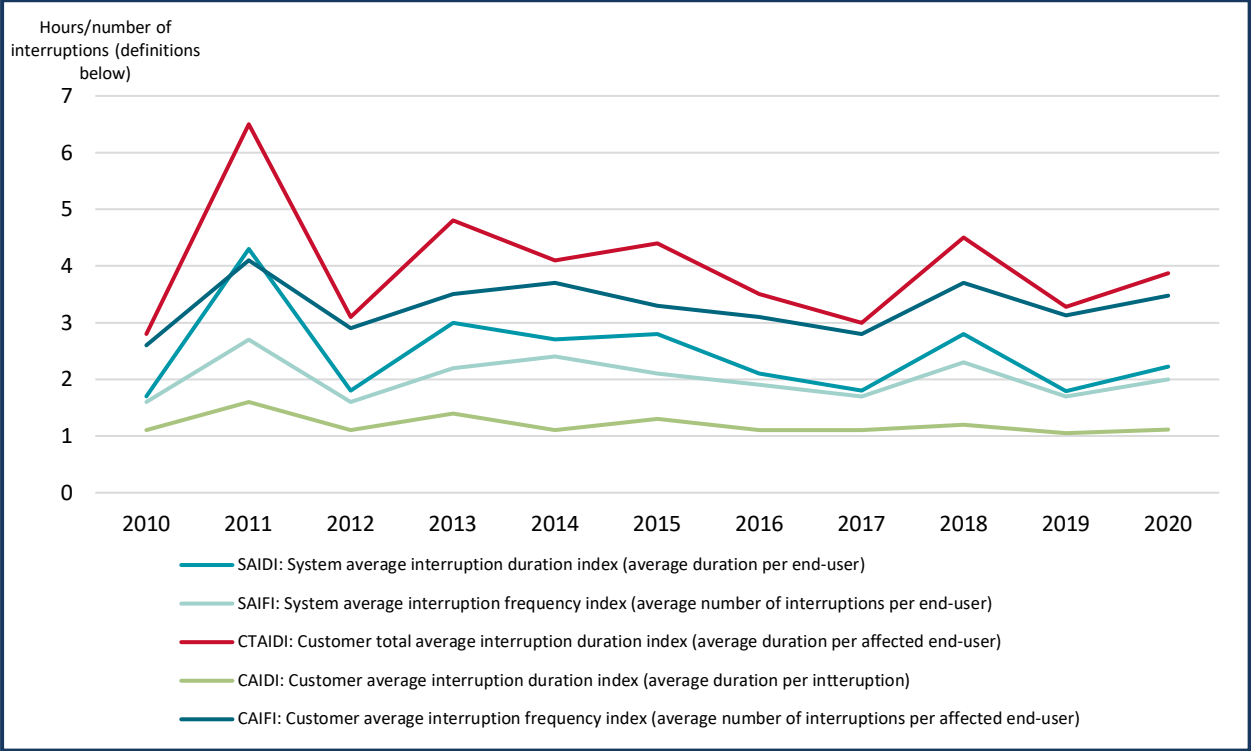


Figure 1 Continuity of supply indices with reference to end users - long interruptions (> 3min)

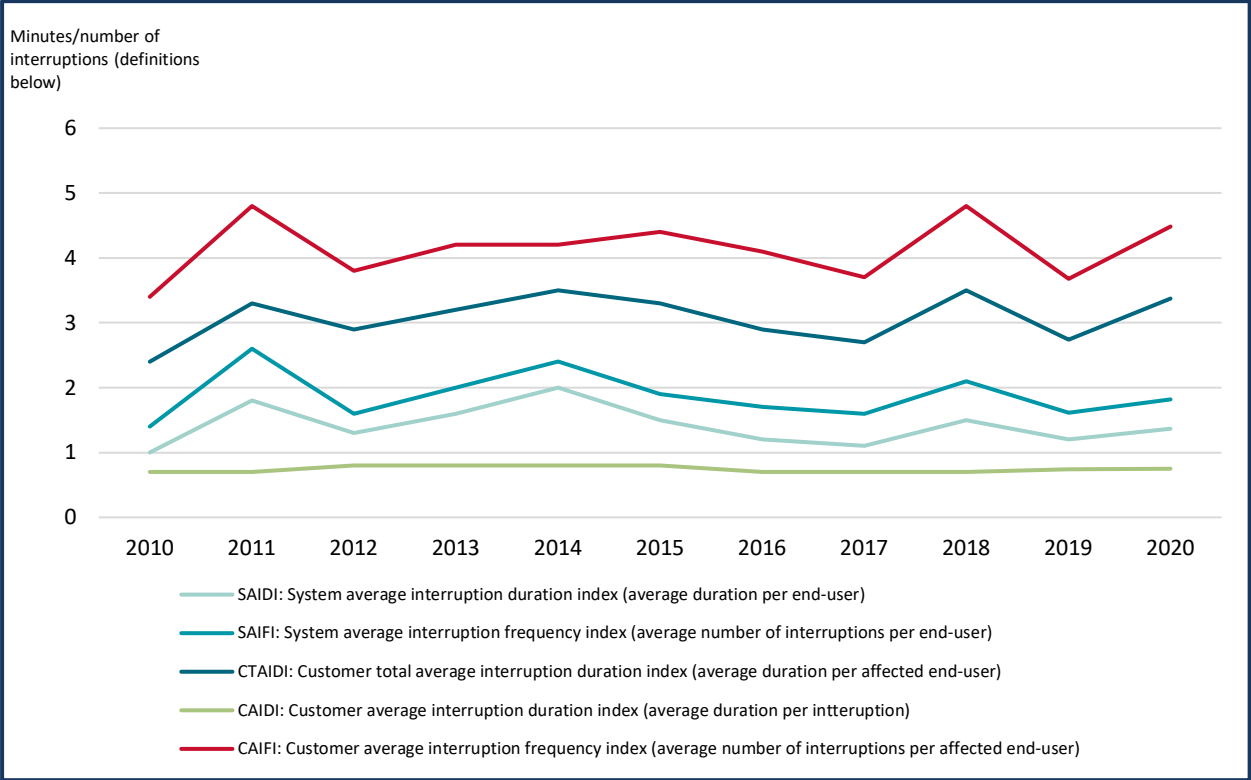


Figure 2 Continuity of supply indices with reference to end users - short interruptions (≤ 3min)

Reported “Energy not supplied” in Table 1, is divided into 27 end user groups up to 2008. From 2009 the number of end-user groups have been increased to 36.

Table 1. Energy supplied and continuity indicators in Norway, long interruptions

Year	Energy supplied [GWh]	Energy not supplied- notified interruptions [GWh]	Energy not supplied- non-notified interruptions [GWh]	Energy not supplied in total [GWh]
1996	98 571	16.30	13.80	30.10
1997	101 987	15.40	20.20	35.60
1998	106 228	12.20	11.70	23.80
1999	106 525	11.40	17.30	28.80
2000	104 193	8.40	16.50	24.90
2001	108 361	4.80	12.30	17.10
2002	107 814	4.60	12.70	17.30
2003	105 572	4.80	15.60	20.40
2004	109 459	4.30	10.30	14.70
2005	111 804	5.60	9.30	14.90
2006	106 385	4.10	11.80	15.90
2007	109 712	4.70	10.10	14.80
2008	109 570	4.20	11.40	15.60
2009	107 052	3.60	8.90	12.60
2010	111 041	3.70	7.50	11.20
2011	107 045	4.00	33.20	37.20
2012	110 698	3.80	8.00	11.80
2013	112 118	3.80	24.90	28.70
2014	114 441	4.30	12.50	16.80
2015	116 062	4.50	16.50	21.00
2016	117 684	4.10	10.80	14.90
2017	116 608	4.50	9.10	14.30
2018	120 986	5.00	15.10	20.10
2019	126 247	5.32	8.69	14.01
2020	126 761	7.09	11.95	19.04

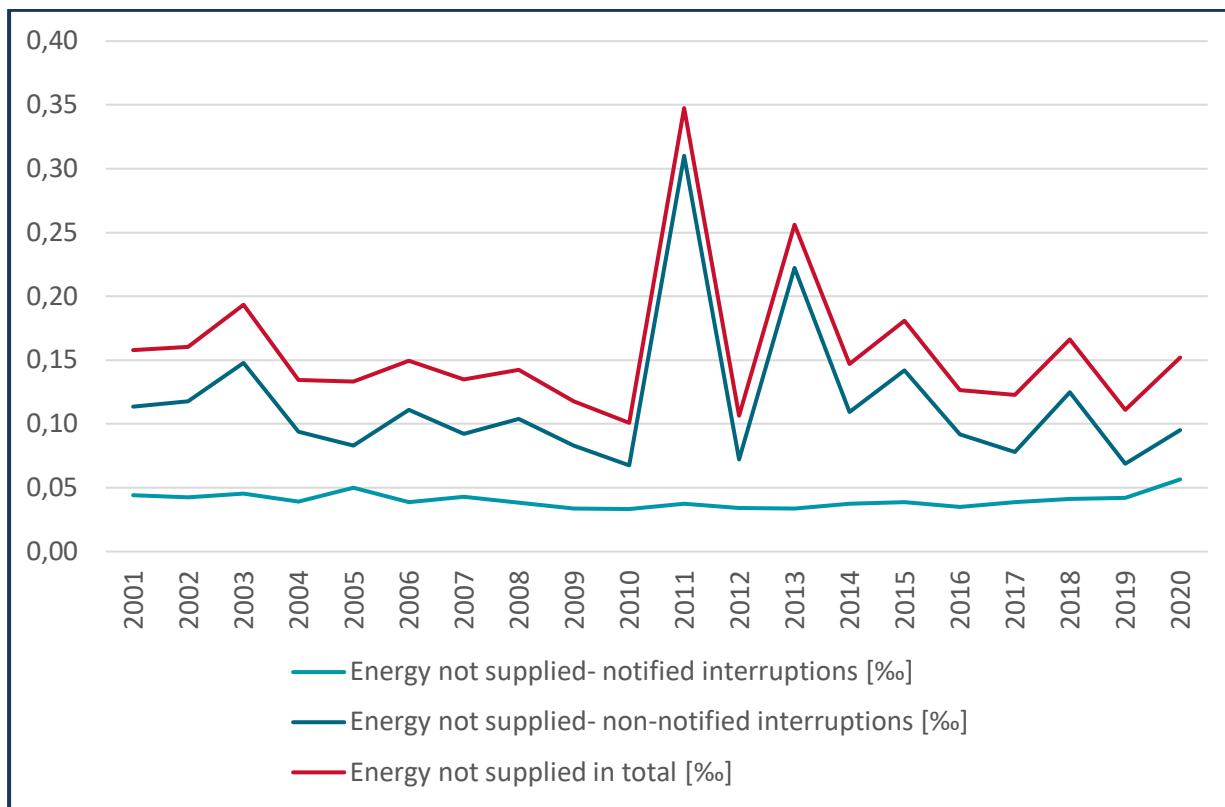


Figure 3 Energy not supplied (ENS) in thousand relative to the energy supplied (ES) to end users in Norway since 2001

In 2020 all the indicators on CENs presented in Figure 1 and Figure 2 increased compared to 2019. This means that the end-users were affected by more interruptions and the outage time per interruption also increased. There were more interruptions with energy not supplied on the highest network levels in 2020, this might explain the slight increase from 2019 to 2020. In 2003, 2006, 2011 and 2013, several hurricanes caused a high amount of energy not supplied. The amount of energy not supplied in 2014 was lower than in 2013, although storms in the Northern part of Norway and thundershowers in the summer caused a higher number of interruptions per customer. In 2015, the number of interruptions per customer was lower than in 2014, but the average interruption duration increased. This may be due to fewer interruptions caused by thundershowers and more interruptions caused by wind during storms. Interruptions due to storms with heavy wind normally takes longer time to repair than interruptions due to thundershowers.

Balancing market and balance settlement

Statnett holds a license for the system operation responsibility. This obliges Statnett to ensure physical balance between power production and consumption in the operational hour. In performing these tasks, the Nordic balancing market is an important instrument.

Norway is a part of an integrated Nordic balancing energy market for manual frequency restoration reserves (mFRR), known as “the regulating power market”. The Nordic area (except DK1) is a common synchronous area, and the Nordic TSOs therefore collectively operate the Nordic area as one single load frequency control area. In the regulation power market, generators and consumers can, subject to a minimum bid size requirement of 10 MW, submit bids to provide the TSOs with regulating power to balance the system. The bids with the lowest cost for upward or downward regulation are activated depending on the TSOs’ needs, and the final price is set based on marginal pricing (pay-as-cleared). In this way, the balancing resources are utilized in the most efficient way.

The mFRR balancing energy price varies close to the day-ahead clearing price. The balancing energy price will typically be above the day-ahead price in periods with upward regulation, and below the day-ahead price in periods with downward regulation.

According to Norwegian regulation, Statnett has the obligation to make sure that there are sufficient available balancing reserves in the power system at all times. The level is based on the dimensioning fault of the system, which is currently 1 200 MW in Norway. In addition, Statnett procures 500 MW mFRR to handle regional congestions and imbalances. To fulfil the requirement for available mFRR, Statnett operates a balancing capacity option market for mFRR (called “RKOM”), to make sure there is sufficient upward regulation on the merit order list. The RKOM is operational during wintertime, typically from October to April, and contracts are made both on weekly and seasonal level. Through RKOM, market participants are compensated for guaranteeing that they will provide upward regulation bids to the regulating power market.

In the forthcoming years, the Nordic TSOs (Statnett, the Danish TSO Energinet, the Swedish TSO Svenska Kraftnät and the Finnish TSO Fingrid) intend to further develop and make major changes to the existing integrated Nordic balancing market. This work is done under the umbrella of the so-called “Nordic Balancing Model” (NBM) and has the main objective of introducing a 15-minute imbalance settlement period in Q2 2023 and improving the frequency quality in the Nordic area. In this context, the Nordic TSOs have also proposed to shift from the current concept of operating the Nordic area as one load frequency block to a so-called MACE-based model. This model implies that each Nordic bidding zone will function as load frequency areas and thus have an individual obligation to balance the Nordic system and to keep frequency rate oscillating within the accepted margins for deviation. The change from the current balancing approach entails a shift from a large degree of manual process to a large degree of automatized process. The NBM also foresees a number of other balancing-related measures such as the establishment of a balancing energy market for automatic frequency restoration reserves (aFRR) and capacity markets for aFRR as well as capacity markets for mFRR.

The NBM also ensures the Nordic area is compliant with various new requirements in the EBGL and its subordinated Terms, Conditions and Methodologies (TCMs). It also facilitates the Nordic countries’ future participation in the European balancing platforms that are currently under development. At present, the Nordic TSOs intend to connect to the balancing platforms for aFRR (“PICASSO”) and mFRR (“MARI”).

Statnett has also been given a license for the responsibility of the balance settlement. The licence obliges Statnett to ensure a financial balance in the balancing market, by acting as a clearinghouse for the Norwegian part of the balancing market. The purpose of the balance settlement is to settle the differences between the executed trades against the actual input or offtakes from the power network.

In 2009, the four Nordic countries implemented a common model for settlement of imbalances, a so-called one-and-a-half price settlement, to harmonise rules and regulations. According to this model, the consumption balance is settled according to a single price, which is based on the marginal price of the activated mFRR balancing energy. The production balance is, however, settled according to two different prices, the Day-ahead clearing price or the marginal price of the activated mFRR balancing energy, depending on whether the imbalance contributes to reducing or increasing the net system imbalance, respectively. However, the Nordic TSOs have proposed to move to a single imbalance price model in Q4 2021. In this context, the Nordic TSOs are expected to submit a proposal for a methodology for the introduction of the single imbalance price by the end of 2020. The Nordic TSOs have also collectively announced that they expect to change from current 60 minutes imbalance settlement period to a 15-minutes imbalance settlement period by Q2 2023.

In recent years, NVE-RME has in cooperation with the Swedish (EI) and Finnish (EV) NRAs, worked with the TSOs to prepare for a common Nordic Balance Settlement (NBS) through a joint company (“eSett”). The NBS, which is an important step towards harmonised Nordic end-user markets, was successfully implemented in May 2017. The Danish TSO, Energinet, joined the NBS in 2018 and the settlement operations was handled over from Energinet to eSett took in Q1 2021.

3.1.3 Network tariffs for connection and access

The Norwegian electricity network is characterised as transmission (400-132 kV) and distribution (132 – 240 V) network. Distribution network is further differentiated as regional distribution (132 – 22 kV) and local distribution (22 – 240 V) for regulatory purposes. Statnett is the only Transmission System Operator (TSO) and is responsible for the transmission tariffs. Statnett is the main owner of the transmission network. For minor parts that have previously been owned by distribution system operators (DSOs), Statnett is in the process of taking over. By the end of 2020, there were 106 network companies owning and operating regional distribution and/or local distribution network. Tariffs shall be structured in accordance with regulation 1999-03-11 no. 30; Regulations governing financial and technical reporting, income caps for network operations and tariffs.

Revenue Cap model

NVE-RME regulates the DSOs and Statnett using an incentive-based revenue cap (RC) model. The RCs are set annually, based on a yardstick formula of 40 percent cost recovery and 60 percent cost norm resulting from benchmarking exercises. The regulation model covers operators of all electricity networks. Statnett is benchmarked together with other European TSOs, while the DSOs are benchmarked in a model based on Data Envelopment Analysis (DEA): one model comparing companies operating the regional distribution networks and one model comparing companies operating the local distribution networks. The DEA-results are adjusted using regression analysis to account for different geographical challenges between the DSOs. The models also take differences in network structure and operating environments into account.

NVE-RME notifies the RCs for the coming year “t” in November (t-1), and the DSOs and TSO set their tariffs accordingly. In February, the year after which the RCs applied for (t+1), we calculate the final RCs. We publish all data, benchmarking results and revenue cap calculations on our web page once the calculations are finished. This is to increase the transparency of the methodology and data used in the calculation of the RC. In principle, the notified and the final RCs for one year will only differ due to differences between estimated and actual electricity prices, inflation and WACC. In addition, we correct any errors in the DSOs’ costs or technical data that we discover prior to calculating the final RCs.

NVE-RME calculates the RCs based on expected total costs using inflation adjusted cost data from two years prior. The deviation between the expected total costs and the actual total costs for all companies in one year is included in the RC calculation two years later (e.g. we correct for the deviation between expected and actual costs for 2020 in the RC for 2022). We distribute the total cost deviation among the companies using their share of the sector’s total regulatory asset base. This mechanism does not apply to the regulation of Statnett.

Allowed Revenue

The companies set their tariffs based on their allowed revenue, which includes the revenue cap, costs related to property taxes, approved R&D costs and tariffs paid to other regulated networks. In order to remove the time lag in the cost of capital recovery, we add the difference between actual cost of capital (depreciations and return on assets) in the RC year and the capital costs from two years back to the allowed revenues.

Any Costs of Energy Not Supplied (CENS) during the year are deducted from the allowed revenues. CENS is a measure of the value of lost load for the customers. The CENS arrangement provides an incentive for

network operators to have a socio-economic maintenance and investment level in order to minimize power outages.

The revenue compliance is subject to regulatory control. We calculate excess or deficit revenue for a given year as the difference between actual collected revenues and allowed revenues for that year. Actual collected revenues include tariff revenues from customers, congestion revenues and revenues from system operations. Since we consider revenues generated from congestions as part of Statnett's actual revenue, they contribute to reducing the base for tariffs that Statnett can collect from Norwegian customers. However, the costs related to reducing the congestion are also part of the tariff base, which implies that the congestion revenues are used to finance investments to eliminate congestion. We decide an excess/deficit revenue balance every year, approximately one year after the RCs are set. At that time, the companies have reported their actual costs for the RC-year. The DSOs should adjust this balance towards zero over time, through tariff changes. Excess revenues must be reimbursed to the customers, while deficit revenues may be recovered.

Tariff determination

The tariff requirements and calculation methodology are subject to NVE-RME regulation. All network companies are responsible for determining tariffs within their income cap according to the regulation of the tariff structure. The regulation set a number of requirements for the structure of tariffs. This includes:

- Network companies shall offer non-discriminatory and objective tariffs and conditions
- Tariffs shall give price signals about effective utilisation and development of the network
- Any differentiation of the tariff must be based on network related criteria that are objective and verifiable.
- All houses, apartments and vacation homes are to be metered and settled individually

All tariffs are based on costs referring to the consumer's connection point. An agreement with the network company at the point of connection provides access to the entire network system and the power market.

According to the regulation on tariff structure, tariffs consist of a consumption-based energy component based on marginal network losses, and a fixed annual amount per customer. The fixed component covers customer-specific costs and network costs that are not covered by the consumption-based tariff components.

Transmission network tariffs

The transmission network tariff consists of a variable energy component and a fixed component, set by Statnett.

The energy component reflects the load each customer puts on to the network system when drawing power from it or feeding power into it. System load is reflected through marginal loss rates calculated for each connection point in the transmission network. The marginal loss rate is symmetric around zero for feeding and drawing power at each individual connection point. In areas with a production surplus, feeding (production) has a positive loss rate and drawing (consumption) a negative loss rate, and vice versa. The marginal loss rates in the transmission network are administratively restricted to ± 15 per cent. Separate marginal loss rates are calculated for daytime, night-time and weekends, and recalculated weekly in order to reflect changes in system load. The marginal loss rates are published on Statnett's

website and distributed to the customers on Fridays before the start of a new week. Area prices available on Nord Pool are used to calculate the energy component.

For the fixed tariff components, there is a distinction between feeding into (production) and drawing (consumption) of power. Cost allocation and differentiation between customer groups must take place in accordance with network-based, objective and non-discriminatory criteria.

Distribution tariffs

Consumers in the distribution network are charged a fixed component that covers customer-specific costs and a share of the other fixed costs in the network. The energy component for customers without maximum demand metering in the distribution network may in addition to network losses also cover a share of the other fixed costs in the network.

The network companies calculate separate tariffs for high-voltage and low-voltage connections.

Table 2. Average tariffs for a household customer

	2019 ⁴		2020 ⁵	
	incl. VAT and consumer tax	excl. VAT and consumer tax	incl. VAT and consumer tax	excl. VAT and consumer tax
Energy component	0.43 NOK/kWh (0.044 €/kWh)	0.20 NOK/kWh (0.021 €/kWh)	0.42 NOK/kWh (0.039 €/kWh)	0.19 NOK/kWh (0.018 €/kWh)
Fixed component	2 662 NOK/year (270.2 €/year)	2 234 NOK/year (226.8 €/year)	2 437 NOK/year (227.4 €/year)	2 019 NOK/year (188.4 €/year)

Tariffs for production

Tariffs for production are independent of the recipient of the power. As for other tariffs, the tariffs for production consist of an energy component and a fixed component.

The energy component varies with the customer's current feeding (production) and is determined based on marginal network losses in the whole network system.

The fixed component for producers connected to the transmission level, set by Statnett, is normative for the fixed component for producers connected to the regional and distribution networks. The fixed component for 2020 was 0.0121 NOK/kWh, which included a G-charge of 0.0116 NOK/kWh and 0.0005 NOK/kWh for costs related to mark-up for system operation. Average annual production the last ten years is used to calculate the tariff for each production unit. Tariffs for 2019 were based on data for the period 2009-2018.

⁴ NOK 1 = EUR 0.1015

⁵ NOK 1 = EUR 0.0933

Tariffs for prosumers

All consumers have a right to produce their own electricity and to sell surplus electricity. The network companies have a general obligation to connect prosumers and receive their production. Prosumers feeding in less than 100 kW are not charged the fixed component for production (G-charge).

Prosumers choose their own electricity supplier that supply their need for electricity and buy surplus electricity from the prosumer. In 2020 there were about 6 800 prosumers in Norway.

Connection charges

Network companies calculate a connection charge to cover costs of connecting new customers to the network or to cover costs of reinforcing the network for existing customers. Until 2019 connection charges did not include investments in the meshed network. From 2019 connection charges for customers with capacity exceeding 1 MW, include a share of costs of network investments at all voltage levels, including investments in regional distribution and transmission. Investment costs in regional and transmission network are in general multiplied by a reduction factor of 0.5 when taken into the connection charge. The objective of the connection charge is to make the customer responsible for the costs related to a new connection or an upgrade of the customer's existing network connection. Costs not covered by the responsible customer, but by the network company will increase the network company's allowed income, and hence, be dispersed to all customers through increased tariffs.

NVE-RME has handled and settled 10 complaints and disputes regarding tariffs and connection charges in 2020.

3.1.4 Cross-border issues

Capacity allocation and congestion management

According to Norwegian regulation, the TSO is responsible for establishing bidding zones in order to handle structural congestions, i.e. large and long lasting congestions in the transmission network.

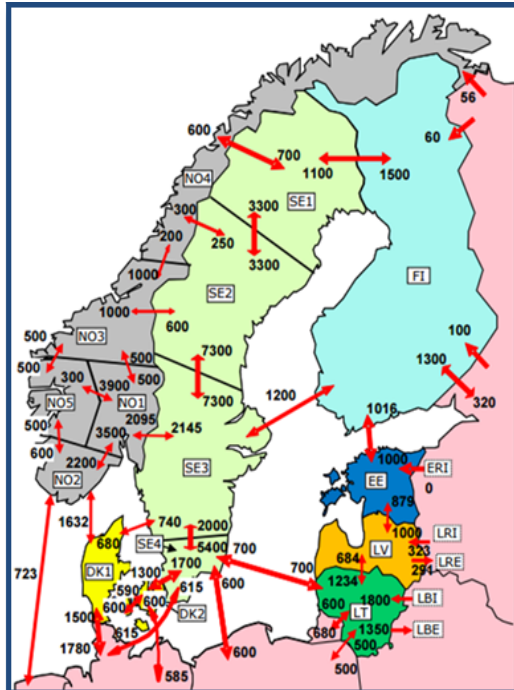


Figure 4. Price areas in the Nordic countries in 2020.
Source: Nord Pool

In 2020, there were five bidding zones in Norway. The bidding zones are NO1 (Eastern Norway including Oslo), NO2 (Southern Norway), NO3 (Middle Norway including Trondheim and Molde), NO4 (Northern Norway), and NO5 (Western Norway including Bergen).

Statnett determines the maximum permitted limits for available transmission capacity to the market (trading limits) on the bidding zone borders according to the “Principles for Determining the Transfer Capacities in the Nordic Power Market”. The relevant TSOs coordinate on the “binding” available net transfer capacities (NTCs) across national borders on a bilateral basis.

Further, the TSOs are responsible for publishing capacities for each border for the next day, two hours before gate closure of the Day Ahead market. Hence, these trading capacities are published on the ENTSO-Es Transparency Platform.

Norway takes part in the common European single day-ahead and intraday coupling. Nord Pool European Market Coupling Operator AS and EPEX SPOT SE are assigned marketplace concessions to operate physical power exchanges in Norway.

Norway has cross-border interconnections with Sweden, Denmark, the Netherlands, Russia and Finland. However, the interconnector towards Finland is small (150 MW), and primarily it serves the purpose of providing overall system stability in this northern part of the Nordic grid. Its available capacity for cross-border trading to the Day Ahead market is included in the NTCs on the SE1-FI border. The interconnection to Russia is a connection to the hydro power plant *Boris-Gleb* and only used for import. Additionally, the interconnector from Southern Norway (NO2) to Germany, NordLink, entered into operation in December 2020.

Due to fluctuations in the power situation, technical failures and maintenance, the available transmission cross-border capacity in Norway varies over time.

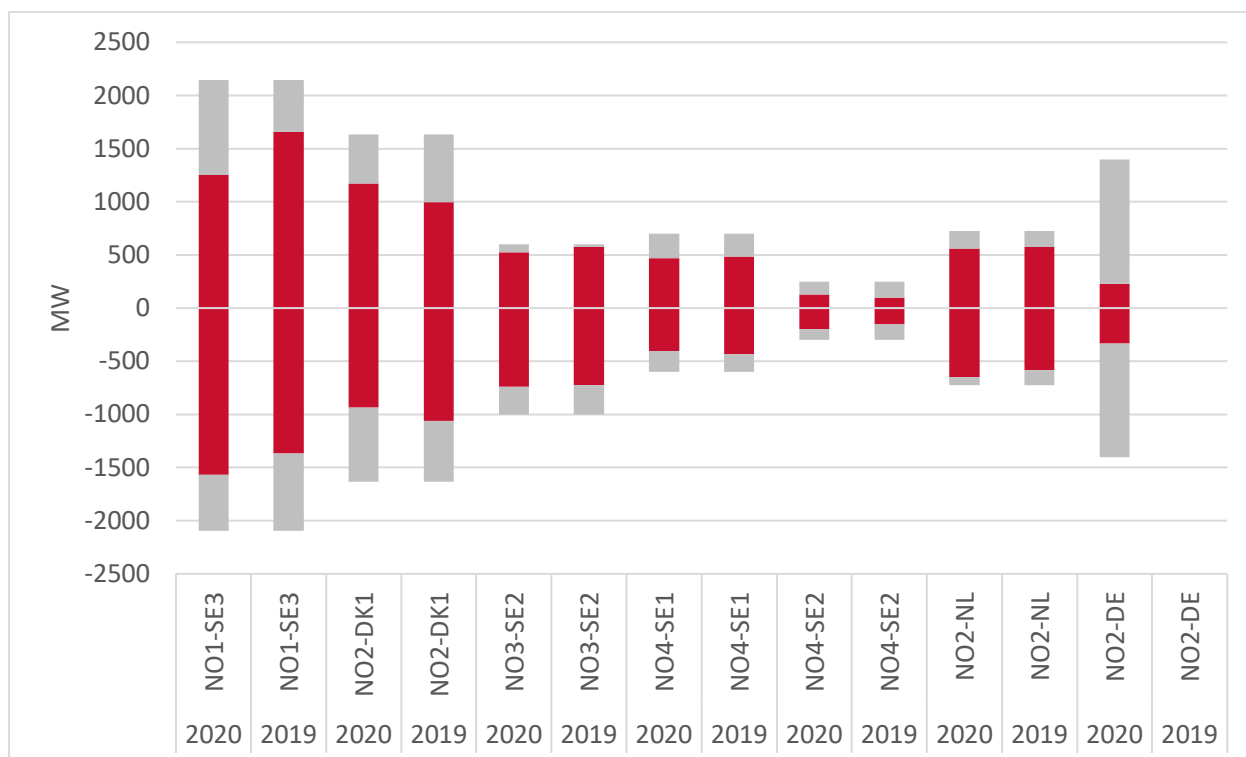


Figure 5. Available capacity in 2020 and 2019 for export and import as a portion of installed capacity for each cross-border interconnector. Source: Nord Pool Spot and SKM Syspower

The export capacity available to the market on Norway’s largest interconnection between eastern Norway (NO1) and central Sweden (SE3) decreased from 2019 to 2020. An accident caused several weeks with reduced capacity during the spring. During the summer and fall it was mostly maintenance work that caused less export capacity between NO1 and SE3. As shown in Table 3, the export capacity decreased by 19 percentage points from 2019 to 2020.

The border to Denmark consists of four parallel cables, Skagerrak (SK) 1-4, where the SK4 is the biggest with a capacity of about 700 MW, total capacity on all cables being about 1 700 MW. There were limitations and faults on the SK4 onshore cable in Denmark throughout the year. In order to facilitate system as well as asset security, the operational pattern on SK4 is changed. It entails an asymmetrical capacity allocation, which means that more capacity is given in one direction than the other. It is possible to reverse the primary and secondary directions, but it takes a few days to complete this switching in the installations. The direction is set based on socio- economic criteria, and from March most capacity was given in the NO->DK direction. Additionally, it was cable faults on SK1 (26 June to 21 September) and SK2 (31 May to 1 October) which led to capacity reductions.

On the border to the Netherlands there were reduction on the interconnector NorNed over longer time periods in 2020. This was due to issues in the AC network in the Netherlands.

In December the interconnector between Norway and Germany, NordLink, started its test operation. The new interconnector increased Norway’s trade capacity with 1 400 MW, but during the first month of test operation NordLink was operated at less than half its capacity.

The export capacity was especially low during the summer and early fall. In 2020 Norway used on average 70 percent of the available export capacity, while the utilization rate of available import capacity was only 10 percent. The corresponding numbers for 2019 were 38 and 27 percent.

Table 3. Average availability of interconnectors in 2020 and 2019. Source: SKM Syspower

Connection	2020		2019	
	Export [%]	Import [%]	Export [%]	Import [%]
NO1-SE3	58	75	77	65
NO2-DK1	72	57	61	65
NO3-SE2	88	74	96	73
NO4-SE1	67	67	69	72
NO4-SE2	50	67	39	51
NO2-NL	77	90	79	81
NO2-DE	16	24	-	-

Price differences

The division of bidding zones reflects physical structural congestions (transmission constraints) in the grid. The relevant TSOs set cross-zonal transmission constraints daily for the next day, between all zones, in both directions. Capacity given to the Day Ahead market is physically firm, i.e. guaranteed and upheld by the TSO. A consequence of having multiple bidding zones is that different zones can have different wholesale prices, reflecting the underlying supply and demand given the grid constraints. A system without bidding zones, on the other hand, would have required the TSOs to use more resources on redispatch measures. In turn, this would have resulted in increased costs for system operation and, all else equal, increased grid tariff. Lack of bidding zones is also likely to have affected the TSOs possibility to operate the grid within acceptable security limits.

An efficient wholesale market with bidding zones reflecting grid topology will yield efficient price signals for both generators and consumers alike. The wholesale price is an important input both in the short run, e.g. planning of next days' generation or consumption, and in the long run e.g. for seasonal planning of maintenance as well as for investment purposes e.g. where to build power plants and where to place large consumption units.

The wholesale market price is also important for the TSO when considering grid reinforcement or investing in new infrastructure. The price differences indicate the marginal benefit of expanding capacity between these zones. Consistently large price differences indicate a large potential welfare gain if the cross-zonal capacity is increased.

3.1.5 Compliance

DSOs

NVE-RME monitors network companies and ensures compliance with the neutrality criteria and other relevant regulations according to the Energy Act. NVE-RME has the authority to use sanctions such as for example fines in cases of non-compliance. DSOs with more than 100 000 customers participates in a compliance program in order to ensure neutrality vis-à-vis power suppliers and retail customers. NVE-RME also encourages DSOs with less than 100 000 customers to maintain similar procedures.

According to the Electricity Directive 2003/54/EC, network and supply companies can be bundled if the number of customers (both residential and business customers) does not exceed 100 000. To avoid cross-subsidisation and discrimination of electricity suppliers, NVE-RME regulates these bundled companies. The neutrality criteria require a clear separation of monopoly network activities and activities related to electricity production and sales. Further, the DSOs have a responsibility to give the retail market customers sufficient relevant information about supplier competition in the market.

Electricity suppliers

The Norwegian Price comparison tool is operated by the Norwegian Consumer Council. In 2020, the NVE-RME and the Consumer Council established a cooperation to enforce the obligation of suppliers to report all active contracts to the price comparison tool. The goal is improved communication between NVE-RME and the Consumer Council regarding possible violations. This will enable NVE-RME to issue decisions on lacking or faulty reporting quicker.

NVE-RME banned supply contracts that violated billing and settlement regulation

After monitoring electricity supply contracts offered buy suppliers in the Norwegian market, NVE-RME decided to ban Equal price per month contracts (EPC) after decided that they violated regulation on settlement and billing. With EPCs, the retailer bills the consumer for the same amount of money each month for spot-price based delivery of electric power and grid-services, regardless of the actual consumption and spot prices within the billing period. The billing amount is calculated to represent the average monthly payment of one year's consumption, based on the retailers forecast of prices and consumption for a specific consumer. Due to the variation of electricity demand over the year, an EPC-consumer will systematically receive too high invoices during the summer, and correspondingly too low invoices during the winter.

NVE-RME found that the EPCs violated regulation on billing because the bills are not based on actual, metered consumption. Furthermore, according to national regulation, consumers should be billed and settled at least every three months. EPCs typically had yearly settlement. Lastly, the EPCs were not in line with the regulation on advanced payment which only allows for billing 10 weeks in advance of delivery.

NVE-RME issued decisions requiring that the retailers should stop selling this product to customers and existing customers on EPC contracts should be transferred to other contract types. All the companies which received a decision have contested the decision to the Independent Appeal Body.

Economic regulation

According to the economic regulation of network companies, transactions within a vertically integrated company and transactions between a network company and other companies in the same corporation

needs to be based on competitive market conditions. Further, the national regulator may impose a specific method for cost allocation between areas of operation in vertically integrated companies. We annually audit a selection of the companies to reveal any possible cross subsidies.

3.2 Promoting Competition

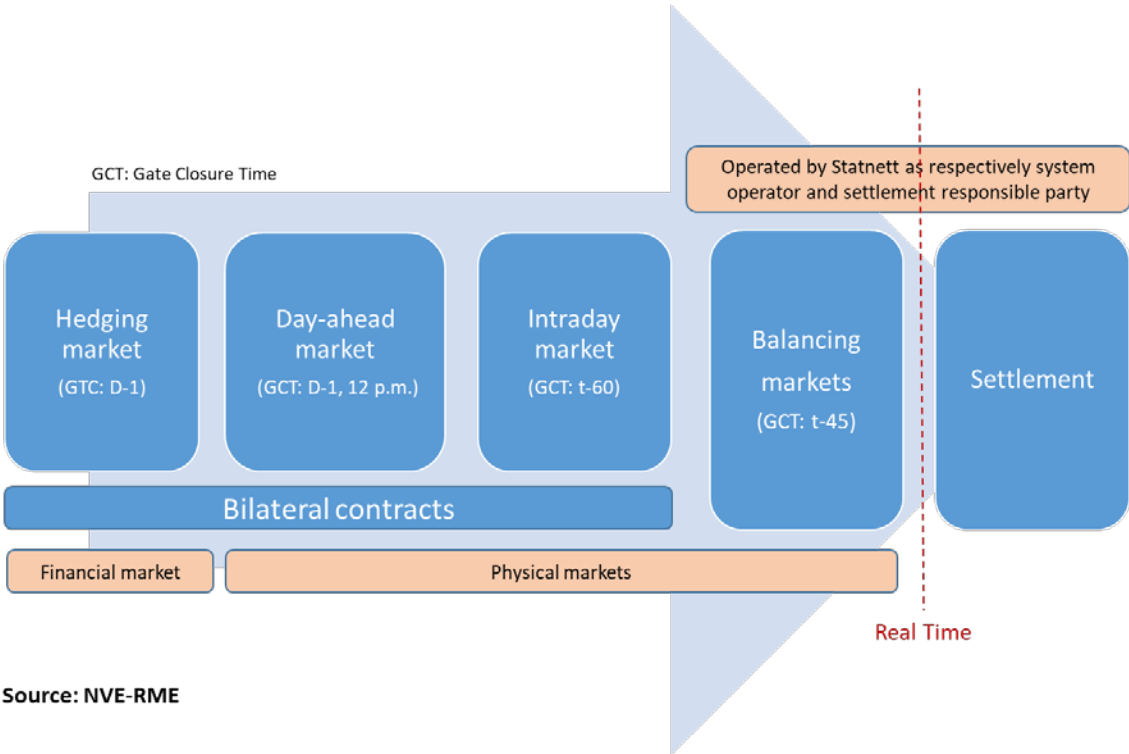
3.2.1 Wholesale markets

The Norwegian wholesale electricity market has been an integrated part of the Nordic market since the mid-1990s, and from 2014, a part of the European market coupling. Norway is now part of the single day-ahead and intraday coupling established by the Commission Regulation on capacity allocation and congestion management. Nord Pool European market Coupling Operator AS and EPEX SPOT SE are assigned market place concessions to operate physical power exchanges in Norway, and offer services in the Day ahead and Intraday markets.

A high number of market participants and high market shares indicate good liquidity and a well-functioning market, which in turn contributes to the participants’ confidence in the price formation.

Nord Pool is responsible for the System price calculation. The System price is the underlying price reference for financial trading and hedging contracts in the Nordic market. The System price denotes the unconstrained market clearing price for all bidding zones in the Nordic countries. For most bidding zones, there is a high correlation between the area prices and the System price, enabling market participants to hedge directly towards the System price. In addition, EPADs can be used to hedge against differences between area prices.

The main market for price hedging is the financial market organised by Nasdaq OMX (NOMX) and the Financial Supervisory Authority regulates the marketplace. The Exchange listed derivatives refer to both the Nordic System price and bidding zone prices. Different combinations of listed derivatives represent both zonal and cross-zonal hedging opportunities covering all Nordic bidding zones. NOMX also offers derivatives of German, Dutch and UK electricity, carbon emissions and electricity certificates.



Source: NVE-RME

Figure 6. Time frame in energy markets

3.2.1.1 Price monitoring

The price development is monitored by analysing and publishing weekly and quarterly reports of the Norwegian and Nordic electricity market. These reports contain a description of wholesale electricity prices, both the System price and price differences across price areas, the hydrological situation, power generation, consumption, and cross border exchange.

Figure 7 show how the weekly temperatures for Norway and Sweden developed through 2020 and 2019 compared to normal. The temperatures were higher than normal most of 2020, and especially during the winter months in the beginning and end of the year. This resulted in relatively lower electricity consumption for heating purposes this period. In total, the electricity consumption was 133.7 TWh in 2020, which is 1.1 TWh lower than in 2019.

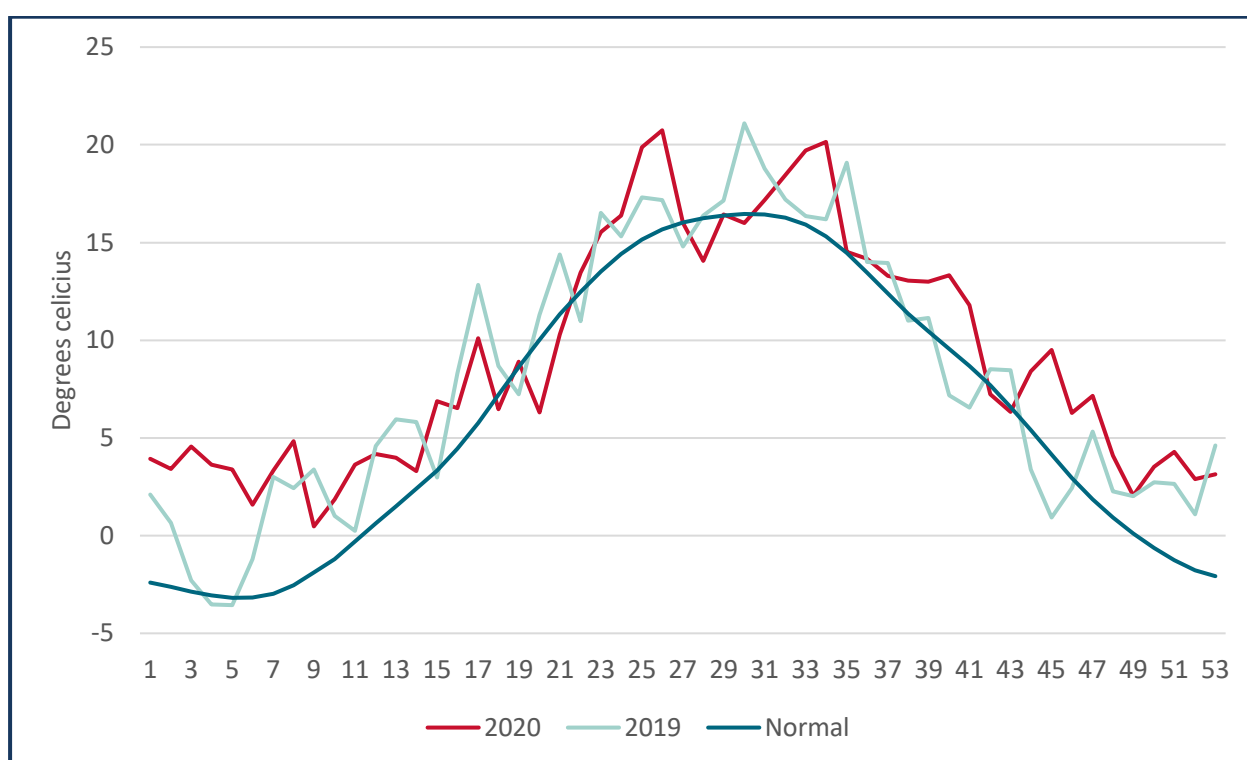


Figure 7. Average weekly temperatures for Norway and Sweden in 2020 and 2019 compared to normal. Source: SKM Syspower

Figure 8 shows the development of the Norwegian hydro reservoir levels in 2020 and 2019. In the beginning of 2020, the hydro reservoir level was about 4.5 percentage points below normal level. Mild weather during the winter gave more rain than normal and lower electricity consumption, which contributed to reservoir levels above normal levels most of the winter and spring. The only time during the year the Norwegian reservoir levels were below normal was in the weeks before the snow melted. The big volumes of snow caused a sharp increase in the reservoir level during the summer. The reservoir level stayed close to or above historical maximum levels for the rest of the year.

North of Norway (NO4) was the only price area in Norway that had a reservoir filling lower than normal during the winter and spring 2020. When the snow melted during the summer the reservoir level in the north of Norway experienced the same sharp increase as the rest of Norway. During the last quarter of 2020, the reservoir level in NO4 was close to historical maximum levels as well.

The Norwegian power production was 154.2 TWh in 2020, which represents an increase of 19.6 TWh from the 2019 production at 134.6 TWh.

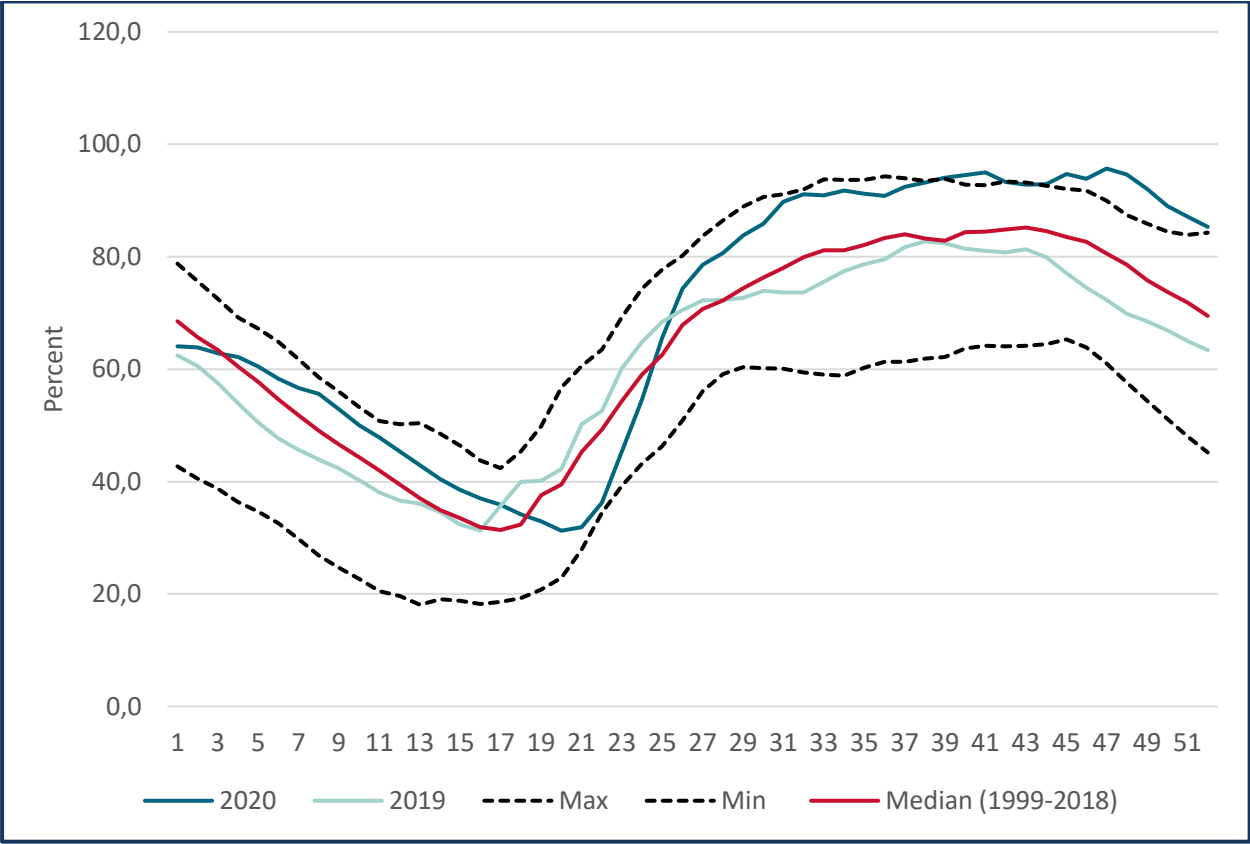


Figure 8. Hydro reservoir levels in Norway. 100 percent represents 84 TWh storage capacity. Source: NVE

Table 4 shows the annual average area prices in 2020 and 2019. The annual System price in 2020 was 10.9 EUR/MWh which represents a reduction of 72 percent since 2019. The average Norwegian power price was even lower at 9.2 EUR/MWh. The strong hydrological balance in Norway, less electricity consumption than normal and periods with less available export capacity than normal are factors that explain the low price.

Table 4. Annual prices in the Norwegian Elspot areas. Source: SKM Syspower

EUR/MWh	2020 [€/MWh]	2019 [€/MWh]	% Change 2019-2020
System Price	10.9	38.9	-72
East Norway (NO1)	9.3	39.3	-76
South West Norway (NO2)	9.3	39.3	-76
Mid Norway (NO3)	9.5	38.5	-75
North Norway (NO4)	8.9	38.3	-77
West Norway (NO5)	9.2	39.3	-77

Figure 9 shows the price in the five Norwegian bidding zones in 2020, and table 4 show the annual average area prices. The prices fell throughout the winter and spring as the amount of snow in the mountains increased and the hydro producers tried to make place for the inflow that was going to come when the snow melted. The increase in the power prices at the end of the spring reflects that the snow melted a bit later than normal and the Norwegian reservoir levels moved below normal. When the melting started there was a drastic fall in the power price as the hydro reservoirs filled up. The Norwegian prices stayed low throughout the summer. During the end of the year the prices varied more, mostly due to variations in weather and temperatures.

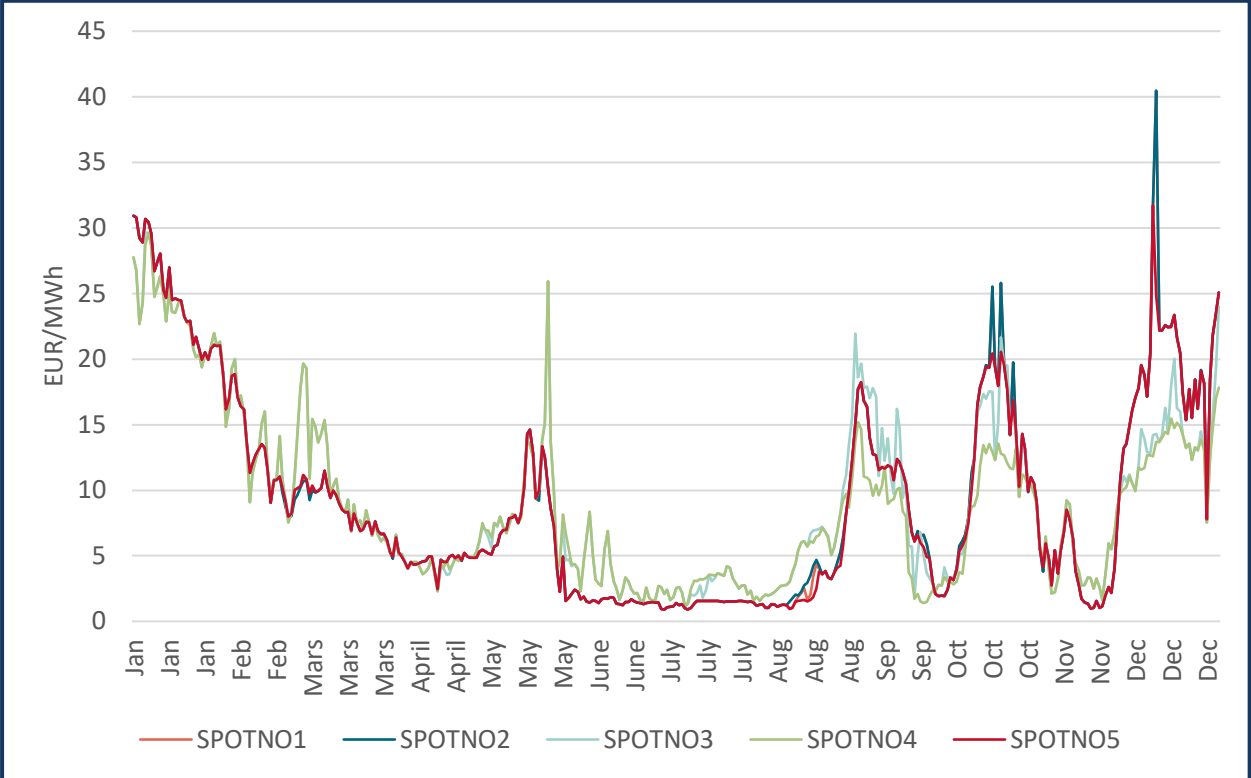


Figure 9. Price development in Norwegian bidding zones in 2020. Source: SKM Syspower

Figure 10 below shows the development in the daily Nordic System price in 2020 and 2019. As illustrated in the figure, the average System price was lower in 2020 than 2019 during the whole year. At the highest the daily price only reached 30 EUR/MWh, and at the lowest the daily system price was 0.7 EUR/MWh.

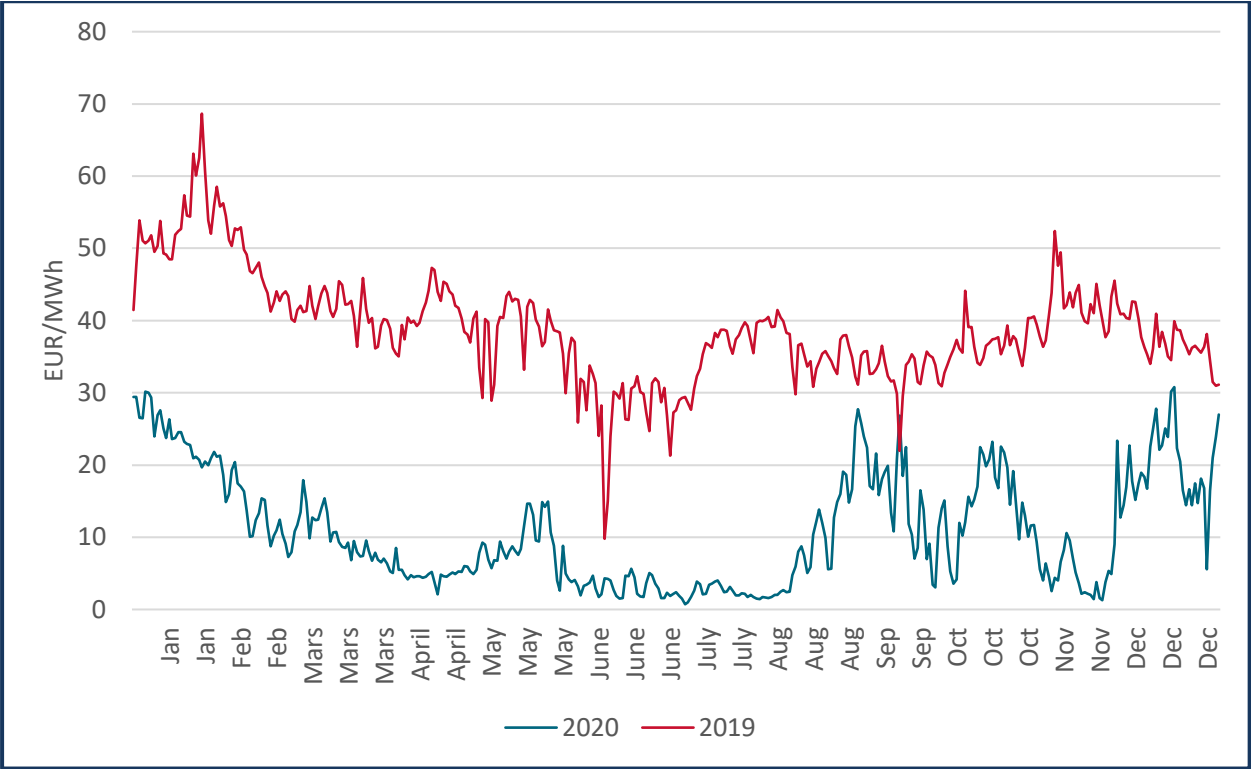


Figure 10. Nordic System price 2020 and 2019, EUR/MWh

With regard to the price monitoring in the wholesale market, NVE-RME supports the Norwegian Competition Authority in monitoring Norwegian generators’ bidding behaviour at NP. Price differences that can’t be explained as price-taker behaviour is investigated by looking at the different participants’ bidding in the marketplace. As a part of this process, NVE-RME has the mandate to collect information about the bidding from NP and production plans from the TSO.

3.2.1.2 Monitoring the level of transparency, including compliance with transparency obligation

Rules governing market conduct

Prohibitions of market manipulation and insider trading, requirements on disclosure of inside information and market surveillance is implemented in the Norwegian energy legislation.

These provisions are similar to REMIT⁶, and as a result Norway has harmonised market conduct rules with our neighbouring energy markets.

The rules are enforced by NVE-RME. We are continuously strengthening our market surveillance and investigation capabilities to ensure that the market participants comply with the rules.

Further, also according to Norwegian energy legislation, the Norwegian TSO (Statnett) may suspend orders/bids in balancing markets when it is obvious that the price setting is not efficient.

According to the Norwegian energy legislation, a marketplace arranging transactions in wholesale energy products (e.g. NP – Intraday and Day Ahead markets, Statnett – balancing services) is required to establish and maintain effective arrangements and procedures to identify breaches of the prohibitions of insider trading and market manipulation. When the marketplace reasonably suspects a breach, it shall notify NVE-RME without further delay. The requirement is similar to REMIT art. 15.

Furthermore, regulations given in the Norwegian Competition Act regarding abuse of dominant position and prohibition of co-ordinated actions may apply. These regulations are under the competence of the Norwegian Competition Authority. NVE-RME present assessments of the market situation for physical electricity to the Competition Authority.

Transparency in the wholesale market

According to the Norwegian energy legislation, market participants are required to publish inside information on a publicly available platform. Further, Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets applies.

In addition, NP publishes a range of market data per market time unit (per hour):

Day Ahead market

- System price
- Prices per bidding zone
- Volumes – buy and sell volumes per area
- Available transmission capacities between bidding zones within the exchange area, and on interconnectors to continental Europe
- Flow between bidding zones and on interconnectors to continental Europe

Regulating power (Balancing market)

- Volumes for up or down regulation per bidding zone
- Prices per bidding zone
- Special regulation volume (congestion management)
- Automatically activated reserves

Intraday market

- Prices
- Flows
- Available transmission capacities
- Total Scheduled flow

⁶ EU No 1227/2011 on Wholesale Energy Market Integrity and Transparency ("REMIT")

3.2.2 Retail markets

The Norwegian Energy Act states that any entity engaged in physical trading, generation and/or distribution of electric energy in Norway is required to hold a trading license. NVE-RME has through the Energy Act been given the authority to grant such licenses and is delegated the power to issue supplementing regulation through terms and conditions of the licenses whenever necessary. The trading license is the basis for NVE-RMEs supervision and regulation of market actors through the Energy Act regulation. A trading license is required to become a balance responsible party and to trade at a power exchange.

The licensing regime is light and transparent and does not represent an undue barrier to competition or entry in the market. Since 2020, NVE-RME has used an interactive application form that guides applicants to the rights answers and a business rule engine to handle the applications. This means that around 90 percent of applicants receive their license within minutes of applying. In the beginning of 2021, 646 received a trading license lasting from 1 January 2021 to 31 December 2024. Electricity suppliers supplying residential customers had 163 of these licences, while 100 were DSOs.

Since the liberalization of the electricity market in 1991, the number of residential customers with a supplier different from the incumbent supplier has increased. However, most incumbent suppliers still have a dominant position within their local network area. On average, the dominant supplier has a market share of about 70 percent of residential customers within its own network area. This share has been stable for several years.

NVE-RME sent secondary legislation mandating separate branding of network operations and commercial activities on public consultation in June 2019. The regulation was adopted in 2020 and will enter into force on 1 January 2022. Separate branding is assumed to increase the competitive pressure in the end-user market by making it easier for end-user to identify electricity suppliers and DSOs, and also to understand their different and independent roles.

3.2.2.1 Monitoring the level of prices, the level of transparency, the level and effectiveness of market opening and competition

The Norwegian Consumer Council operates the Norwegian price comparison tool for electricity contracts, which contains information about all offers available in the market. It ranks contracts according to the estimated total cost of energy including taxes. NVE-RME advises customers in the retail market to use the price comparison website whenever they choose a supplier, and all DSOs are obliged to inform their customers about the price comparison tool on their bill.

NVE-RME regulates the collection of information for Consumer Council's price comparison tool under the Energy Act regulations. When developing the regulations for collecting information for Consumer Council's price comparison tool, a key principle for NVE-RME was to ensure that all contracts in the market are presented in the price comparison tool.

There are no regulated prices in Norway. Customers who have not yet chosen a supplier shall, the first six weeks, be served by their local DSO (supplier of last resort) at a price that is maximum øre/kWh 5 excl. VAT (or øre/kWh 6.25 incl. VAT) above spot price. After 6 weeks, the supplier of last resort is obliged to

set the price and terms in a way that gives an incentive to the customers to find a supplier in the energy market.

As of January 2012, a mandatory support scheme to stimulate increased investments in the production of electricity from renewable energy sources was in place in Norway. The electricity producers included in the support scheme receive one electricity certificate for each megawatt hour of renewable electricity generated. At the same time, electricity suppliers and certain electricity users are obliged to purchase electricity certificates for a specified proportion of the volume of electricity they deliver or use. The electricity certificates are traded in a common Norwegian-Swedish market, and the price of electricity certificates is determined by supply and demand. The consumers of electricity finance the scheme, as the supplier’s costs of purchasing the certificates are added to the electricity price.

Electricity suppliers are required to refer to NVE website to inform their customers about the costs imposed by the electricity certificate obligation.

In 2020, electricity consumers paid for electricity certificates amounting to 18.6 percent of their total electricity consumption. The quota curve will gradually increase until 2021, which is the last year for approving new facilities. Thereafter, the share will decline towards 2035 as the electricity certification scheme faces out. The actual additional cost paid by the consumers varies according to supply and demand. On average, a customer paid an additional 1.6 øre/kWh (including VAT) due to electricity certificates in 2020. This means that a household using 20 000 kWh of electricity in 2020, paid a total cost of approximately 320 NOK (including VAT).

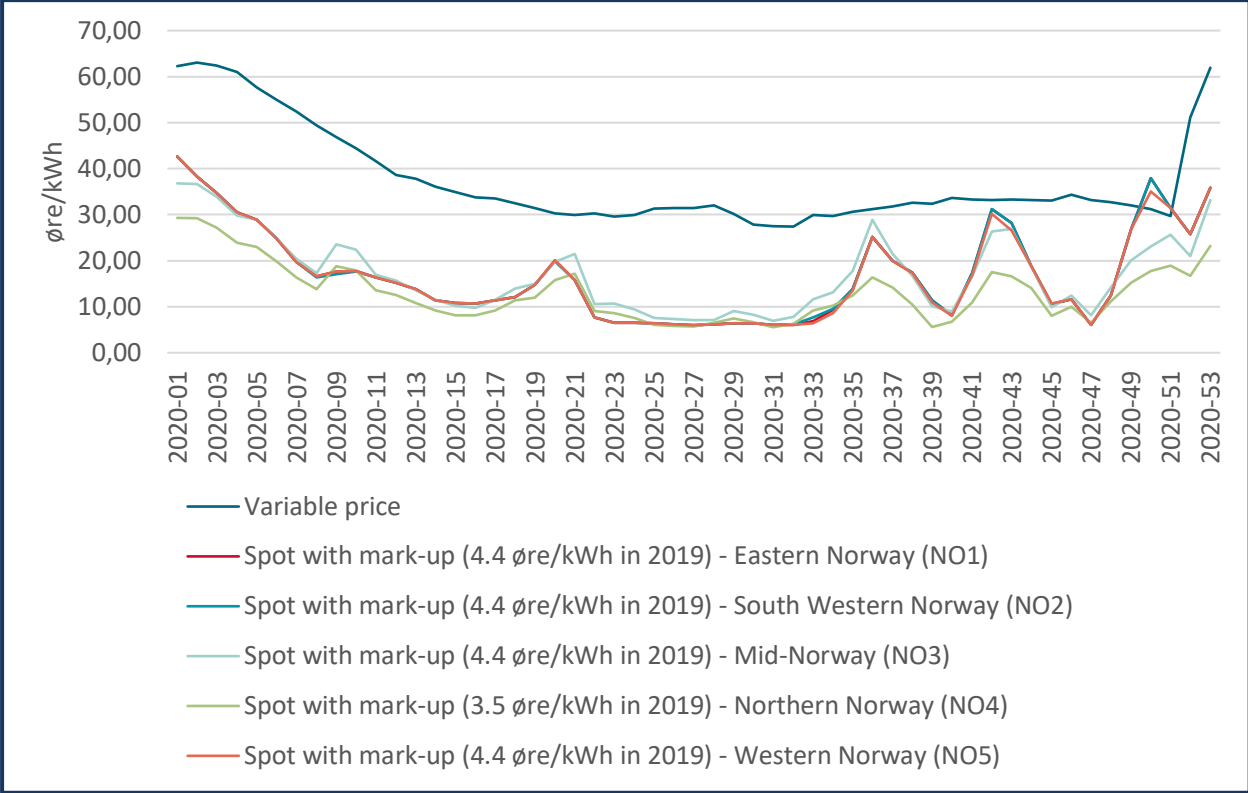


Figure 11. Average price development for the spot contract in the five Norwegian bidding zones

The figure above shows the average price development throughout 2020 for the spot price contracts in the five Norwegian bidding zones of the Nord Pool Spot power exchange, together with the variable price contract. Around 75 percent of the household customers has spot-based contracts, but customers can freely choose from a wide range of other contract types, for instance variable contracts with a price cap or price guarantee, contracts bundled with other products (gift certificates, airline mileage bonuses, etc.) or contracts including guarantees of origin⁷.

The listed prices in the figure include VAT and a mark-up of øre/kWh 4.4, except for the el-spot area Northern Norway, where the price excludes VAT and includes a mark-up of øre/kWh 3.5. The mark-ups are calculated by NVE-RME to represent an average mark-up for spot-price contracts offered in the market. The mark-up used for contracts in Northern Norway is lower as this area of Norway is exempted from VAT on electricity.

In the retail market, general competition legislation (The Norwegian Competition Act and the competition rules applicable through the EEA Agreement) apply. The physical power exchanges, Nord Pool European Market Coupling Operator AS and EPEX Spot SE, operates under marketplace license issued by NVE-RME pursuant to the Norwegian Energy Act. The marketing of electricity contracts is regulated by the Norwegian Consumer Protection Authority.

3.2.2.2 Recommendations on supply prices, investigation, and measures to promote effective competition

As part of the goal to further increase competition and efficiency in the market, smart hourly metering (AMI) and a national point of data management (Elhub) was implemented. The smart meter roll-out was completed 1 January 2019 and the datahub went live on February 2019. The implementation of Elhub standardises the exchange of hourly metering data, simplifying the communication of metering data in the chain between DSOs, suppliers, and consumers. NVE-RME considers active, well-informed consumers to be key for the Norwegian retail market. Smart meters provide real-time consumption data, and price signals through dynamic price contracts give incentive for energy efficiency and peak load management, by enabling consumers to adjust consumption to price variations.

In general, NVE-RME aims at identifying and reducing the barriers that keep consumers from being actively involved in the retail market. By providing information about the national price comparison web site and presenting a compilation of average retail market prices on a weekly basis, NVE-RME encourages consumers to ensure that their contracts are among the most competitive ones.

In 2020, NVE-RME commissioned a study on the current situation of household customers in the Norwegian retail market. The report investigates challenges consumers face when they buy electricity. The consultants then investigated to what extent the problems could be ameliorated within the existing regulatory framework or whether there is a need to update regulations. The study considered the complete legal framework regulating the retail market for the consumer, including consumer protection legislation and energy legislation. The report concludes that information asymmetry is one of the most significant issues in the retail market and that some consumers probably pay more than they could for their electricity. The report suggests ten measures that the government bodies can implement to improve the information in the retail market. NVE-RME and the Consumer Protection Authority have established a working group to address the issues raised in the report.

⁷ Electricity price. Statistics Norway <https://www.ssb.no/en/statbank/table/09364>

3.2.2.2.1 Retail market statistics

NVE-RME publishes an overview of the retail market prices on a weekly basis, comparing the average price of the three standard types of contracts the past week, and by presenting an estimation of the average accumulated electricity cost for the customers so far this year. The data are collected from the Norwegian Consumer Council and Nord Pool. The data is published in a weekly report on NVE-RME's website and is regularly referred to by the public media. NVE-RME also publishes similar retail market data in a quarterly report on the energy market.

To assess retail market functioning, NVE-RME produces statistics on a regular basis. Norway has a national programme that defines and delimits official statistics⁸. The retail market statistics is a part of this programme and must satisfy a set of quality requirements. An example of such a requirement is that the statistics must be produced in a professional and transparent manner independent of political and other influences.

In 2020, NVE-RME replaced DSO survey data with data from the national hub (Elhub). By using data from Elhub, the production process has become more efficient and the response burden for the DSOs has been reduced. The project has given NVE-RME more detailed, punctual, and accurate data to monitor and assess the retail market. Among the metrics used are supplier switching rates, share of customers supplied by suppliers of last resort and supplier market shares. NVE-RME will continue to develop retail market statistics in 2021 and plan to produce reports on prosumers and inactive customers.

In 2020 there were 620 000 supplier switches resulting in a switching rate of 19 percent.⁹ The share of final household customers supplied by the supplier of last resort was 2.1 percent in the end of 2020, a reduction of 16 percent from 2019. Both measures indicates more active consumers.

The market share of the three largest suppliers in the household sector by metering points has been around 40 percent for several years. The Herfindahl-Hirschman Index (HHI) measures the level of concentration in a market. The HHI for the household customers measures just under 700. The low concentration can be explained by a high number of suppliers and it indicates a competitive market structure.¹⁰

3.2.2.2.2 Cyber security

In 2020, NVE-RME decided to fund a PhD position for one employee on cybersecurity of smart metering systems and the future smart grid. The three-year doctoral degree education was established in cooperation with the Norwegian University of Science and Technology and started August 2020.

In august 2020, NVE-RME conducted a security audit of Elhub as a part of our supervisory activities. Elhub is Norway's national meter data hub and is owned by Statnett, the Norwegian TSO. Consumption data for all final customers are stored and shared to market actors through the hub. The audit investigated information security management and technical security. Due to the Covid-19 situation, the audit meetings were conducted with key personnel meeting in person and observers connected over video-link.

⁸ National programme for official statistics: <https://www.ssb.no/en/omssb/lover-og-prinsipper/nasjonalt-program-for-offisiell-statistikk>

⁹ Incl. both household and non-household customers

¹⁰ The Herfindahl-Hirschman Index (HHI) measures the degree of concentration in a market. Based on guidance from the European Commission an HHI of above 2,000 signifies a highly concentrated market. 2017 Handbook for National Energy Regulators: how to assess retail market functioning <https://www.ceer.eu/documents/104400/-/-/840b4ce7-9e4a-5ecc-403a-fad85d6ba268>.

3.3 Security of supply

3.3.1 Monitoring balance of supply and demand

The large share of hydropower production makes the Norwegian power system vulnerable to variations in inflow and precipitation. Norway has detailed regulations and means for handling critical energy situations and energy rationing. It has not been necessary to activate energy rationing in Norway.

The individual network and production companies are responsible for routines regarding resources, material and equipment, but there are common arrangements to ensure that the individual companies cooperate on these issues.

Market information and monitoring

Both the Norwegian TSO and NVE-RME analyse the possible development in the energy and power balance. When it comes to monitoring the market development, regular reports that describes the development are published.

In strained operational situations or during operational disturbances

Through the Norwegian regulation on system operation, the TSO is granted duties and responsibilities to require mandatory participation in the balancing market, require regulation of power production (even when not part of the balancing market), and to require load shedding. Load shedding may be ordered manually, however, load shedding also occurs by the use of automatic system protection schemes. System protection schemes in the transmission network can only be installed and operated based on decisions made by the TSO.

Norway's special regulations for highly critical power situations

Statnett is responsible for the operation of the power system, also in the case of extreme situations. NVE is head of the preparedness and emergency planning of the power supply and is also the rationing authority. Regulations relating to power system operation regarding handling of extreme situations came into force 1 January 2005. This regulation aims to secure extreme situations and is not relevant for normal operation. Through this regulation, Statnett is given an extended responsibility to continuously investigate and develop necessary measures to ensure that there is momentary balance at all times and to ensure the energy balance during the winter season. Statnett is obliged to inform of the findings. The different measures with conditions are approved before they enter into force. Permanent- and operational costs for the different measures are handled within Statnett's revenue cap.

According to Norwegian regulation, Statnett can develop different remedial actions within the terms of the regulation on system operation based on the following set of terms:

- To reduce risk of electricity rationing
- Must be effective for handling of extreme situation, and at the same time not influence the electricity market or investment decisions within the production or the network
- Maintain TSO neutrality and independent position in the power market

- Contribute to a socio-economic handling of extreme situations and to maintain the efficiency of the physical power market
- Take into consideration the already existing flexibility in production, transmission and consumption

Electricity peak demand

Domestic gross energy consumption was 133.7 TWh in 2020, a decrease from 134.9 TWh in 2019. The Norwegian peak demand normally occurs in the winter season. The peak electricity demand was 21 861 MWh/h in 2020, which is lower than the peak demand in the previous ten years.

Table 5. Peak demand for the last 10 seasons. Source: Statnett.

Year	Weekday	Date	Hour (CEST)	Demand [MWh/h]
2010	Wednesday	06.01.2010	8	23 994
2011	Monday	21.02.2011	8	22 129
2012	Wednesday	05.12.2012	8	23 443
2013	Wednesday	23.01.2013	8	24 180
2014	Thursday	22.01.2014	9	23 489
2015	Wednesday	04.02.2015	8	22 530
2016	Thursday	21.01.2016	8	24 485
2017	Thursday	09.02.2017	8	23 246
2018	Thursday	01.03.2018	8	24 108
2019	Thursday	31.01.2019	17	23 672
2020	Friday	28.02.2020	8	21 861

Currently available generation capacity

The total installed generation capacity in Norway was 37 840 MW in 2020. Available generation capacity during a cold winter is estimated to be approximately 26 600 MW by Statnett. The wind power generation capacity increased by 1 532 MW from 2019 to 2020, whereas the hydro power generation capacity increased by 332 MW. The amount of wind power under construction was 1 154 MW by the end of 2020.

Table 6. Generation fuel mix 31.12.2020. Source: NVE and Multiconsult

	Installed capacity (MW)	Mean annual generation (TWh/y)	Net capacity added (MW)	Under construction (MW)	License/permit given, not yet built (MW)
Wind Power	3 977	13.10	1 532	2 487	1 641
Hydro Power	33 003	135.60	332	875	1 783
Thermal Power	700	3.50	0	0	0
Solar Power	160	0.14	40	N/A	N/A
Sum	37 840	152.34	1 904	3 362	3 424

Monitoring balance of supply and demand in the national market, the level of expected future demand and envisaged additional capacity being planned or under construction

The responsibility to coordinate long-term power system planning is delegated to 17 owners of the distribution network (33 – 132 kV). Each of these are responsible for planning the distribution network in a specific area, in cooperation with other network owners and other relevant parties. The Norwegian TSO is responsible for operation and planning of the national transmission network (132-420 kV).

Every second year, the responsible network companies in the distribution planning areas and Statnett present updated regional and national network development plans. The timeframe for the network development plan is minimum 20 years. The plan must describe the present network, future transmission and distribution conditions together with anticipated measures and investments. The plan describes generation, transmission and consumption of electricity, and includes conditions that are of importance for the development of the power system in the area. Simplified socio-economic analysis must be presented for all network investments that require environmental impact assessment (EIA). The main objective of the power system studies is to contribute to a socioeconomic rational development of the regional distribution networks and the transmission network.

3.3.2 Monitoring investment in generation capacities in relation to SoS

Authorization criteria for new generation investments and long-term planning

For all new projects (wind-, gas – and hydro power plants, power lines, transformers) a license to build and operate must be granted. The profitability, public and private interests and environmental issues will be considered for every project.

The responsibility for power system studies is delegated to an appointed licensee in a given network area. The main task is to contribute to a socio-economic rational development of the distribution and transmission network. In this respect, the energy carriers in question are for stationary energy usage. The power system studies will continue to be an important base document in the handling of the applications for a license to build or expand an energy plant or installation. This is especially of importance regarding applications for the larger overhead line projects.

Progress in major infrastructure projects

NordLink and North Sea Link

In October 2014 Statnett was granted licenses to build two HVDC cables to Germany and UK respectively, each with a capacity of 1 400 MW. The NordLink cable to Germany was in operation from December 2020. The interconnector between Norway and UK, North Sea Link, started construction in 2018 and is scheduled for operation from 1 October 2021.

NorthConnect

A company owned by Vattenfall, ECO, Lyse and Agder Energi is planning a new interconnector between Norway and Scotland with a capacity of 1 400 MW. Applications for construction and foreign trade licenses were sent to the Ministry of Petroleum and Energy (MPE) in 2019. MPE has informed NorthConnect that there is insufficient basis to make a decision on the application. Experience must be gained from the NordLink and NSL cable first.

Greater Oslo Grid Plan

A series of licenses have been given to Statnett to replace older cables and lines and ensuring security of supply to the Oslo region. Construction on new lines started in 2017.

Western Corridor

During the period leading up to 2021, Statnett will upgrade the voltage in the Western Corridor from the current voltage of 300 kV to 420 kV. The Western Corridor is a collective term for the main grid in south-western Norway, including the counties of Aust-Agder, Vest-Agder and Rogaland. This will enable renewable integration, increase security of supply and reduce constraints on the interconnectors.

Sogndal-Aurland

Statnett is planning to upgrade the 300 kV power line Sogndal-Aurland to 420 kV voltage. This will increase the transmission capacity southwards from Sogndal and facilitate new wind and hydro production. The project is in a permitting process.

Expected future demand and envisaged capacity for the next 5 years and 5-15 years

The total investment in grid development over the next decade is estimated to 14.2 billion euros. This is a higher value than last year. The historically high network investment level will ensure a reliable power supply, facilitate renewable energy projects, electrification of fossil energy use and industrial and commercial development throughout Norway.

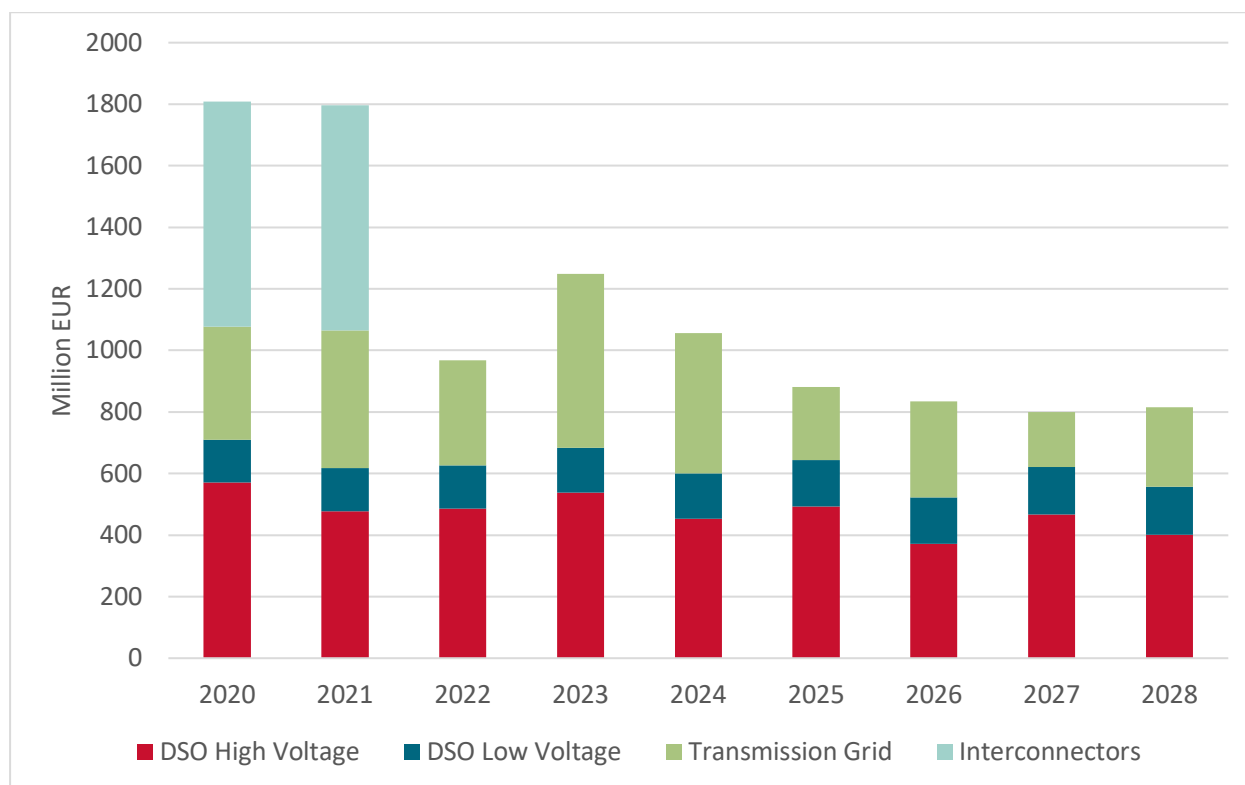


Figure 12. Expected investment levels in the Norwegian network. 1 EUR = 10 NOK in 2020

3.3.3 Measures to cover peak demand or shortfalls of suppliers

The quality and level of maintenance of the networks

The CENS arrangement referred to in chapter 3.1.2 is the main regulatory tool to ensure a proper level of maintenance of the networks. In addition, NVE-RME carries out audits on companies regarding operation and maintenance. The quality of the maintenance is monitored on these audits.

Measures to cover peak demand

Peak demand is handled through market mechanisms, where price signals through the day ahead, intraday and balancing markets provide incentives for market participants to adjust their consumption and production accordingly.

4. THE GAS MARKET

Although Norway is a large gas producer, only 839 GWh (2020) is distributed in gas distribution networks. The Norwegian gas market is small and is expected to remain small.

There are two local areas with gas distribution networks in Rogaland in the southwestern part of Norway. Both are connected to the upstream pipelines from Kårstø gas processing plant, and they use injected tail gas from LNG production facilities in addition to natural gas. There is no transmission network in Norway as defined in EUs third Natural Gas Directive.

NVE-RME is the national regulatory authority for gas distribution. The current regulation was changed from November 2019 to comply with the directive 2009/73/EC (Gas market directive).

In September 2020, the Ministry of Petroleum and Energy notified the companies in the two areas described above that they would be given the role as distribution system operators. The formal designation went into force from 1 February 2021.

5. CONSUMER PROTECTION AND DISPUTE SETTLEMENT IN THE ELECTRICITY MARKET

5.1 Consumer protection

Network companies are obliged to connect customers within their license area.

The electricity market is open for all customers, and the prices are set in the market. By contractual law, the suppliers are required to provide the customers with the terms and conditions for the chosen electricity contract. All suppliers are obliged to show the price for the contracts they offer in a certain way according to regulations managed by the Norwegian Consumer Protection Authority. Further, the suppliers are obliged to inform the customer about any price changes deviating from the agreed price before the price change takes place. Change of supplier has been free of charge for all customers since 1997.

To strengthen the consumer's position in the retail market, the DSOs are by regulation obliged to provide the customers with information regarding both network issues and electricity supply issues. The DSO must provide the customers with information regarding the terms and conditions of the electricity supplied by supplier of last resort, and give the customers easy access to their consumption data by giving access to a web service and putting information in the invoice, etc. Further, they are obliged to provide the customers with neutral information on how to choose a supplier, which suppliers are available in the given network area, information about the national price comparison web site, and contact details to the Norwegian Electricity Appeal Board.

To make sure network companies do not abuse their power as monopolists, they are regulated with a revenue cap in addition to regulations regarding tariff structure. In previous years, the Norwegian Parliament granted funds to reduce network tariffs for customers in areas with the highest distribution costs. The sum was gradually reduced and 2018 was the first year when no funds were allocated to this purpose.

The DSO is the supplier of last resort mainly to ensure that the customer is supplied with electricity, even if they have not signed a contract with an ordinary supplier. The price charged by the supplier of last resort is designed to give the customer an incentive to choose an ordinary supplier. However, the DSO, as the supplier of last resort, has a high threshold for disconnecting a customer unable to handle the electricity bills, and must ensure that customers are protected from disconnection when life or health is at risk.

Though there are no particular measures in the Norwegian Energy legislation aimed at protecting vulnerable customers, they are protected through Norway's well-developed general welfare system. When the social services have guaranteed for a customer's payment, disconnection is prohibited.

5.2 Dispute settlement

NVE-RME has been authorized to monitor compliance with, and to take decisions according to the Energy Act and regulations laid down in accordance with the Act. NVE-RME handles complaints and disputes regarding network regulation and tariffs, customer compensations for outages over 12 hours, quality of

supply, metering and settlement, billing, supplier switching, neutrality and non-discrimination, system operation and the obligations and powers of the TSO.

The Norwegian Electricity Appeal Board assists customers regarding complaints related to contracts for network connection, network use and/or electricity supply that have not been settled between the customer and the electricity supplier and/or the DSO. All companies that have received a trading license from NVE-RME under the Energy Act are included in the scheme. The Board consists of two representatives appointed by the Norwegian Consumer Council, and two representatives appointed by electricity industry. The Board is managed by a legal professional. In 2020, the Norwegian Electricity Appeal Board received 593 written complaints and reached a decision in 149 cases.

Appendix

Table 7. Continuity of supply indices with reference to the end users as regards long interruptions in Norway.

	SAIDI [hours]	SAIFI	CTAIDI [hours]	CAIDI [hours]	CAIFI
2005	2.3	1.9	2.9	1.2	2.4
2006	2.6	2.1	4.6	1.3	3.4
2007	2.4	2.0	3.6	1.2	3.1
2008	2.5	2.1	3.9	1.2	3.3
2009	2.0	1.8	3.2	1.1	2.9
2010	1.7	1.6	2.8	1.1	2.6
2011	4.3	2.7	6.5	1.6	4.1
2012	1.8	1.6	3.1	1.1	2.9
2013	3.0	2.2	4.8	1.4	3.5
2014	2.7	2.4	4.1	1.1	3.7
2015	2.8	2.1	4.4	1.3	3.3
2016	2.1	1.9	3.5	1.1	3.1
2017	1.8	1.7	3.0	1.1	2.8
2018	2.8	2.3	4.5	1.2	3.7
2019	1.8	1.7	3.3	1.1	3.1
2020	2.2	2.0	3.9	1.1	3.5

Table 8. Continuity of supply indices with reference to the end users as regards short interruptions in Norway.

	SAIDI [minutes]	SAIFI	CTAIDI [minutes]	CAIDI [minutes]	CAIFI
2006	1.4	1.8	3.0	0.8	3.8
2007	1.4	1.9	3.0	0.8	3.9
2008	1.7	2.1	3.3	0.8	4.3
2009	1.2	1.8	2.6	0.7	3.8
2010	1.0	1.4	2.4	0.7	3.4
2011	1.8	2.6	3.3	0.7	4.8
2012	1.3	1.6	2.9	0.8	3.8
2013	1.6	2.0	3.2	0.8	4.2
2014	2.0	2.4	3.5	0.8	4.2
2015	1.5	1.9	3.3	0.8	4.4
2016	1.2	1.7	2.9	0.7	4.1
2017	1.1	1.6	2.7	0.7	3.7
2018	1.5	2.1	3.5	0.7	4.8
2019	1.2	1.6	2.7	0.7	3.7
2020	1.4	1.8	3.4	0.8	4.5

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