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The Norwegian Energy Regulatory Authority -RME

RME RAPPORT

Nr. 5/2020

National Report 2020

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RME Rapport nr. 5/2020

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Published by:	The Norwegian Energy Regulatory Authority
Authors:	Ove Flataker and Hege Holte Nielsen
Cover photo:	Knut Svendheim/NVE
ISBN:	978-82-410-2057-5
ISSN:	2535-8251

Summary: The Norwegian National Report 2020 describes the development of the electricity and gas markets in 2019. The report is based on the reporting requirements pursuant to the Electricity Directive 2009/72/EC article 37.

Keywords: Energy regulation

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August, 2020

NVE
The Norwegian Energy Regulatory Authority – RME

National Report 2020

The data/content refer to 31 December 2019 or the reporting period 2019 unless otherwise stated.

PREFACE

The Norwegian electricity market is a part of the Nordic 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). The Norwegian Energy Regulatory Authority 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 2019.

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 2019, 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, 31 July 2020

Ove Flataker

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, 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).

CONTENT

2. MAIN DEVELOPMENTS IN THE ELECTRICITY MARKET

2.1 Norway – net importer of electricity for the first time since 2010

The electricity production in Norway was 134.6 TWh in 2019, which represents a reduction of 12.5 TWh from 2018. The gross consumption was 134.7 TWh in 2019, a decrease from the all-time high of 136.9 TWh in 2018. As a result of the significant decrease in annual production, Norway became a net importer of electricity in 2019. The last time this occurred was in 2010.

Hydropower production represents 92 percent of the total electricity production in Norway, and the Nordic electricity system is therefore highly influenced by the hydrological situation. The annual inflow in Norway were lower in 2019 compared to 2018, but the variations within the year was smaller. Despite less inflow and lower reservoir levels than normal for most of 2019, the hydrological balance in Norway improved throughout the year. This was mostly due to less hydropower production and more precipitation from snow than the previous year.

The average power price in Norway was 38.9 EUR/MWh in 2019. This is 4.6 EUR/MWh lower than in 2018.

2.2 Implementing a new, national data hub and smart meters in the retail market

The Norwegian electricity retail market has been subject to substantial changes in the years towards 2019. NVE-RME has developed regulations to facilitate the implementation of a national data hub (Elhub) and smart metering infrastructure (AMI) in order to increase competition and efficiency in the market. The Elhub which is owned by Statnett, was successfully implemented 18 February 2019. Deadline for the smart meter rollout was in the end of December 2018, and at that time 97 percent of the smart meters were installed. The smart meters send metering data to the DSOs. The meters are also equipped with a Home Area Network (HAN) interface, where end-users can get access to information regarding their own consumption every 2-10 second. The smart meters measures production as well as consumption. The implementation of the Elhub and rollout of AMS will make the exchange of information in the market more efficient and facilitate the use of demand response tools and services.

2.3 Interconnectors from Norway to Germany and Great Britain under construction

There are two interconnectors under construction from Norway, both with a capacity of 1400 MW. The North Sea Link to Great Britain is expected to be operational in 2021, and the NordLink to Germany is expected to in operation in December 2020, with test operation until March 2021. In 2019, the development and compliance with the approved license on both interconnectors has been monitored and it has not been discovered any situations of non-compliance with the license. Both of the projects will also be monitored in the future.

In 2019 an assessment of the applications for NorthConnect was delivered, an interconnector between Norway and Scotland with a capacity of 1400 MW, to the Ministry of Petroleum and Energy.

2.4 Changes in the existing regulation and public consultations in 2019

Connection charges

New regulations on connection charges were adopted in 2019. Customers who wish to connect to the electricity network or to increase the capacity on an existing connection, have to pay a connection charge. The charge includes the share of investment costs necessary to invest in new network infrastructure for the increased demand. The charge is based on actual investment costs and give the customer an incentive to adjust the demand or location to avoid or postpone network investments.

The previous regulation on connection charges was only used for investments on local distribution levels (up to 22 kV), or for investments used by one actor only (e.g. a radial connection to a power plant). The new regulation network charges will in practice be similar on all network levels and thereby strengthen customer protection.

National data hub - Elhub

Statnett is responsible for the establishment of a data hub, and that it operates in compliance with relevant regulation. To facilitate this, Statnett has established a daughter-company, Elhub, that is responsible for the development and operation of the data-hub. As required by NVE-RME, Elhub facilitates a stakeholder council that consists of representatives from DSOs and suppliers, while NVE-RME participates as an observer. The council provides the industry with recent developments and on-going issues and progress, and the parties of the council are invited to raise and discuss issues.

NVE-RME has followed the migration of metering data from the DSOs to Elhub closely and is monitoring the quality of the metering point data in Elhub. In 2019, the DSOs who did not comply with the requirements for reporting consumption, production and power exchange to Elhub where imposed a coercive fine by NVE-RME.

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 will enter into force 1 January 2021. A proposal to except DSOs with less than 10 000 customers from functional unbundling has been on a public consultation in 2020. The Ministry of Petroleum and Energy adopted supplementary secondary legislation on legal and functional unbundling in 2020, which will enter into force 1 January 2021.

Economic regulation of transmission and distribution networks

NVE-RME decides annual revenue caps for each DSO/TSO. The revenue caps are based partly on the DSOs' and the TSO's actual costs and partly on a cost norm. Through the cost norm, the DSOs/TSO are given incentives to reduce their actual costs. In 2019, we decided to put more weight on the cost norm in the revenue cap calculations. This means that from 2023, we increase the weight put on the cost norm from 60 to 70 percent. This change will make cost-efficiency even more attractive amongst the DSOs and TSO.

Due to technicalities in the cost norm model, some might argue that the current model favors investments over operational or flexibility measures. In 2019, we sought to make the cost norm model more neutral

between different measures taken by the DSOs. However, our suggested change was regarded as flawed by the industry. Therefore, we will continue this work in the years to come. We did implement one change to make the cost norm model more neutral between investments financed by customer contributions and investments financed by the DSOs/TSO.

In 2019, we suggested several changes in the compensation scheme for customers experiencing very long interruptions. We decided that the compensation scheme will be integrated in the CENS scheme (cost of energy not supplied) from 2020. From 2021, the compensation scheme will be limited to only households and holiday homes, the rates for compensation will be updated and the compensation will be paid automatically to the customers.

In 2019, we also changed our practices regarding DSOs and TSO involvement in R&D, pilot and demo projects. The change will make it easier for DSOs and TSO to participate in such projects. Going forward, it will also be easier for us to grant exemptions from the economic limits within the current R&D scheme.

Network Codes and Guidelines

In 2019, NVE-RME prepared the implementation of Guidelines on Capacity Allocation and Congestion Management (CACM), Guideline on Forward Capacity Allocation (FCA), System Operation (SO), as well as actively taking part in the development of Guideline on Electricity Balancing (EB). NVE-RME follows and takes active part in the implementation process of the abovementioned guidelines. Furthermore, the proposals for terms, conditions and methodologies adopted according to these network codes/guidelines will be part of Norwegian legislation once the specific network code/guideline is implemented in Norway.

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.

Transparency Regulations

Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets (transparency regulation) entered into force in Norway 1 November 2019. This regulates data that Statnett is obliged to gather from the market participants, or to calculate themselves, and send these for publication on ENTSO-Es transparency platform.

Changes in the regulation on quality of electricity supply

Changes in the regulation on quality of electricity supply entered into force 1 January 2019. The motivation for the changes was to improve the DSOs' and Statnett's registration of interruptions. Deadlines for exchange of interruption data after an interruption that affects more than one grid company have been specified, amongst other things.

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

Changes in the regulation relating to system responsibility in the power system entered into force 1 July 2019. The changes specify that the TSO must establish guidelines on how they exercise some of the articles in the regulations relating to system responsibility. The purpose behind this is to increase predictability for market players when it comes to individual as well as system critical decisions that are made. In June 2019, the National Regulatory Authority (NRA) approved the TSO's guidelines for four of the articles in the regulation on system responsibility.

In November 2019, further changes in the regulations on system responsibility and quality of electricity supply were approved. The changes enter 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, compelling the TSO 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. In addition, the ownership of the TSO and the publicly owned electricity producer Statkraft has been divided between two different government ministries since 2002. Norway therefore complies with the requirements in the Electricity Directive 2003/54/EC for ownership unbundling.

Today, DSOs with more than 100 000 connected customers in Norway are legally and functionally unbundled. In 2019, the seven DSOs in this category represented approximately 58 % percent of the total connected customers. 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 2019, there were 113 Norwegian DSOs with less than 100 000 connected customers. These DSOs are therefore 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. 39 of the DSOs with less than 100 000 customers are organised in a legal entity devoted entirely to managing the grid. All 120 DSOs are under regulation concerning neutral and non-discriminatory behavior 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.

NVE-RME sent secondary legislation mandating separate branding of network operations and all other commercial activities on public consultation in June 2019. 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.

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 regulation[1] 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)[2] 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

[1] Norwegian Regulation 30 November 2004 No 1557 on the Quality of Supply in the Power System

[2] 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 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.

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.

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 & 2. Figure 1 represents long interruptions and figure 2 represents short interruptions (Tables with corresponding figures are enclosed in the appendix).

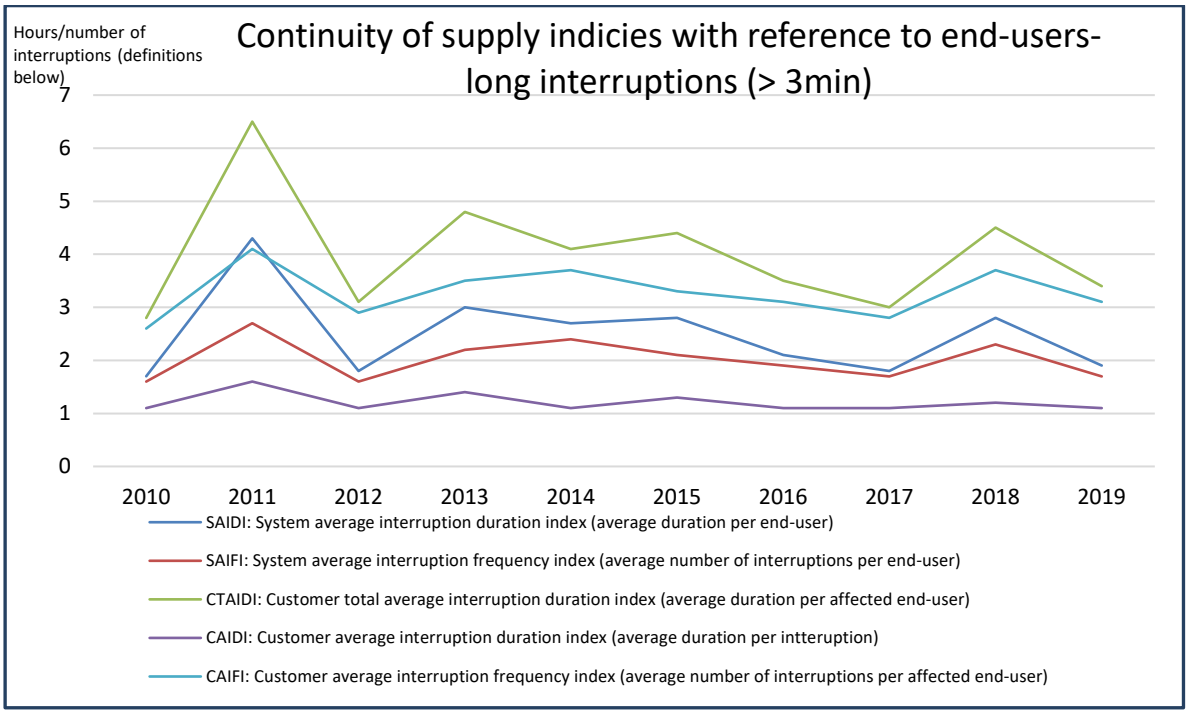

Figure 1 Continuity of supply indices with reference to end users - long interruptions.

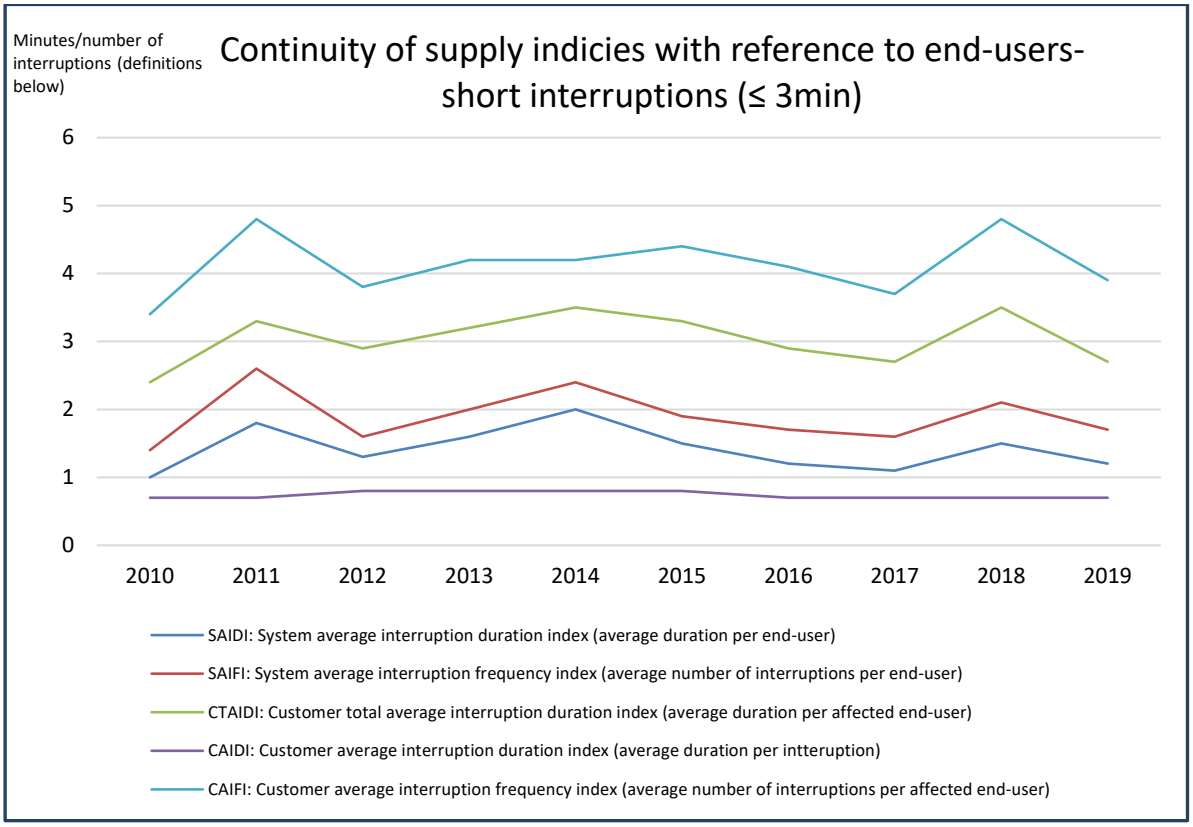

Figure 2 Continuity of supply indices with reference to end users - short interruptions.

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	16.3	13.8	30.1
1997	101 987	15.4	20.2	35.6
1998	106 228	12.2	11.7	23.8
1999	106 525	11.4	17.3	28.8
2000	104 193	8.4	16.5	24.9
2001	108 361	4.8	12.3	17.1
2002	107 814	4.6	12.7	17.3
2003	105 572	4.8	15.6	20.4
2004	109 459	4.3	10.3	14.7
2005	111 804	5.6	9.3	14.9
2006	106 385	4.1	11.8	15.9
2007	109 712	4.7	10.1	14.8
2008	109 570	4.2	11.4	15.6
2009	107 052	3.6	8.9	12.6
2010	111 041	3.7	7.5	11.2
2011	107 045	4.0	33.2	37.2
2012	110 698	3.8	8.0	11.8
2013	112 118	3.8	24.9	28.7
2014	114 441	4.3	12.5	16.8
2015	116 062	4.5	16.5	21.0
2016	117 684	4.1	10.8	14.9
2017	116 608	4.5	9.1	14.3
2018	120 986	5.0	15.1	20.1
2019[3]	113 894	4.6	7.6	12.2

Statistics for 2019 will be completed in summer 2019. Source NVE-RME

[3] Due to new report system for 2019, the values for energy supplied and energy not supplied in this report are temporary. The values are based on reports from 90 % of the companies, but without some large companies. The final numbers will be published on RMEs homepage.

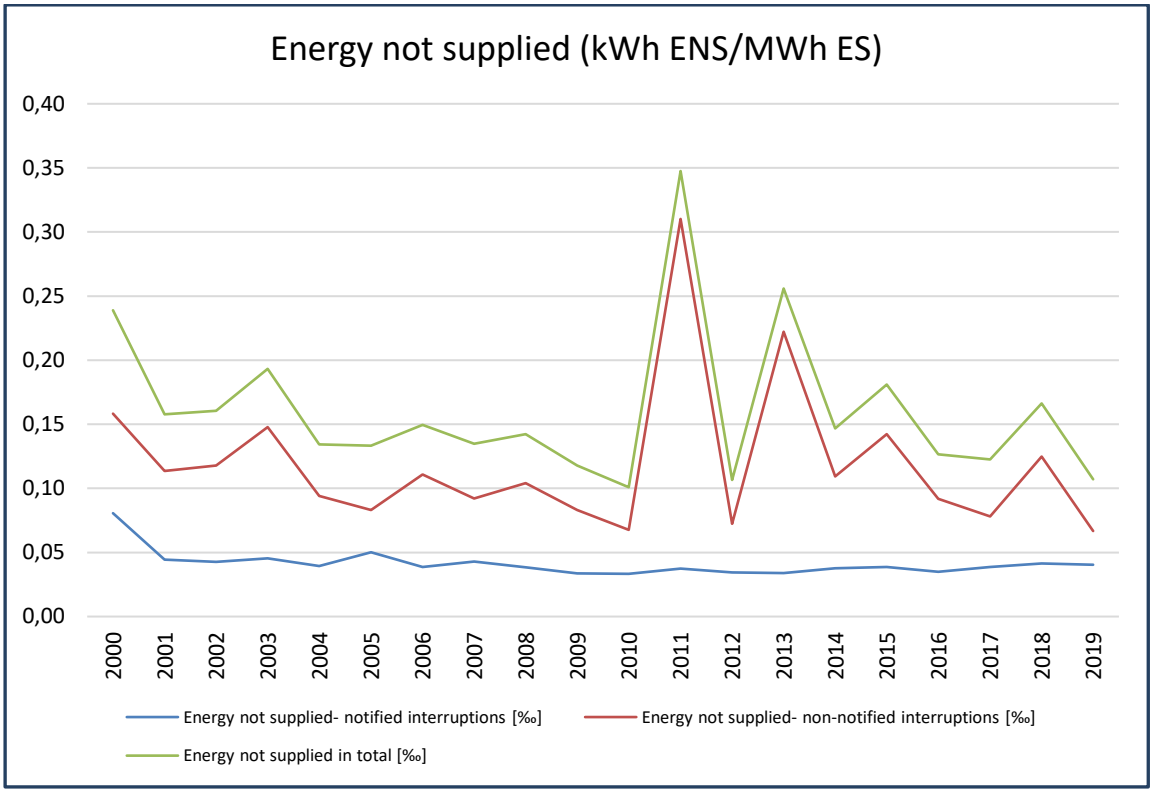

Figure 3 Energy not supplied (ENS) in thousand relative to the energy supplied (ES) to end users in Norway since 2000.

In 2019 all the indicators on CENs presented in figure 1 and 2 decreased compared to 2018. This means that the end-users were affected by fewer interruptions and the outage time per interruption also decreased. 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 1200 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 automized 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 handover of settlement operations from Energinet to eSett is expected to take place in Q1 2021.

3.1.3 Network tariffs for connection and access

The Norwegian electricity network is characterised as transmission (400kV-132 kV) and distribution (132kV – 240V) network. Distribution network is further differentiated as regional distribution (132kV – 22kV) and local distribution (22kV – 240V) 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 2019, there were 115 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 distribution system operators (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 in order to account for different geographical challenges between the companies. 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 network companies 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 companies' costs or technical data discovered after the notification in 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 2019 in the RC for 2021). 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 Spot 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

	2018[4]		2019[5]	
	incl. VAT and consumer tax	excl. VAT and consumer tax	incl. VAT and consumer tax	excl. VAT and consumer tax
Energy component	0.44 NOK/kWh (0.046 €/kWh)	0.20 NOK/kWh (0.021 €/kWh)	0.43 NOK/kWh (0.044 €/kWh)	0.2 NOK/kWh (0.021 €/kWh)
Fixed component	2328 NOK/year (242.4 €/year)	1930 NOK/year (201 €/year)	2662 NOK/year (270.2 €/year)	2234 NOK/year (226.8 €/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 2019 was 0.0134 NOK/kWh, which included a G-charge of 0.0114 NOK/kWh and 0.002 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 2008-2018.

[4] NOK1 = EUR 0.1042
[5] NOK1 = EUR 0.1015

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.
Prosumers choose their own electricity supplier that supply their need for electricity and buy surplus electricity from the prosumer. In 2019 there were about 5000 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 charges 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 25 complaints and disputes regarding tariffs and connection charges in 2019.

3.1.4 Cross-border issues

Capacity allocation and congestion management

According to Norwegian regulation, the TSO has been granted duties and responsibilities regarding congestion management. 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.

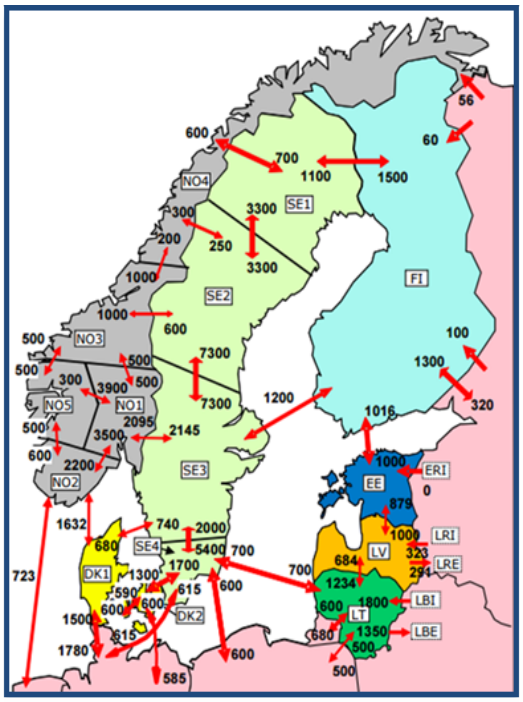

Figure 4. Price areas in the Nordic countries in 2019. Source: Nord Pool.

In 2019, 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).

The TSOs are responsible for determining the maximum permitted limits for transmission capacity (trading limits) between the Nordic bidding zones according to the Available Transmission Capacity (ATC/NTC) method. The relevant TSO does also agree on transmission capacity with their counterpart on borders going out of the Nordic region.

Further, the TSOs are responsible for publishing trading limits for each border for the next day, two hours before gate closure of the Day Ahead market. Hence, these trading capacities are published 10:00 AM on the web site of Nord Pool (NP).

Cross-border electricity exchange is determined through the market coupling, which has implicit auctioning. This is the case for all borders within and adjacent to Norway and means that a large consumer who buys electricity on NP buys it from the market rather than a specific producer. Further, all bilateral agreements that involve trading volume between bidding zones must be submitted to NP. 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.

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

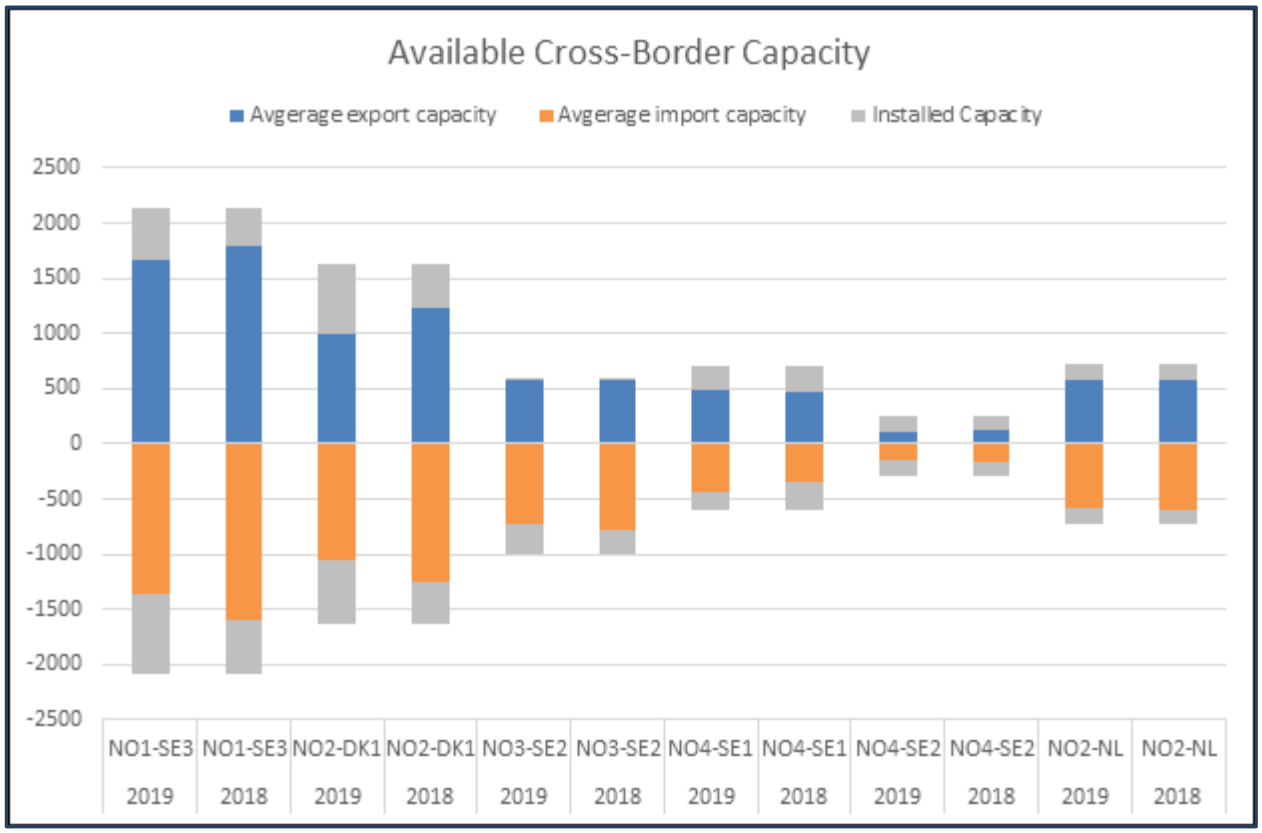

Figure 5. Available capacity in 2019 and 2018 for export and import as a portion of installed capacity for each cross-border interconnector. Source: Nord Pool Spot and SKM Syspower.

The capacity available to the market on Norway's largest interconnection between eastern Norway (NO1) and central Sweden (SE3) decreased from 2018 to 2019. This was mostly due to maintenance work on the interconnection. As shown in Table 3, the export capacity decreased by 7 percentage points from 2018 to 2019, whereas the import capacity decreased by 11 percentage points.

Available capacity on the subsea cables between the area of southern Norway (NO2) and western Denmark (DK1) was significantly reduced from 2018 to 2019. It was both planned maintenance work and some failures on the connection that caused this reduction in capacity. During the last quarter of 2019 it was mostly failure on the Skagerrak 4 cable that caused the decrease in available capacity. As shown in Table 3 the import capacity on the connection was reduced by 12 percentage points from 2018 to 2019, while the export capacity was reduced by 15 percentage points.

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

	2019		2018	
Connection	Export	Import	Export	Import
NO1-SE3	77 %	65 %	84 %	76 %
NO2-DK1	61 %	65 %	76 %	77 %
NO3-SE2	96 %	73 %	95 %	78 %
NO4-SE1	69 %	72 %	67 %	58 %
NO4-SE2	39 %	50 %	49 %	58 %
NO2-NL	79 %	81 %	81 %	83 %

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.

In 2019, NVE-RME monitored the webpages of all DSOs to ensure that the information they publish about electricity suppliers is in compliance with the neutrality rules. Deviation was found at one DSO, the lowest number of deviations since the beginning of regulation of neutrality on the DSO's webpages.

Electricity suppliers

In 2019 NVE-RME audited two Norwegian suppliers reporting to strompris.no, the national website for price-comparison, for deviation from prices on the supplier's own web-pages. NVE-RME also monitored

the presentation of prices of green certificates on all electricity supplier's webpages. This was done to ensure transparency in pricing of products across all suppliers. Deviation was found at six of the 100 monitored suppliers.

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. The Nordic electricity exchange, Nord Pool (NP), organises and operates the Day-ahead and Intraday markets based on implicit auctions. Trading capacities not utilized in the Day-ahead market are made available in the intraday market.

The Day-Ahead market at NP covers all bidding zones of Norway, Sweden, Denmark, Finland, Estonia, Latvia, Lithuania, Germany, Austria, France, Netherlands and Belgium. 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.

NP is also 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.

The main market for price hedging is the financial market organised by Nasdaq OMX (NOMX) and the Financial Supervisory Authority regulates the market place. 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.

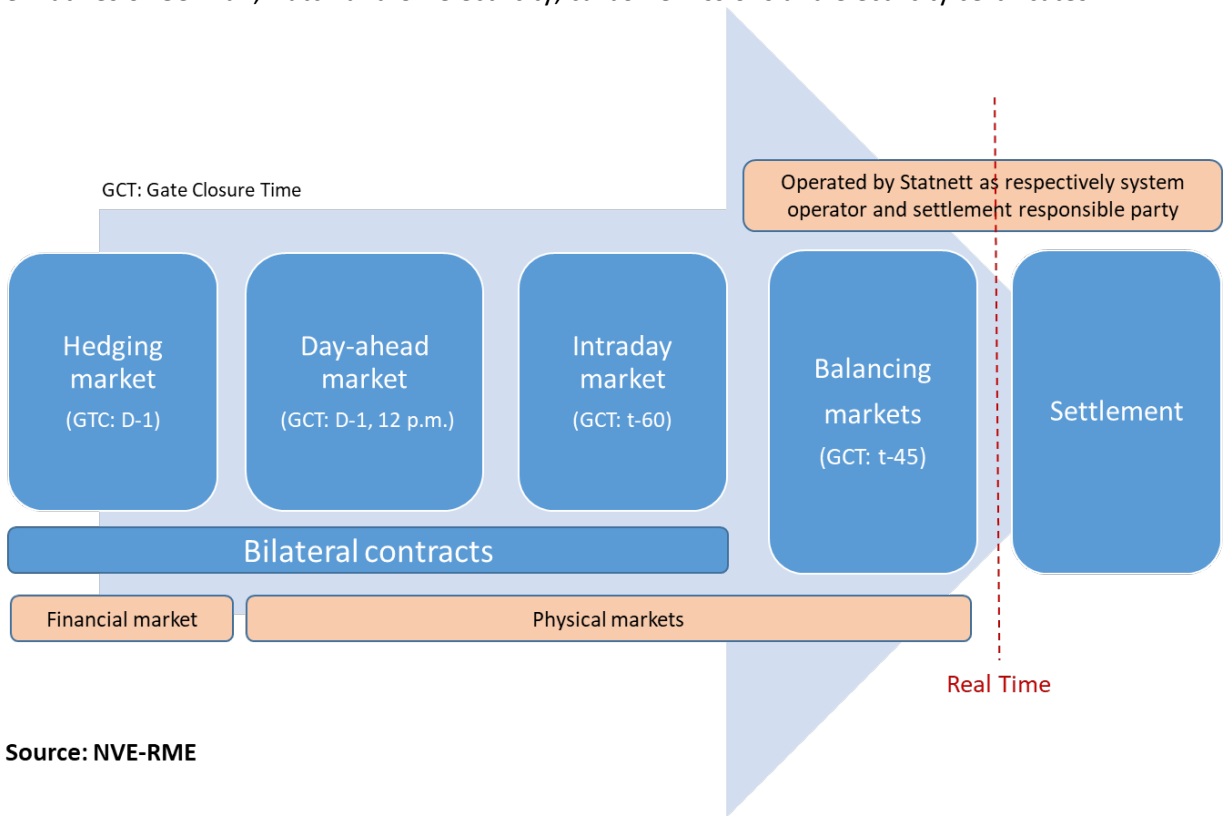

Figure 6. Time frame in energy markets

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 2018 and 2019 compared to normal. The four first months of 2019 were warmer than normal, which resulted in relatively lower electricity consumption for heating purposes this period. The electricity consumption in Norway in the first quarter of 2019 were 15 percentage points lower than the same quarter in 2018. The summer were colder than 2018, but the temperatures were still mostly above normal. In total, the electricity consumption in Norway was 134,7 TWh in 2019, which is 2,2 TWh lower than in 2018.

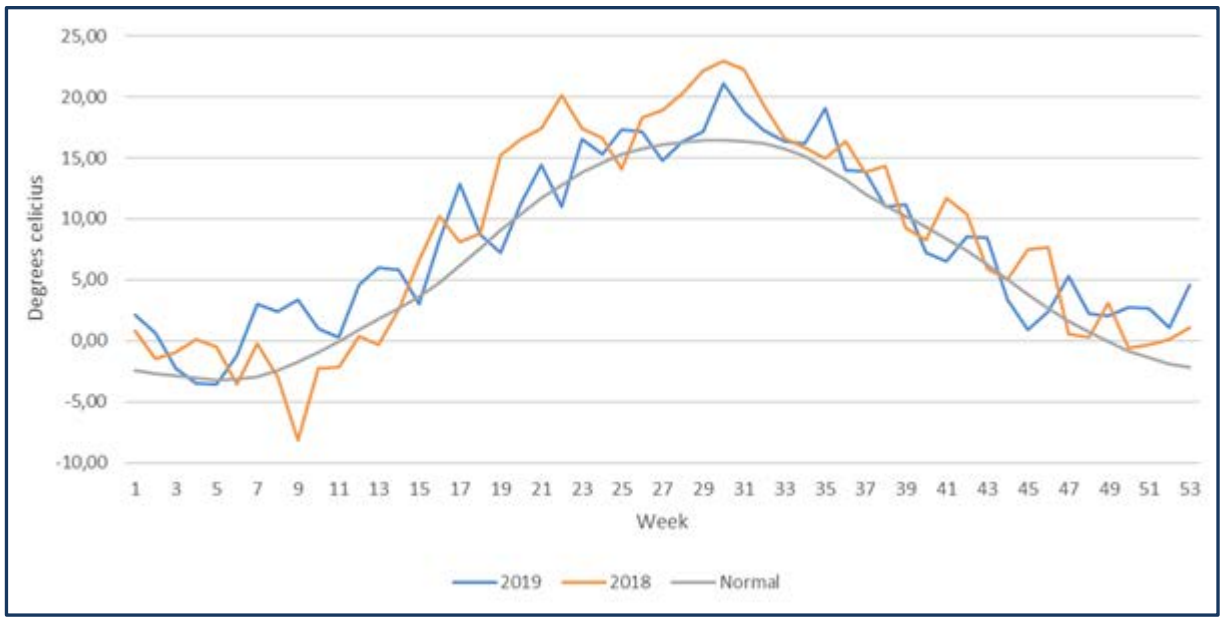

Figure 7. Average weekly temperatures for Norway and Sweden in 2019 and 2018 compared to normal. Source: SKM Syspower

Figure 8 shows the development of the Norwegian hydro reservoir levels in 2019 and 2018. In the beginning of 2019, the hydro reservoir level was 62,5 percent, which is 6 percentage points below normal level. As shown in Figure 8, the reservoir level was lower than normal most of the time in 2019. Only in the second quarter, when the snow was melting and the inflow increased, the reservoir levels were higher than normal. In the last quarter of 2019 there was colder weather and more precipitation as snow. This resulted in an earlier reduction in the hydro reservoir level than normal, and the reservoir levels ended up at the same level as the beginning of the year, around 6 percentage points below normal.

In the north of Norway (NO4) the reservoir level was below normal throughout the whole year and the reservoir level reached an historical minimum level in that area. Little rain during the summer, and precipitation as snow at the end of the year, were some of the reasons for the relatively low reservoir filling in this area.

The Norwegian power production was 134,6 TWh in 2019, a reduction from 147,1 TWh in 2018.

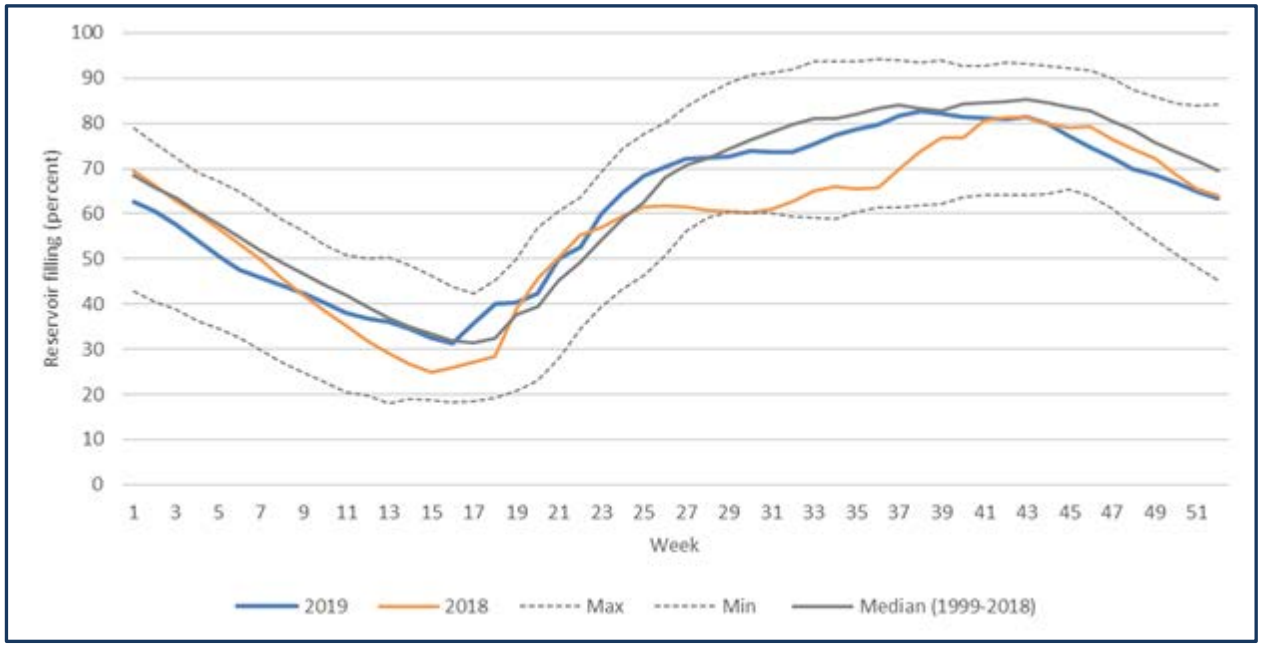

Figure 8. Hydro reservoir levels in Norway. 100 percent represents 84 TWh storage capacity. Source: NVE

Table 4 shows the annual average area prices in 2019 and 2018. The annual System price in 2019 was 38,9 EUR/MWh which represents a reduction of 11 percent since 2018. The summer of 2019 was not as warm and dry as in 2018, and it had a more normal amount of rainfall and thus a better hydrological situation than the year before. This can explain some of the decrease in power prices from 2018 to 2019.

Table 4. Annual prices in the Norwegian Elspot areas, €/MWh. Source: SKM Syspower.

EUR/MWh	2019	2018	% Change 2018-2019
System price	38,9	44,0	-11 %
East Norway (NO1)	39,3	43,7	-10 %
South West Norway (NO2)	39,3	43,2	-9 %
Mid Norway (NO3)	38,5	44,1	-13 %
North Norway (NO4)	38,3	43,7	-12 %
West Norway (NO5)	39,3	43,0	-9 %

Figure 9 below shows the development in the daily Nordic System price in 2019 and 2018. As illustrated in the figure, the average System price was at the highest level in January in 2019, with an average price of 53,8 EUR/MWh. The highest daily price reached 68,7 EUR/MWh in February. Throughout the year the price fell and in June the average monthly System price was at its lowest level at 28 EUR/MWh. As shown in the graph the price curve followed a quite different, but more normal pattern, than the year before, with lower prices during the summer than in the winter.

Figure 9. Nordic System price 2019 and 2018, EUR/ MWh.

Figure 10 show the price development in the five Norwegian bidding zones in 2019, and table 4 show the annual average area prices. As for the System price, the average electricity price in the different price areas in Norway decreased between 2018 and 2019 as well.

Figure 10. Price development in Norwegian bidding zones in 2019. Source: SKM Sypower.

With regards 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 market place. 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 on the organised market place

Prohibitions of market manipulation and insider trading, requirements on disclosure of inside information and market surveillance was implemented in the Norwegian energy legislation and entered into force 1.3.2018.

These provisions are similar to REMIT[6], and 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 market place 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 market place 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.

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

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 entered into force in Norway from 1 November 2019.

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

Elspot (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

Elbas (Intraday market)

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

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

Power system data

- Production
- Consumption
- Exchange
- Hydro reservoir

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 licensing regime is light and transparent and does not represent an undue barrier to competition or entry in the market. 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.

At the end of 2019, 478 companies were holding a trading license. The current licensing period lasts from 1 January 2015 to 31 December 2020. Of the companies that had a trading license in 2018, 139 were electricity suppliers supplying residential customers, while 137 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.

Following the launch of Elhub and experience from the voluntary combined billing regime implemented in 2016, NVE-RME is working to improve the regulation to reduce transactional costs and ensure a balances distribution of risk between network companies and suppliers. In 2019, NVE-RME commissioned a report to investigate possible changes in the combined billing regime model to make it easier for the supplier to recoup his loss if the customer does not pay his bill.

NVE-RME sent secondary legislation mandating separate branding of network operations and commercial activities on public consultation in June 2019. 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.

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 (Forbrukerrådet) 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 network tariffs and 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 Forbrukerrådet's price comparison tool under the Energy Act regulations. When developing the regulations for collecting information for Forbrukerrådet'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.

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.

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 2019, electricity consumers paid for electricity certificates amounting to 17.1 percent of their total electricity consumption. This share will steadily increase towards 2020 where it reaches its peak at 18.9 percent of the total annual electricity consumption. The actual additional cost paid by the consumers in 2019 due to the introduction of the system was determined by the price of the electricity certificates, which varied according to supply and demand. On average, a customer paid an additional 2.2 øre/kWh (including VAT) due to electricity certificates in 2019. This means that a household using 20 000 kWh of electricity in 2019, paid a total cost of approximately 440 NOK (including VAT).

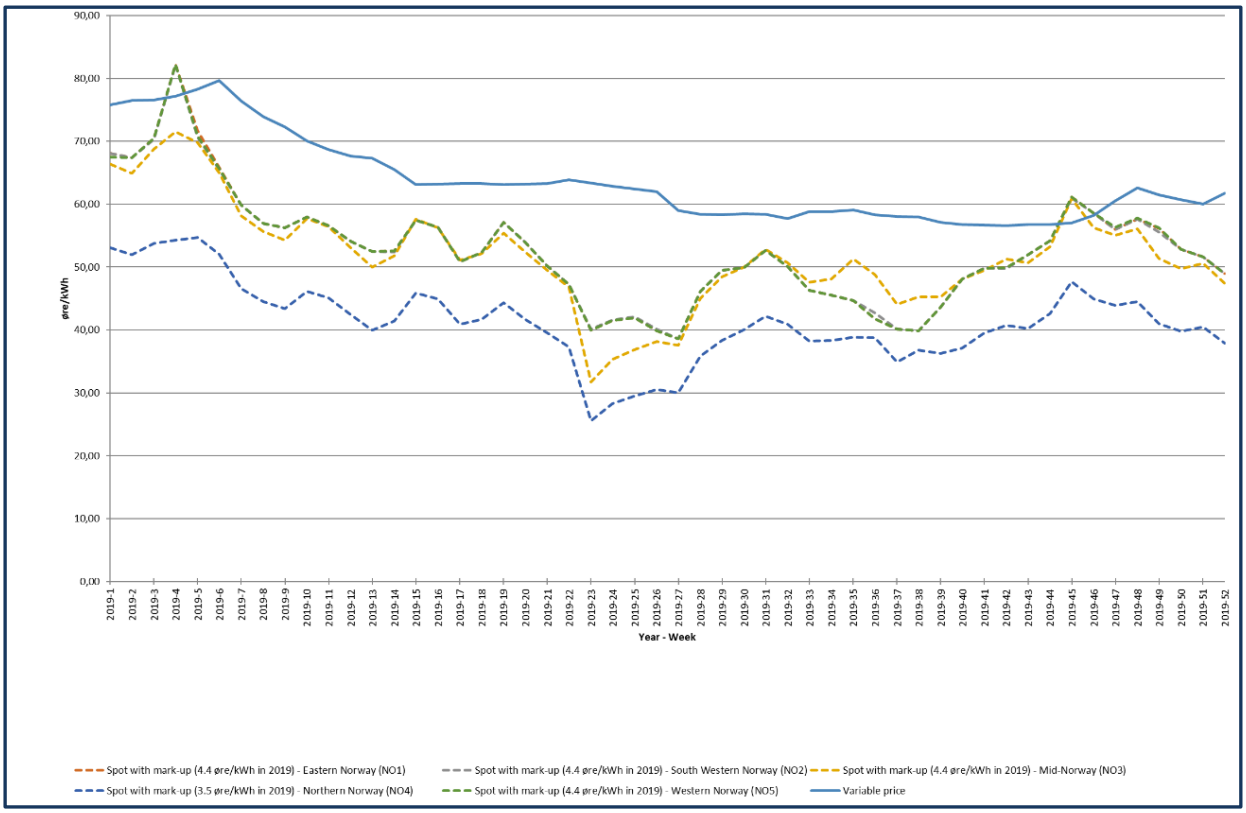

Figure 11. Average price development for the spot contract in the five Norwegian bidding zones.

The figure above shows the average price development throughout 2019 for the spot contracts in the five Norwegian bidding zones of the Nord Pool Spot power exchange, together with the variable contract. These two contract types are common, 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 origin.

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 exchange, Nord Pool AS, operates under a 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

Two major milestones were passed in the Norwegian retail market for electricity in 2019. 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. 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 order to monitor the efficiency of the retail market, NVE-RME monitors supplier switches and the switching rate. In 2019 there were 714 135 supplier switches resulting in a switching rate of 24 percent.[7] With an operational datahub in place, we have improved our data collection by receiving data directly from the hub. Before, NVE-RME conducted a quarterly survey from a group of DSOs that combined represents approximately 90 percent of the retail market (measured by the number of metering points). Acquiring data from the hub has increased the data quality significantly, removed an administrative burden from the DSOs and improved the quality of our statistics.

In 2017 NVE-RME started a project to further develop our retail market monitoring. In 2019, NVE-RME commissioned a report on designing indicators for improved monitoring of the retail market and implementing them into a spreadsheet-tool for analysis. The report recommended primarily to apply the retailers' margin in absolute value and profitability as indicators, and to monitor the competition by following the development in the indicators over time.

[7] Incl. both household and non-household customers

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 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 134,7 TWh in 2019, a decrease from the all-time high of 136,9 TWh in 2018. The Norwegian peak demand normally occurs in the winter season. The peak electricity demand was 23672 MWh/h in 2019, which is lower than the peak demand in 2018.

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

Year	Weekday	Date	Hour (CEST)	Demand [MWh/h]
2009	Monday	05.01.2009	8	21 984
2010	Wednesda	06.01.2010	8	23 994
2011	Monday	21.02.2011	8	22 129
2012	Wednesda	05.12.2012	8	23 443
2013	Wednesda	23.01.2013	8	24 180
2014	Thursday	22.01.2014	9	23 489
2015	Wednesda	04.02.2015	8	22 530
2016	Thursday	21.01.2016	8	24485
2017	Thursday	09.02.2017	8	23246
2018	Thursday	01.03.2018	8	24108
2019	Thursday	31.01.2019	17	23672

Currently available generation capacity

The total installed generation capacity in Norway was 36 493 MW as of 31.12.2019. Available generation capacity during a cold winter is estimated to approximately 26 500 MW by Statnett. The wind power generation capacity increased by 780 MW from 2018 to 2019, whereas the hydro power generation capacity increased by 277 MW. The amount of wind power under construction was 2487 MW by the end of 2019.

Table 6. Generation fuel mix 31.12.2019. 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	2444	7,7	780	2487	1641
Hydro Power	32671	135,6	277	875	1783
Thermal Power	700	3,5	0	0	0
Solar Power	120	0,10	51	N/A	N/A
Sum	36568	146,9	1109	3362	3424

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 for power system planning is delegated to 17 owners of the distribution network (33 – 132 kV) that are responsible for planning the distribution network in 17 specific areas. The Norwegian TSO is responsible for operation and planning of the national transmission network (132 kV-420 kV).

Every second year, the responsible utilities in the distribution planning areas and Statnett make an updated regional network development plan. 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 includes presentations of statistics with characteristics of generation, transmission and consumption of electricity, and includes conditions that are of importance and relevance for the development of the power system in the designated area. Simplified socio-economic analysis must be presented for all network investments that require environmental impact assessment (EIA). The main objective of 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 economy, 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 1400 MW. Statnett is in cooperation with the German TSO (Tennet) developing the NordLink cable to Germany, which is expected to be commissioned in March 2021. In addition, Statnett and the British TSO (National Grid) plan to complete the North Sea Link in 2021. This interconnector between Norway and UK started construction in 2018.

NorthConnect
A company owned by Vattenfall, ECO, Lyse and Agder Energi is planning a new interconnector between Norway and Scotland with a capacity of 1400 MW. Applications for construction and foreign trade licenses have been sent to the Ministry of Petroleum and Energy (MPE).

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 300kV to 420kV. 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.

Aurland - Sogndal
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.

Fosen
New 420 kV-lines in mid Norway (Fosen) in order to facilitate new wind production was commissioned in 2019.

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 10,6 billion euros. This is a lower value than last year mainly due to changes in the exchange rate between NOK and EUR. The expected future investments are at a relatively stable level from 2018 to 2019.

The historically high network investment level will ensure a reliable power supply, facilitate renewable energy projects and industrial and commercial development throughout Norway. Norway and Sweden have a mutual agreement of installing 28.4 TWh of new renewable energy within 2021 with financial aid through a green certificate market. The agreement of 28.4 TWh was reached in 2019. As of 31.12.2019, renewable power plants with an annual average production of 34.4 TWh were included in the certificate market. This increasing investment in renewable power plants, together with the installation of smart metering in all Norwegian households in 2019 and new HVDC cables to Germany and UK, will cause a high level of investment in the distribution and transmission network in Norway in the coming years, as illustrated in Figure 12.

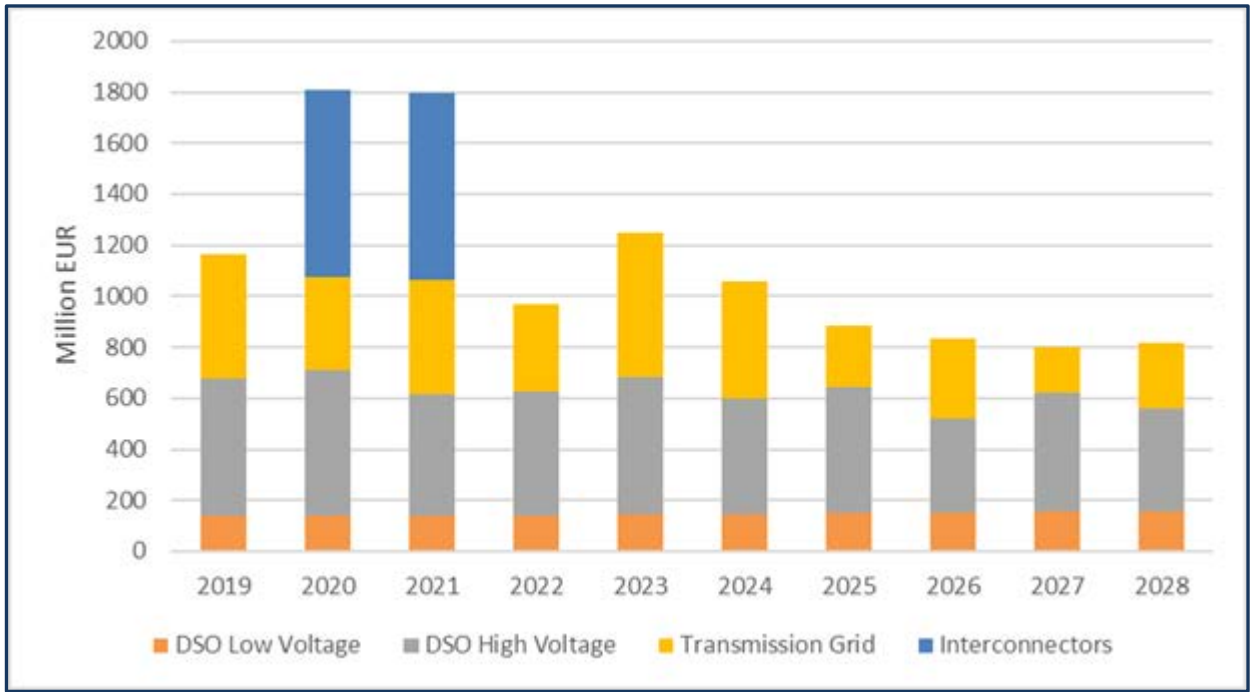

Figure 12. Expected investment levels in the Norwegian network. 1 EUR = 11,21 NOK in 2019.

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 2.1.2 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 by utilizing the balancing markets and the flexibility in the system. To ensure sufficient balancing resources to cover peak demand Statnett has developed a marked for acquiring balancing resource options (RKOM).

4. THE GAS MARKET

Although Norway is a large gas producer, only 940 GWh (2019) 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 is based on a light-handed approach because of the limited scope and the exception from third-party access (TPA) due to emerging markets conditions. In the current regulation, it is necessary to obtain a license to introduce gas infrastructure such as gas transmission or LNG facilities in a new region, and to have separate financial accounts for distribution, LNG and storage.

In December 2018, the Ministry of Petroleum and Energy sent their proposal for a new regulation which includes third-party access and regulated tariffs adapted to local market conditions. The consultation process ended in March 2019. The regulation entered into force 1 November 2019.

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 suppler of last resort, has a high threshold for disconnecting a customer unable to handle the electricity bills, and has to make sure 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 2019, the Norwegian Electricity Appeal Board received 842 written complaints and reached a decision in 95 cases.

Appendix[8]

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	1.9	1.7	3.4	1.1	3.1

Statistics for 2019 will be completed in summer 2019. Source NVE-RME.

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	1.7	2.7	0.7	3.9

Statistics for 2019 will be completed in summer 2019. Source NVE-RME.

[8] Due to new report system for 2019, the values for continuity of supply in this report are temporary. The values are based on reports from 90% of the companies, but without some large companies. The final numbers will be published on RMEs homepage.

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