National Report 2017

Norwegian Water Resources and Energy Directorate (NVE)

The data/content refer to 31 December 2016 or the reporting period 2016 unless otherwise stated.

FOREWORD

The Norwegian electricity market formally opened for competition when the Energy Act came into force 1 January 1991. The regulatory activities are ensured by the Norwegian Water Resources and Energy Directorate (NVE). NVE 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 development of the Norwegian market has been successively followed by similar market openings in the other Nordic countries. A common Swedish-Norwegian wholesale market was established in 1996, and from the beginning of 2000, all of the Nordic countries were included in a common market place. In addition, the Baltic countries became a part of the open and integrated electricity market with one power exchange in 2013. The Nordic/Baltic market is interconnected with the continental European market as well as to Russia with several interconnectors.

Norway is a member of the European Free Trade Association (EFTA) and is a part of the European Economic Area Agreement (EEA). As a consequence the EEA procedures regarding the adoption of new EU directives is applicable to Norway. The Electricity Directive 2003/54/EC and Regulation 1228/2003 was approved in the EEA Committee in December 2005. This report is based on the reporting requirements in Directive 2003/54/EC articles 3(9), 4 and 23 (1/8), and Directive 2005/89/EC article 7.

NVE is a member of Council of European Energy Regulators (CEER). In 2016, NVE has continued its efforts to contribute to the work of ACER and CEER to obtain a well functional electricity market. The format of the participation of NVE in ACER will be formalised in the EEA agreement, when implementing the third energy market package. NVE is also a member of the organization for the Nordic energy regulators, NordREG.

The Norwegian National Report 2017 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.

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CONTENT

1 MAIN DEVELOPMENTS IN THE ELECTRICITY MARKET 4

1.1 INTRODUCTION – ABOUT THE NORWEGIAN WATER RESOURCES AND ENERGY DIRECTORATE (NVE) 4
1.2 MAIN DEVELOPMENTS IN 2016 4
1.2.1 ELECTRICITY PRODUCTION AND CONSUMPTION – NEW RECORD IN 2016 4
1.2.2 IMPLEMENTING A NEW, NATIONAL POINT OF DATA MANAGEMENT AND SMART METERS IN THE RETAIL MARKET 5
1.3 CHANGES IN THE EXISTING REGULATION AND PUBLIC CONSULTATIONS IN 2016 6

2 THE ELECTRICITY MARKET 9

2.1 NETWORK REGULATION 9
2.1.1 UNBUNDLING 9
2.1.2 TECHNICAL FUNCTIONING 10
2.1.3 NETWORK TARIFFS FOR CONNECTION AND ACCESS 15
2.1.4 CROSS-BORDER ISSUES 19
2.1.5 COMPLIANCE 22
2.2 PROMOTING COMPETITION 24
2.2.1 WHOLESALE MARKETS 24
2.2.2 RETAIL MARKETS 29
2.3 SECURITY OF SUPPLY 33
2.3.1 MONITORING BALANCE OF SUPPLY AND DEMAND 33
2.3.2 MONITORING INVESTMENT IN GENERATION CAPACITIES IN RELATION TO SOS 36
2.3.3 MEASURES TO COVER PEAK DEMAND OR SHORTFALLS OF SUPPLIERS 38

3 THE GAS MARKET 38

4 CONSUMER PROTECTION AND DISPUTE SETTLEMENT IN THE ELECTRICITY MARKET 39

4.1 CONSUMER PROTECTION 39
4.2 DISPUTE SETTLEMENT 39

APPENDIX 41

1 MAIN DEVELOPMENTS IN THE ELECTRICITY MARKET

1.1 Introduction – About the Norwegian Water Resources and Energy Directorate (NVE)

The Norwegian Water Resources and Energy Directorate`s (NVE) main statutory objective is to promote social and economic 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 has the authority to issue regulations on economic and technical reporting, network revenues, market access and network tariffs, non-discriminatory behaviour, customer information, metering, settlement and billing and the organized physical power exchange (Nord Pool). In addition, NVE issues regulations on system responsibility and quality of supply. The Energy Act regulates the main frame of the Norwegian electricity and gas market and NVE has the power to enforce many of the provisions in the Energy Act.

NVE is the national independent regulatory authority for the electricity market in Norway. NVE has no ownership or economic interests in the electricity generation industry. NVE is separate legal entity with its own budget set by the Parliament and has the authority to act within the scope of its competences. The Department of Energy Market Regulation was established in 2013 in order to prepare for the implementation of the Third Energy Market Package.

NVE 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 also has a cooperation agreement with The Directorate for Civil Protection and Emergency Planning. NVE is a member of Council of European Energy Regulators (CEER) and the organization of the Nordic Energy Regulators (NordREG).

1.2 Main developments in 2016

1.2.1 Electricity production and consumption – new record in 2016

The total production of electricity in Norway was 149.5 TWh in 2016, which is a new record, mainly caused by a large amount of water stored in the reservoirs in the beginning of the year. The hydropower production represents 96 percent of the total electricity production in Norway, and the Nordic electricity system is highly influenced by the hydrological situation. In 2016, it was also a record high electricity consumption, despite higher temperatures than normal. This can be explained by increased consumption in all sectors. The power intensive industry, higher population and electrification of the transport sector are among the factors that drives the increased consumption.

1.2.2 Implementing a new, national point of data management and smart meters in the retail market

The Norwegian retail market for electricity will undergo formidable changes in the years towards 2019. As part of the goal to further increase competition and efficiency in the market, NVE has developed regulations that facilitate the implementation of a national point of data management (Elhub) and smart metering infrastructure (AMI). Elhub will be operated by a subsidiary company owned by Statnett. The targeted implementation date for Elhub was 23 October 2017, but it has recently been postponed to 2018. The smart meter rollout is set to be completed by January 2019. These changes will make the exchange of information in the market more efficient and facilitate the use of demand response tools and services.

NVE is also developing legal frameworks for a combined billing and a customer centric supplier model in the Norwegian market. A voluntary combined billing regime entered into force in September 2016. Following the planned launch of Elhub in 2017, and the experience gained from the voluntary combined billing regime, a more extensive, mandatory billing regime will be considered, which will form the basis for a customer centric supplier model. Together with Elhub and AMS, these reforms represent the most significant changes to the Norwegian electricity retail market in over two decades.

1.3 Changes in the existing regulation and public consultations in 2016

Cross-subsidisation

NVE has adopted new rules for procurement procedures within vertically integrated corporations. The intention is to avoid overpricing and to prevent cross-subsidisation between the DSO and other companies within the same corporation. The rules for such procurements will follow the procedures and threshold amounts deriving from Directive 2014/25/EU (on procurement by entities operating in the water, energy, transport and postal services sectors). The regulation entered into force 1 July 2016.

Surplus customer – "Prosumer"

NVE has adopted changes in the Settlement Regulation. The changes will make it easier for consumers to produce and sell surplus electricity in the market. The prosumers energy exchange is metered hourly in one smart meter and is exempted from paying g-charge. The prosumer choose their own supplier who buy and sell electricity to/from the prosumer. The regulation entered into force 1 January 2017.

National point of data management - Elhub

NVE has adopted several changes in the Settlement Regulation in connection with the implementation of the national point of data management (Elhub) and smart metering. NVE has made changes in the regulation on information exchange related to supplier switching, customer change, metering, DSO neutrality, settlement of metering corrections as well as requirements for responsibilities regarding the operation of Elhub. The regulatory changes will enter into force when the Elhub is implemented, currently estimated to go live in Q1 2018.

Voluntary combined billing

NVE proposed the implementation of voluntary combined billing in 2015. The regulatory changes entered into force 1 September 2016 and will increase the neutrality of the DSO, and level the playing field between integrated suppliers and independent suppliers.

Mandatory combined billing

Following the implementation of Elhub NVE aims to implement a mandatory combined billing regime, effectively creating a customer centric model in the Norwegian market. A study on the costs and benefits of network tariff settlement in Elhub, the effect of changing the supplier of last resort regime and right to terminate the supply was conducted in 2016. NVE will also gather experience from the new voluntary combined billing.

Restrictions on advance payments

Following some cases in the market where suppliers where charging disproportionate advance payments, NVE decided to restrict this practice. A new regulation entered into force on 1 January 2016. This

regulation allows companies to offer advance payments, but put certain restrictions on this practice to abolish exploitative practices in the market.

Economic regulation of transmission and distribution networks

In 2016, NVE decided that the Norwegian TSO (Statnett) should present a public report that describes the main cost developments. The report will be published biannually, and the first report from Statnett is due in 2017.

In 2015, NVE updated the cost functions for the quality scheme "Costs of energy not supplied" (in Norwegian "KILE") for all customer categories except households. In 2016, a project was started with the aim of establishing updated cost functions also for this category. External consultants will survey the customers' willingness to pay for reduced outages (up to 72 hours). The project will be finished in November 2017.

Nordic Balance Settlement

NVE has adopted several changes in the Settlement Regulation to facilitate a common Nordic Balance Settlement (NBS). The regulatory changes entered into force 1 May 2017. This joint Nordic NBS is a forerunner in a European context where the Finnish, Swedish and Norwegian TSOs have agreed to combine their balance settlement processes and operation through one organization, eSett Oy.

Network Codes

In 2016, NVE prepared for the implementation of Guideline on Capacity Allocation and Congestion Management (CACM) as well as Guideline on Forward Capacity Allocation (FCA). The proposals adopted according to these network codes will be part of Norwegian legislation once the specific network code is implemented in Norway. One example of development, following from CACM, are Multiple Nemo Arrangements (MNA), which is developed in order to facilitate competition between physical power exchanges.

In April 2015, NVE requested Statnett, the Norwegian TSO, to review the technical requirements in the connection codes. The main points in the request to Statnett were to identify differences in the three connection codes compared to the current practice in Norway, propose national specifications of the non-exhaustive requirements in the codes, and propose Norwegian procedures and allocation of responsibility for requirements following the connection codes. In the request, Statnett were required to work in close collaboration with national stakeholders. Statnett solved this by establishing three stakeholder groups, one for each of the grid connection codes. This work has continued in 2016. The review of the Network Code on Demand Connection (DCC) are planned to be finished in august 2017, and the Network Codes on requirements for grid connection of generators (RfG) and for grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC) will be finished by the end of 2017.

Market surveillance

Through 2016, NVE has been building up competence to monitor the power market to detect market manipulation and insider trading. This work is currently carried out to prepare implementation of Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency (REMIT).

Interconnectors from Norway to Germany and to Great Britain under construction

There are two new interconnectors under construction from Norway. One to Great Britain, the North Sea Link, and one to Germany, the NordLink. Each interconnector will have a capacity of 1400 MW, and are expected to be operational in 2022, and 2020 respectively. In 2016, NVE monitored the development and compliance with the approved license on both interconnectors, with particular focus on NordLink. This was due to a challenging situation with respect to grid development in Germany, which might affect socio-economic benefits of the interconnector. NVE has not discovered situations of non-compliance with the license, but will continue to monitor both of the projects in the future.

2 THE ELECTRICITY MARKET

2.1 Network regulation

2.1.1 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 2016, the seven DSOs in this category represented approximately 57% 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 have to produce an annual report to NVE that enables NVE to monitor the DSOs fulfilment of the regulations regarding legal and functional unbundling.

By the end of 2016, there were 131 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 can require a DSO that also has activities in generation or supply to reorganize into separate legal entities. 31 of the DSOs with less than 100 000 customers are organized in a legal entity devoted entirely to managing the grid. All 138 DSOs are under regulations 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. The majority of the Norwegian DSOs are publicly owned.

In 2015, the Norwegian Ministry of Petroleum and Energy proposed an amendment to the Energy Act that imposes legal and functional unbundling for all DSOs, irrespective of size. The proposed amendment was approved by the Parliament June 2016, and will enter into force 1 January 2021.

2.1.2 *Technical functioning*

Quality of electricity supply

NVE has extensive legal powers on the regulation of the quality of electricity supply. This involves establishing requirements for all parties connected to the Norwegian electricity system. This includes network companies, the performance of any activities subjected to competition (production, energy trade and/or supply), the TSO, electricity producers and end-users regardless of whether they hold a license according to the Energy Act or not. The Norwegian regulation[1] of quality of supply applies to those who wholly or partially own, operate or use electrical installations or electrical equipment connected to the Norwegian power system.

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, voltage unbalance and harmonic voltages including total harmonic distortion (THD). If considered necessary, NVE has the power to set minimum requirements for other voltage disturbances as well, such as transient over voltages, interharmonic voltages and main signaling voltages.

The TSO and DSOs have been required to continuously register dips, swells and rapid voltage changes in their own characteristic high and medium voltage network since 2006. In addition, since 2014, they have been obliged to register total harmonic distortion (THD)[2] and flicker. The purpose of these required registrations is that the TSO and DSOs have an obligation to provide information about the expected quality of their network from existing and possible new customers on request. From 2014, the TSO and DSOs were also obliged to report the above-mentioned voltage quality parameters (except rapid voltage changes) to NVE. I.e. the first reporting of voltage quality to NVE was in February 2015. NVE has established a database for all the reported data.

In case of a customer complaint regarding power quality, the TSO and DSOs have to 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, the TSO and DSOs must identify the reason for this and identify the responsible party for the violation. The stakeholder who is responsible must rectify the situation without undue delay. In cases

[1] Norwegian Regulation of 30th 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 can be annoying 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 the TSO or DSO have done all of the aforementioned investigations without reaching an agreement with the customer, the case can be brought forward to NVE for decision. Decisions made by NVE are individual decisions that can be appealed to the Norwegian Ministry of Petroleum and Energy.

Interruptions

NVE 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.

The TSO (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 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 energy not supplied (CENS, in Norwegian "KILE"), among others. Until 2009, this quality adjusting was based on calculating the amount of energy not supplied, and hence a standardized 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 plots for the reliability of the power supply).

From 2005, the interruption data also included end-users. The main reasons for introducing this was; (1) easier to understand for non-technical customers and (2) better possibility 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).

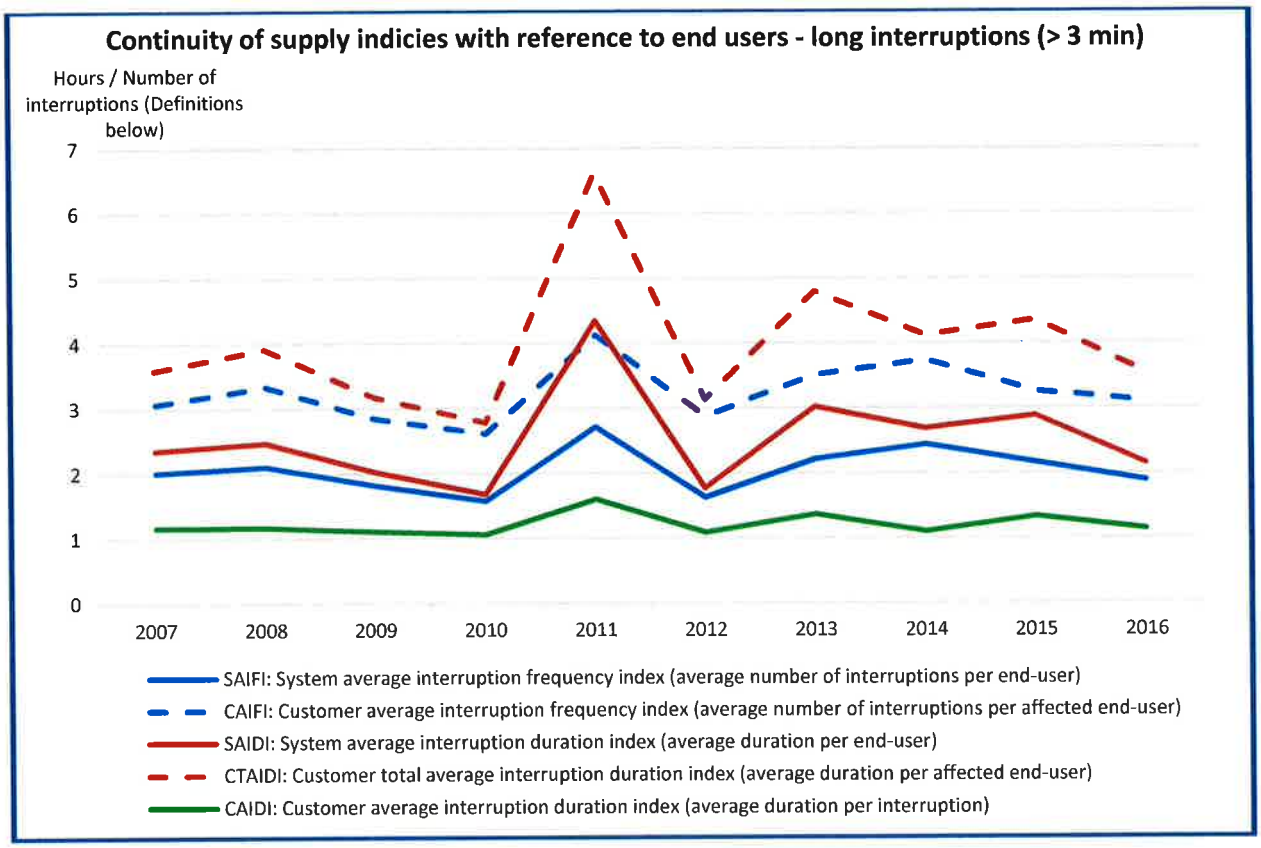

Figure 1. Continuity of supply indices with reference to end users - long interruptions.

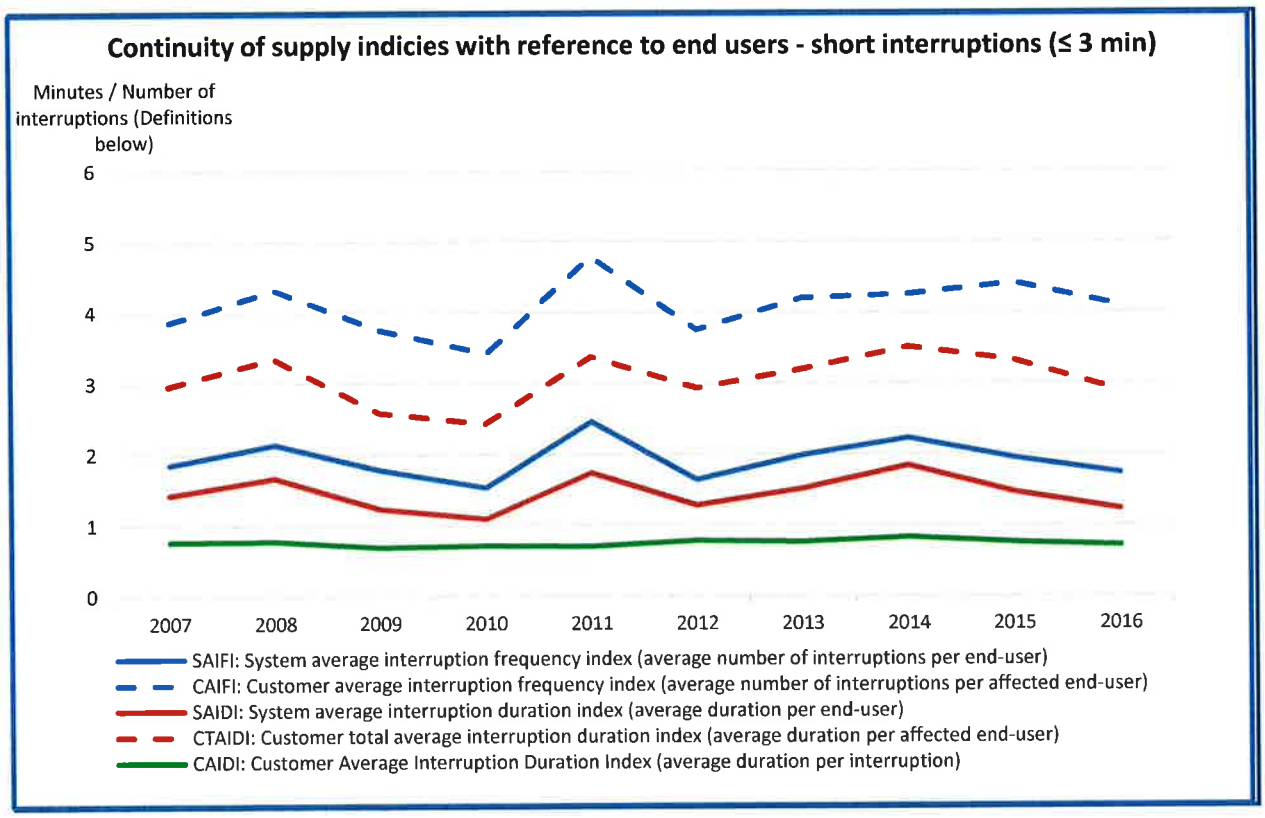

Figure 2. Continuity of supply indices with reference to end users - short interruptions.

Reported "Energy not supplied" in Table 1, is divided into 27 end user groups up to 2008. In 2009 the number of end-user groups was increased to 36.

Table 1. Energy supplied and some 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

Figure 3 shows the development of energy not supplied in per thousand relative to the energy supplied for the last 19 years in Norway.

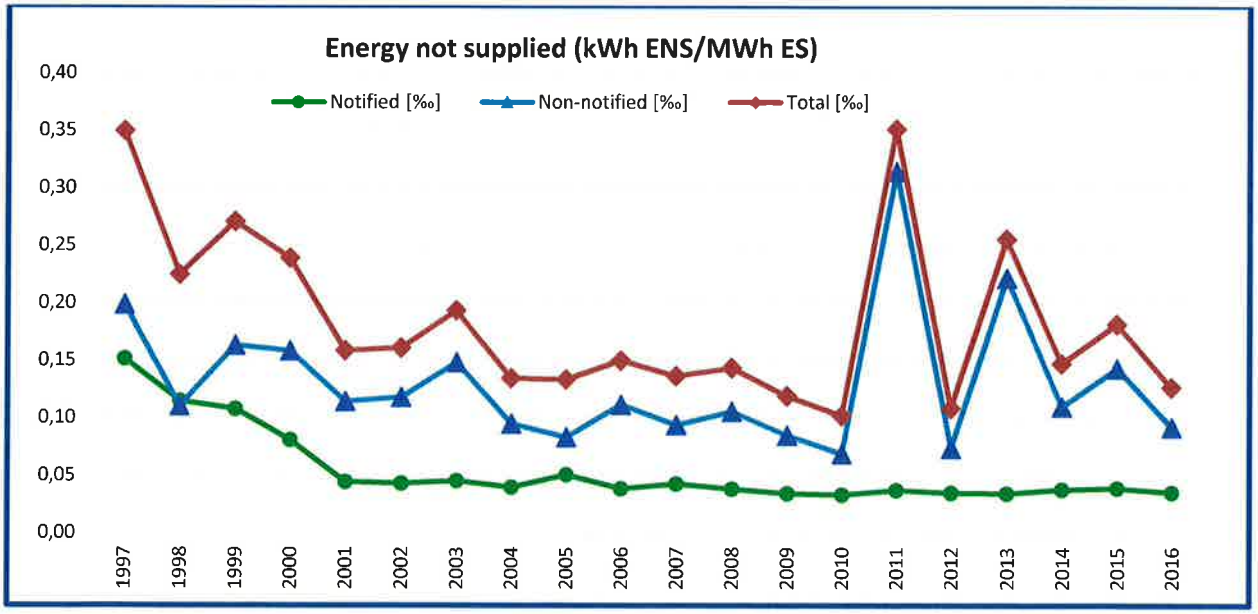

Figure 3. Energy not supplied (ENS) in per thousand relative to the energy supplied (ES) to end users in Norway since 1996.

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. The

outage time per interruption was lower than in 2013, as seen on the values of System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) for long interruptions in figure 1. 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. In 2016 the all the indicators presented in figure 1 and 2 decreased compared to 2015. This means that the end-users were affected by fewer interruptions and the outage time per interruption decreased. This may be because of fewer hurricanes and thundershowers than previous years. At the same time, the amount of energy supplied to the end-users in 2016 reached an all-time high with 117.7 TWh.

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 for Statnett.

Norway is a part of an integrated Nordic balancing energy market for manual frequency restoration reserves (mFRR), known as "the Nordic regulation power market". The Nordic area (except DK1) is synchronised and the Nordic TSOs therefore collectively operates the Nordic area as if it were a single control area. The Nordic balancing energy market for mFRR shares a common merit order list, where the most efficient resources are utilized, for upward or downward regulation. In this 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 mFRR price varies close to the Day-ahead clearing price. In periods with upward regulation, the regulation price will typically be above the spot price and below the spot price in periods with downward regulation.

According to Norwegian regulation, the TSO has the obligation to make sure that there are sufficient reserves in the power system at all times. The required national levels are determined in the Nordic system operation agreement. The level is based on the dimensioning fault of the system, which currently is 1200 MW in Norway. In addition, Statnett consider it necessary to procure 500 MW mFRR to handle regional congestions and imbalances. In order to fulfill the requirement for mFRR, Statnett operates a balancing capacity option market for mFRR (called "RKOM") to make sure there are sufficient upward regulation on the merit order list of the balancing energy market. The RKOM is operational during wintertime, typically from October to April, and has a weekly and a seasonal product. Through RKOM, market participants are compensated for guaranteeing that they will provide bids to the Nordic regulation power market.

Statnett has also been given a license for the responsibility of the balance settlement, which 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 in order to harmonize rules and regulations. According to this

model, the consumption balance is settled according to a single price, 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 marginally price of the activated mFRR balancing energy, depending on whether their imbalance increase or reduce the system balance.

In recent years, NVE has in cooperation with the Swedish regulator EI (Energimarknadsinspektionen) and the Finnish regulator EV (Energiavirasto), worked with the TSOs to prepare for a common Nordic Balance Settlement (NBS) through a joint company. This will be an important step towards a common Nordic end-user market. The go-live date for all three countries was 1 May 2017.

2.1.3 Network tariffs for connection and access

The Norwegian electricity network is characterised as «transmission» (400-132 kV) and "distribution" (132 – 240V). Distribution is further differentiated as regional distribution (132 – 22) and local distribution (22 – 240 v) for regulatory purposes. Statnett is the only Transmission System Operator (TSO) and is responsible for the transmission tariffs. There are 133 network companies owning and operating regional distribution and/or distribution network, some also owning minor parts of the transmission network.

Revenue Cap model

NVE regulates the distribution system operators (DSOs) and the TSO 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 concerns operators of all electricity networks. Statnett is benchmarked together with other European TSOs[3], while the other network operators are benchmarked in a model based on Data Envelopment Analysis (DEA): one model comparing companies operating in the regional distribution network and one model comparing companies operating in the local distribution network. The DEA-results are adjusted using regression analyses 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 notifies the RC for the coming year in November, and the network companies set their tariffs accordingly. All data, benchmarking results and revenue cap calculations, are published 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 RC for one year will only differ due to differences between estimated and actual electricity prices, inflation and WACC. In addition to this, any errors in the companies' costs or technical data discovered after the notification are corrected in the final RC.

The RCs are calculated 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. the deviation between expected and actual costs for 2015 will be corrected in the RC for 2017). The total cost deviation is distributed among the companies using their share of the sectors total regulatory asset base. This mechanism does not apply to the regulation of Statnett.

[3] e3Grid2012 European TSO Benchmarking Study

Allowed Revenue

The companies set their tariffs based on their allowed revenue, which is the revenue cap, with addition to costs related to property tax, approved R&D costs and tariffs paid to other regulated networks. To remove the time lag in the cost of capital recovery, the difference between actual cost of capital (depreciations and return on assets) in the RC year and the amounts from two years back are added to the allowed revenues.

Furthermore, 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. Excess or deficit revenue for a given year is calculated as the difference between actual collected revenues and allowed revenues for that year. Actual collected revenues include tariff revenues from customers, congestion revenue and revenue from system operations. As revenue generated from congestions are considered a part of Statnett's actual revenue, these revenues thereby reduces the base for tariffs that can be collected from Norwegian customers. However, costs related to removing congestion are also part of the tariff base, which implies that the congestion revenue is used in order to finance investments to eliminate congestion. NVE decides an excess/deficit revenue balance every year. The decision is made approximately one year after the RC is set, when the companies have reported their actual costs in the RC-year. The balance is to be adjusted towards zero over time, through tariff changes. Excess revenues must be reimbursed to the customers, while deficit revenues may be recovered.

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. NVE annually audits a selection of the companies to reveal any possible cross subsidies.

Improvements in the economic regulation of regional distribution networks

Norway is facing an intensified investment period in all network levels after a long period of efficiency improvement and low investment activity. The regulatory model is reviewed frequently to adapt to new circumstances and to improve efficiency.

New cost report from Statnett

During 2015, NVE published a report describing the overall regulation of Statnett, focusing on the economic regulation. It also included a statement from Statnett of their latest cost-development. During the last ten years Statnett has increased their costs extensively, mainly due to the need of large, new investments. In 2016, NVE decided that Statnett shall present a public report biannually where they describe the main cost developments. Statnett shall give forecasts on the next five years planned developments and report on the last five years actual development. Deviations between forecasted and actual costs shall be accounted for in future reports. In addition to explanations of the developments in total costs, Statnett shall describe the development in costs for larger investment projects, from the

estimated costs in the license application to the actual capitalized costs. This is to get more insight into whether there are large deviations between estimated and actual costs of investments, and if this is the case, what the causes of the deviations are. The first report will be delivered during 2017.

Tariff determination

The tariff requirements and calculation methodology are subject to NVE regulation. All network companies are responsible for determining tariffs within their income cap according to the regulation on tariff structure. The tariff level is fixed in a non-discriminating way that stimulates efficient utilization and development of the network. Tariffs can be differentiated based on network related criteria that are objective and verifiable.

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. Since 2010, all houses, apartments and vacation homes are to be metered and settled individually.

According to the regulation on tariff structure, tariffs consist of a usage- dependent energy component set 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 usage-dependent tariff components.

The Norwegian TSO levies a local charge for marginal losses to all users of the system. The marginal loss factors are recalculated weekly in order to reflect changes in system conditions. In measurement points with both output and input, loss rates shall be symmetrical around zero. In areas with a production surplus, input has a positive loss rate and outtake a negative loss rate, and vice versa. The marginal loss rates in the transmission network are administratively restricted to 15 percent.

Consumption in the transmission network is charged with an energy component based on marginal network losses and a fixed component that depends on proximity to power production plants and the amount of load that can be disconnected in a given response time.

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 network company are to prepare separate tariffs for high-voltage and low-voltage. 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.

In 2016 a household customer paid an average NOK/kWh 0.41 (€/kWh 0.04) and a fixed component of NOK/year 1.967 (€/year 207.02) including VAT and consumer tax. The corresponding numbers in 2015 were NOK/kWh 0.42 (€/kWh 0.04) and NOK/year NOK/year 1.969 (€/year 207.23). Excluding taxes a household consumer paid an average of NOK/kWh 0.18 (€/kWh 0.02) and NOK/year 1.638 (€/year 172.4).[4]

Producer tariffs consist of an energy component that varies with the customer's current input, and a fixed component. The tariff is independent of the recipient of the power.

[4] NOK 1 = EUR 0.10

The energy component depends on the producer's current input of energy. The energy component is calculated individually for each separate input point, and 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. In 2015, the fixed component was NOK/kWh 0.13, which included a G-charge of NOK/kWh 0.11 and NOK/kWh 0.02 for costs related to ancillary services. Settled production volume is based on the power plant's median annual output the last ten years. For power plants with installed capacity below 1 MW, settled volume is maximum 30 percent of installed load capacity multiplied by 5 000 hours.

Since March 2010, NVE has given a general dispensation to simplify the processes related to end-use customers that generate electricity for their own consumption, and in some hours have a surplus ("prosumers"). The dispensation simplifies the process of selling surplus electricity back to the network. The dispensation implies that the local network company can purchase the surplus electricity and a simplified input tariff. It is not mandatory for the network company to offer the suggested arrangement to prosumers. The dispensation does not apply to generation that requires licensing or producers that supply electricity to other end-users.

In 2014, NVE initiated work on incorporating provisions regarding prosumers in the current regulation. Suggestions for regulation of prosumers have been on public consultation in 2014 and 2015. The changes entered into force 1 January 2017.

Network companies may require a connection charge to cover the costs of connecting new customers to the network or cost of reinforcing the network for existing customers. The connection charges are "semi-deep" because it is not allowed to set connection charges for investments in the meshed network. 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 has handled and settled 33 complaints and disputes regarding tariffs and connection charges in 2016.

2.1.4 *Cross-border issues*

Allocation of capacity 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 large and long lasting congestions in the transmission network and in the case of expected scarcity of energy within a specific geographical area. Countertrade is used, when necessary, to handle congestions between bidding zones, while special regulation is used within a bidding zone, i.e. the TSO is using the balancing market reserves, but can deviate from merit order list and use a bid within the bidding zone with the appropriate location.

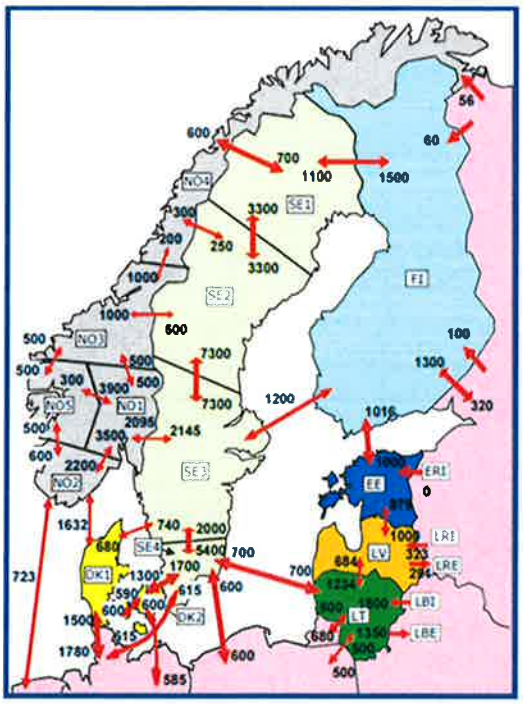

Figure 4. Price areas in the Nordic countries in 2016. Source Statnett

In 2016, 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).

Due to the commissioning of the line between Ørskog (NO5) and Sogndal (NO3), the border between the price areas was adjusted from 7 March 2016. The line was operational from 6 December and this increased the installed market capacity to 500 MW between NO3 and NO5.

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, towards Finland there is only a small interconnection that is not a Day-ahead corridor. The interconnection to Russia is only used for import and not a part of the market coupling.

Due to fluctuations in the power situation, technical failures and maintenance, the available transmission cross-border capacity in Norway varies over time. Figure 5 below shows the average transmission capacity

on the interconnectors that has been available to the market in relation to maximum capacity (grey), in 2016 and 2015.

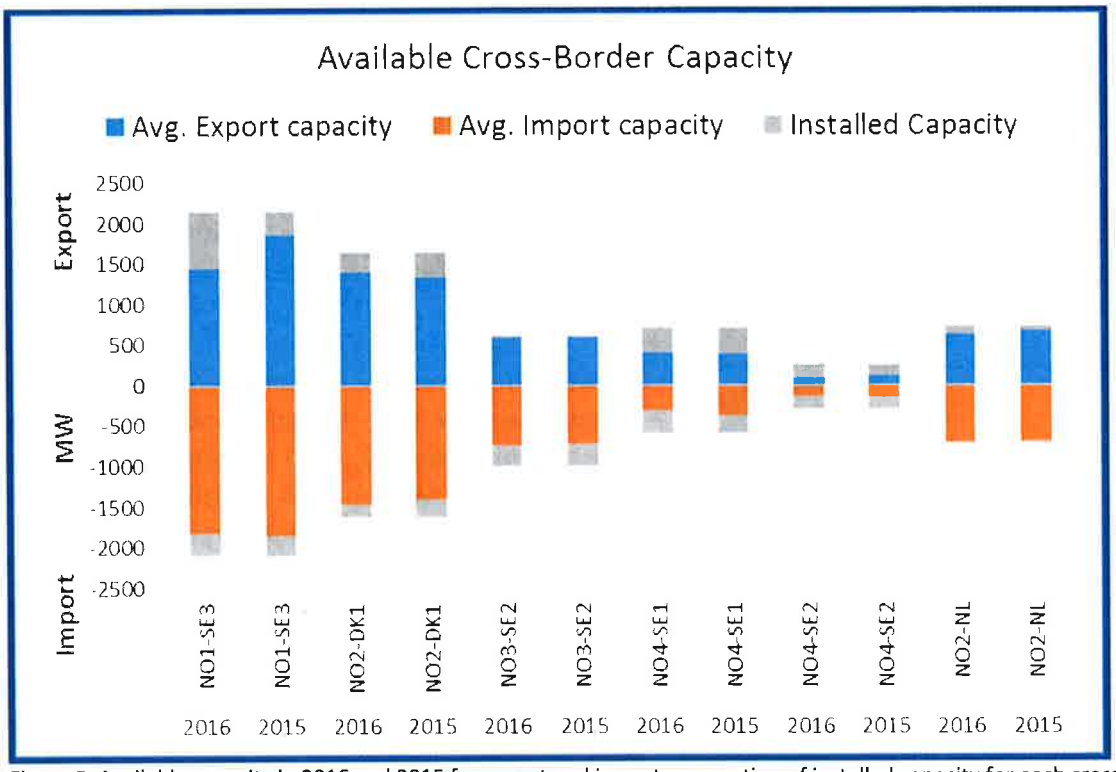

Figure 5. Available capacity in 2016 and 2015 for export and import as a portion of installed capacity for each cross-border interconnector. Source: Nord Pool Spot and SKM Syspower.

Overall, the available cross-border capacity in the market has been relatively stable between Norway and Sweden and Norway and the Netherlands in the time period from 2015 to 2016.

The exception was Norway's export capacity to southern-Sweden (NO1->SE3). The reason behind the 19.11 percentage drop in availability was a failure on cables crossing the Oslo fjord. The temporary replacement cable did not have the same maximum capacity as the original. The export capacity from Norway to Sweden will be limited until September 2017.

	Availablility of interconnectors				Change in percentage units, 2015 to 2016.	
	2016		2015			
Connection	Export	Import	Export	Import	Export	Import
NO1-SE3	67.4 %	86.5 %	86.5 %	88.0 %	-19.1	-1.5
NO2-DK1	85.6 %	90.4 %	81.7 %	86.2 %	3.9	4.2
NO3-SE2	97.8 %	73.5 %	98.4 %	72.2 %	-0.6	1.3
NO4-SE1	56.5 %	50.9 %	55.3 %	62.2 %	1.2	-11.3
NO4-SE2	34.6 %	44.2 %	39.3 %	58.2 %	-4.7	-14.0
NO2-NL	87.2 %	97.1 %	95.3 %	98.7 %	-8.1	-1.6

Available import capacity fell markedly in the north in percentage units between the Norwegian Elspot area, NO4, and the Swedish area SE1 and SE2 from 2015 to 2016. The reason behind this drop is continuing work on uproding the voltage on the north-south corridor in Norway from 300 to 420 kV. A consequence

was that the TSO (Statnett) had to take more operational precaution, by reducing capacity. In addition, work on voltage upgrades on lines in Mid-Norway, can explain parts of the capacity reductions in Northern Norway. Due to lack of system protection in southern Norway, the export capacity on NorNed was reduced from the end of 2016, and throughout the first quarter of 2017.

Price differences

The Norwegian energy market is divided into five bidding zones (NO1-NO5). The division of bidding zones reflects physical structural congestions (transmission constraints) in the grid. No constraints are given to the market (Day-ahead and Intraday) within bidding zones. 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.

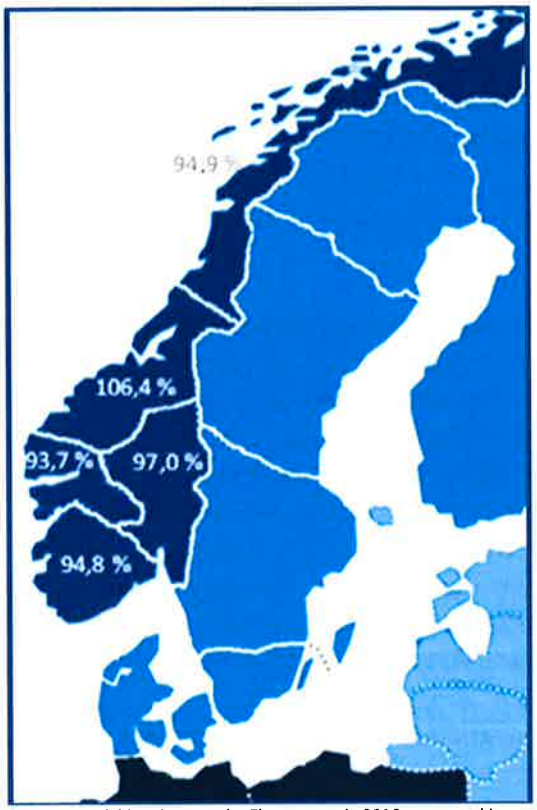

Figure 6: Dark blue denotes the Elspot areas in 2016, measured in percentages of the System price. Source: SKM Syspower and Nord Pool Spot.

Figure 6 depicts prices in the Norwegian bidding zones areas as percentages of the Nordic System price. The System price denotes the unconstrained market-clearing price for all bidding zones in the Nordic countries (more information about the System price can be found in the chapter "Competition in the wholesale market"). The higher the difference in the price in the bidding zone from the System price, the higher the congestion based on the ATC- congestion and capacity allocation.

Figure 6 illustrates that the resulting Elspot prices in NO4 were close to the System price, despite the level of limitations on capacity. Mid Norway, NO3, was close and slightly above the System price. More capacity between NO3 and NO4 would have equalized prices and reduced the congestion. The voltage upgrades in Mid-Norway caused a large share of the capacity reductions, but will allow more capacity to the market upon completion in the future.

With the exception of Mid Norway (NO3), Norway had a surplus of electricity. The record high hydro reservoir levels at the start of 2016 was the main reason. The export capacity was, however, not sufficient to equate prices with the rest of the Nordic system. Western Norway, NO5, had prices that on average were 6.3 percent lower than the System price throughout 2016. In addition to the hydro surplus, the price difference between NO1 and SE2 increased due to the failure on the Oslo fjord cable restricting export capacity.

From northern Norway, the export capacity was reduced due to work on voltage upgrades on the lines between the North and Mid Norway. This contributed to the differences between the Norwegian power prices and System price.

Overall, the figure above shows Day-ahead prices in the Norwegian bidding zones close to the Nordic system price, which indicates that Norway is well-connected with the rest of the Nordic region. The existing Nordic grid, combined with an efficient bidding zone configuration, facilitates an efficient system where price differences between bidding zones reflect fundamental differences at a specific time (e.g. different resource situation).

2.1.5 Compliance

DSOs

NVE monitors network companies and ensures compliance with the neutrality criteria and other relevant regulations according to the Energy Act. NVE 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 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 regulates these bundled companies. The neutrality criteria requires 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 June 2016, the Norwegian Parliament approved a proposed amendment to the Energy Act that imposes legal and functional unbundling for all DSOs, irrespective of size. The amendment will enter into force 1 January 2021.

2.2 Promoting Competition

2.2.1 Wholesale markets

The Norwegian wholesale electricity market has been an integrated part of the Nordic market since the mid-1990s. In recent years, the Baltic market area has been integrated in the Nordic market. The Nordic electricity exchange, Nord Pool (NP) organizes 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 and Lithuania. Market participants at the Elspot/Elbas (Day-ahead and Intraday) part of NP consists of 380 member companies from around 20 different countries. The total Day Ahead traded volume in 2016 was 391 TWh (374 TWh in 2051). This volume constitutes a market share of 95 percent of the regions total consumption. A high level of market participants and high market share indicates a good liquidity and well-functioning market, which in turn contributes to the participants' confidence in price formation at NP. The Nordic, Baltic and German Intraday trade on the NP platform was 5 TWh.

NP is also responsible for the System price calculation. The System price is the underlying price reference for long term 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 long term hedging is financial and is organized by Nasdaq OMX and regulated by the Financial Supervisory Authority. The Exchange listed derivatives refers 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. NOMXs Nordic power contracts (on order book) amounted to 761 TWh in 2016, compared to 743 TWh in 2015. The total clearing turnover for the Nordic financial power contracts was approximately 1 432 TWh in 2016 (1 325 TWh in 2015), which is a multiple of the underlying physical power trade and indicates a highly liquid market in electricity derivatives.

2.2.1.1 Price monitoring

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

Figure 7 below shows the development in the daily Nordic System price in 2016 and 2015. The annual System price at EUR/MWh 26.9 in 2016, was 28 percent higher than in 2015. The maximum monthly average system price at EUR/MWh 38.8 occurred in November, due very low precipitation during the

Autumn. Despite the electricity price spike due to cold weather in January, the system price only averaged 29.9 EUR/MWh.

The minimum system price occurred in February at 19.9 EUR/MWh, which is unusually low for the season. The massive surplus of energy stored in the hydro reservoirs from the snow melting in 2015. The surplus was gradually reduced to normal energy levels during the spring due to high production.

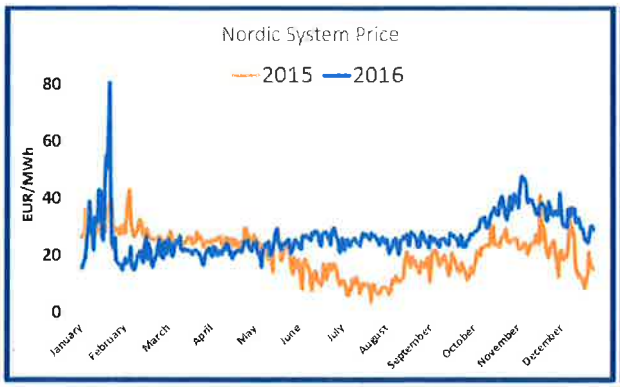

Figure 7. Nordic System price 2016 and 2015, EUR/ MWh.

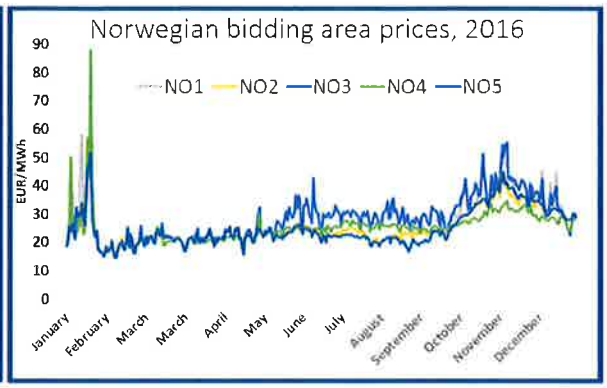

Figure 8. Price development in Norwegian bidding zones in 2016. Source: Nord Pool Spot and SKM Sypower.

Figure 8 shows the price development in the Norwegian 5 bidding zones during 2016, and table 2 (below) shows the annual area prices. In 2016, it was an increase in the prices in all bidding areas compared to 2015. The electricity prices in Norway followed the same pattern as in 2015 throughout 2016. However, grid limitations caused the prices between North and South Norway to diverge in August-October.

Table 2: Annual prices in the Norwegian Elspot areas, €/MWh

€/MWh	2016	2015	Change
System price	26.9	21.0	28 %
East Norway (NO1)	26.2	19.9	32 %
South West Norway (NO2)	25.2	19.8	27 %
Mid Norway (NO3)	28.7	21.3	35 %
North Norway (NO4)	25.1	20.4	23 %
West Norway (NO5)	24.9	19.8	26 %

The price development at NP can be explained by changes in fundamental factors such as variation in precipitation, hydro reservoir levels, inflow, wind and temperature. The figures 9 and 10 below show the weekly developments of temperature and hydro reservoir levels.

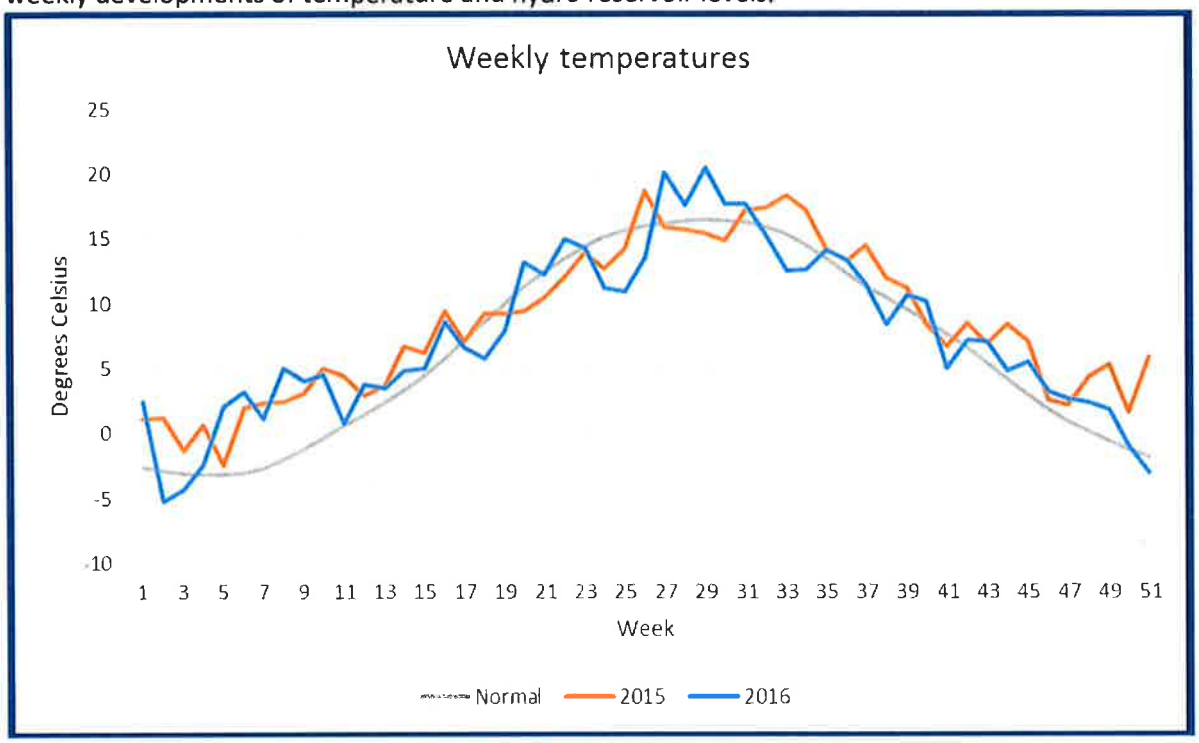

Figure 9. Average weekly temperatures for Norway and Sweden in 2016 and 2015 compared to normal. Source: SKM Syspower.

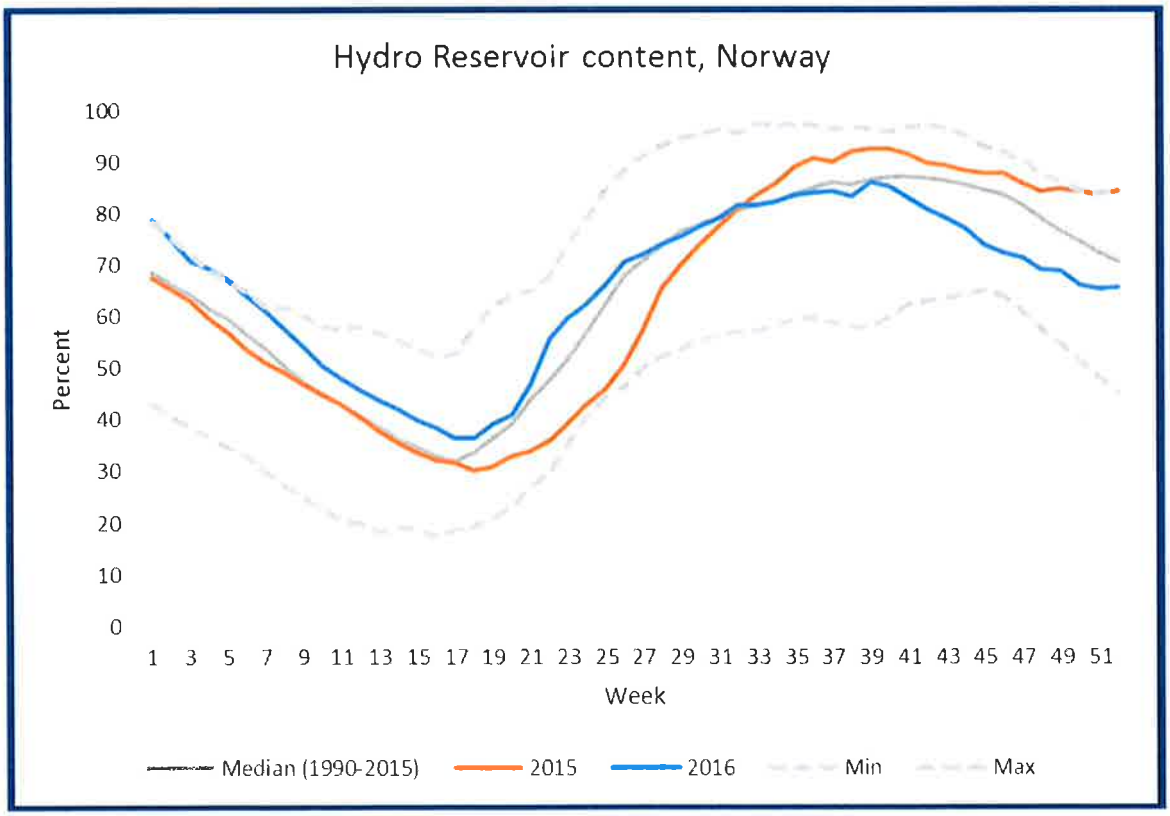

Figure 10. Hydro reservoir levels in Norway. 100 percent represents 82 TWh. Source: NVE

In the beginning of 2016, the hydro reservoir level was 78.9 percent, which is a record high level for the season. The abundance of energy resources gave low electricity prices, despite high consumption during the winter. The average winter temperatures were higher than normal in 2016, but a cold snap in week 2 and 3 gave soaring power prices in all of the Nordic countries. The Norwegian price areas followed the electricity spikes in Finland and southern Sweden due to market coupling. Once the temperatures rose to above normal, the power prices went down. The result was that February had the lowest monthly average electricity price in 2016. High production in the spring and summer caused the hydro reservoirs to be reduced to normal levels. With normal snow levels, prices maintained a higher price level than in 2015 during the summer of 2016. The autumn was particularly dry, and the precipitation that is normally expected for the season failed to be available for hydropower producers. That was the driver behind the price increase in October and November. However, the month of December turned out to be wet and mild, which halted the rapid decline of the hydro reservoirs. At the end of the year, the reservoirs were 65.7 percent, which is 5 percentage points below normal.

In addition to the record high snow hydro reservoirs at the beginning of 2016, the total inflow of energy from snow melting and rain was 129 TWh, which is a normal level. The resulting power production was a record high 149.5 TWh.

With regard to price monitoring in the wholesale market, NVE 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 has the mandate to collect information about the bidding from NP and production plans from the TSO.

2.2.1.2 Monitoring the level of transparency, including compliance with transparency obligation Rules governing market conduct on the organized market place

Nord Pool (NP) holds a market place license issued by NVE, which obligates NP to establish a market surveillance to monitor the participants' behavior. NP has issued Market Conduct Rules (MCR), which applies for all of NP' members. The MCR lay down prohibitions regarding inside trading and market manipulation, and are enforced by the market surveillance (MS). During 2013, the MCR were aligned with EU No 1227/2011 on Wholesale Energy Market Integrity and Transparency ('REMIT'). An important term in MCR is the participants' obligation to disclose inside information.

NP regulates market conduct through the NP Rulebook. The rulebook is a set of private law agreements. All market participants are required to adhere to the standard terms for participation in the NP Rulebook:

<u>Bidding behavior:</u>

- The standard terms for trading in the physical markets include rules for bidding.

<u>Market surveillance:</u>

- Both NP and NOMX are obliged to provide an internal market surveillance.
- The market surveillances of NP and NOMX cooperate to monitor the participants' behaviour to ensure an efficient financial and physical power market. Regular meetings and information exchange between the physical and financial market surveillance teams ensure monitoring and disclosure of possible cross market manipulation.

- NP Market surveillance must ensure that market participants adhere to the rules to maintain the markets confidence in the exchange. The Rulebook for trading at NP regulates market conduct in the physical market with regard to disclosure of price relevant information, misuse of insider information and market manipulation.

Furthermore, regulations given in the Norwegian Competition Act regarding abuse of dominant position apply. These regulations are under the formal competence of the Norwegian Competition Authority. NVE and the Competition Authority cooperate as described under the chapter 3.2.1.1 about price monitoring. Furthermore, if there is suspicion of abuse of dominant position, NVE has the mandate to collect information about market participants' bidding behaviour from NP for the purposes of analysis, and forward it to the Competition Authority for a formal decision.

Transparency in the wholesale market

According to NP' market conduct rules, participants and clearing customers shall disclose any information regarding:

(a) Any outage, limitation, expansion or dismantling of capacity of 100 MW or more for one Generation Unit or Consumption Unit, or 100 MW or more for one Production Unit with an installed capacity of 200 MW or more, for the current year and three (3) calendar years forward, including updates of such information;

(b) Any outage, limitation, expansion or dismantling of capacity in the transmission network affecting cross zonal capacities by 100 MW or more, for the current year and three (3) calendar years forward, including updates of such information;

(c) Any outage, limitation, expansion or dismantling of capacity in the transmission network that reduce power feed-in and/or consumption by 100 MW or more, for the current year and three (3) calendar years forward, including updates of such information;

(d) Any erroneous or missing Orders in the Elspot market of 200 MW or more;

(e) Any information that is likely to significantly affect the prices of one or more derivatives based on Products if made public.

(f) Any Inside Information not covered by sub-paragraph (a) to (e) above

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

Elspot (Day Ahead market)

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

Elbas (Intraday market)

- Prices
- Flows
- Available transmission capacities

Regulating power (Balancing market)

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

Power system data

- Production
- Consumption
- Exchange
- Hydro reservoir

2.2.2 *Retail markets*

The Norwegian Energy Act states that any entity engaged in the physical trading, generation and/or distribution of electric energy in Norway is required to hold a trading license. NVE is through the Energy Act given the authority to provide such licenses, and is delegated the power to issue supplementing regulation through the 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 NVEs 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 2016, 458 companies were holding a trading license. The current licensing period is from 1 January 2015 to 31 December 2018. Of the companies that had a trading license in 2016, 145 were electricity suppliers supplying residential customers, while 138 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 somewhat. 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.

A new regulation of voluntary combined billing were implemented in September 2016. Most suppliers and DSOs spent the rest of 2016 adjusting to the new solution. The voluntary combined billing solution is expected to increase the neutrality of the DSO, and level the playing field between integrated suppliers and independent suppliers. Following the implementation of Elhub and experience from the voluntary combined billing regime, NVE also aims to implement a mandatory combined billing regime, effectively creating a customer centric supplier model in the Norwegian market.

2.2.2.1 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, 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 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.

NVE 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 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 the network company (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 in a way that incentivises the customers to find a supplier in the energy market.

NVE 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 are published in a weekly report on NVE's website, and are regularly referred to by the public media. NVE 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 NVEs website to inform their customers about the costs imposed by the electricity certificate obligation.

In 2016, electricity consumers paid for electricity certificates amounting to 11.9 percent of their total electricity consumption. This share will steadily increase towards 2020 where it reaches its peak at 19.7 percent of the total annual electricity consumption. The actual additional cost paid by the consumers in 2016 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 2.5 øre/kWh (including VAT) due to electricity certificates in 2016. This means that a household using 20 000 kWh of electricity in 2015, paid a total cost of approximately 500 NOK (including VAT).

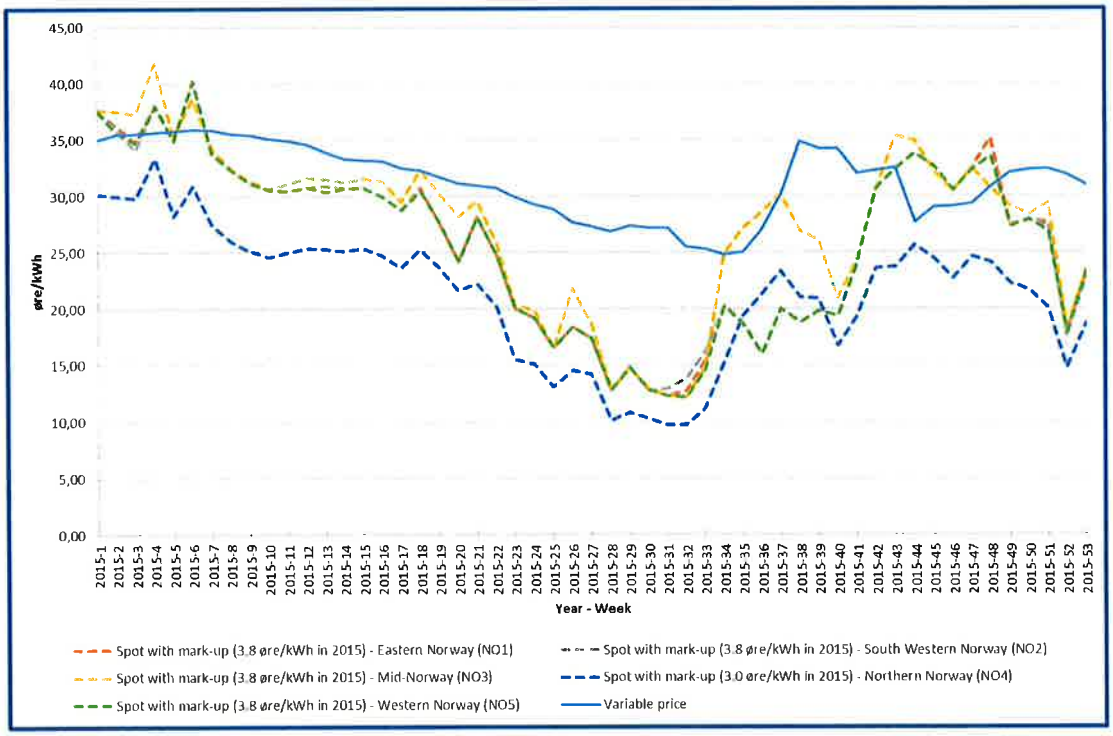

Figure 11. Average price development for the spot contract in the five Norwegian bidding zones

The figure above shows the average price development throughout 2016 for the spot contracts in the five Norwegian bidding zones of the Nord Pool Spot power exchange, together with the variable contract[5]. 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 3.8, except for the el-spot area Northern Norway, where the price excludes VAT and includes a mark-up of øre/kWh 3.0. The mark-ups are calculated by NVE 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, and the Norwegian Competition Authority has full responsibility. The physical power exchange, Nord Pool AS, operates under a market place license issued by NVE pursuant to the Norwegian Energy Act. The marketing of electricity contracts are regulated by the Norwegian Consumer Ombudsman.

2.2.2.2 Recommendations on supply prices, investigations and measures to promote effective competition

The Norwegian retail market for electricity will face substantial changes in the coming years. 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) will be implemented. The targeted implementation for Elhub is 2018 and the smart meter roll-out is set to be completed by 1 January 2019. The implementation of Elhub will standardize the exchange of hourly metering data, simplifying the communication of metering data in the chain between DSOs, suppliers and consumers. NVE considers active, well-informed consumers to be key for the Norwegian retail market. Smart meters are expected to provide real-time consumption data and price signals that give incentive for energy efficiency and peak load management, by enabling consumers to adjust consumption to price variations.

NVE is also assessing the implementation of customer supplier model for the Norwegian retail market, in accordance with NordREG recommendations. The implementation of a customer centric model is key to simplifying the retail market for consumers and is considered a necessary step in the further harmonization of Nordic retail markets for electricity. The model under consideration by NVE includes a mandatory combined billing regime, which will simplify the market structure and make it easier for consumers to engage in the electricity market.

In general, NVE 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 encourages consumers to ensure that their contracts are among the most competitive ones.

[5] The variable contract typically follows the spot price with a lag of about two weeks, since the supplier is obliged to inform about price modifications two weeks before they take place.

One of the investigations NVE carries out in order to monitor the efficiency of the retail market, is a quarterly survey of the number of supplier switches and the market shares of dominant suppliers in the retail market. These data are collected from a group of DSOs that combined over approximately 90 percent of the retail market (measured by the number of metering points), and a quarterly report is published on NVEs web site. In 2016 there were 528 000 supplier switches resulting in a switching rate of 18.4 percent for household customers.

2.3 Security of supply

2.3.1 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. NVE is the national energy rationing authority, but 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 analyses the possible development in the energy and power balance. When it comes to monitoring the market development NVE publish regular reports describing the development.

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 occurrences. 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 NVE of the findings. NVE approves of different measures with conditions before they enter into force. Permanent- and operational costs for the different measures are handled within Statnetts 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 for electricity rationing.
- Must be effective for handling of extreme situation, and yet 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 situation and to maintain the efficiency of the physical power market

- Take into consideration the already existing flexibility in production, transmission and consumption.

The different measures that have been approved by NVE are:

- Use of a mobile gas turbine (150 MW) as reserve power plant.
- Energy options, contract with different consumers to reduce the consumption.

The approved measures can only be activated after approval from NVE. The measures will only be activated in a situation where physical rationing of electricity supply is considered likely. The approved measures has not been applied in Norway. In 2016, energy options was only procured for the power deficit area of Mid Norway (NO3). TSO Statnett did not purchase energy options for 2017, after the commissioning of the Ørskog-Sogndal line. The line increased transmission capacity by 500 MW from NO5 to NO3.

Electricity peak demand

Domestic gross energy consumption was record high 133.1 TWh in 2016 (130.4 TWh in 2015), despite higher than normal temperatures. The reasons are a collection of higher demand in all sectors like power intensive industries, electrification of transport, and increased population.

The Norwegian peak demand occurs in the winter season. The peak electricity demand 24 485 MWh/h in 2016, which is a new record brought on by cold temperatures.

Table 3. Peak demand for the last 10 seasons.

Year	Weekday	Date	Hour (CEST)	Demand [MWh/h]
2006	Monday	06.03.2006	8	21 575
2007	Wednesday	14.12.2007	8	21 588
2008	Thursday	14.02.2008	9	21 589
2009	Monday	05.01.2009	8	21 984
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

Currently available generation capacity

The total installed generation capacity was 32 829 MW. Available generation capacity during a cold winter is estimated to approximately 26 500 MW by Statnett.

	Installed capacity 31.12.2016	Mean annual generation 31.12.2016	Net capacity added in 2016	Under construction on 31.12.2016	License/permit given, not yet built
	[MW]	[TWh/y]	[MW]	[MW]	[MW]
Wind power	873	2.5	0	4202	11380
Hydro power	31671	133.3	433	1657	5544
Thermal power	633*	3.5	0	0	1380
Solar Power	27	0.02	12	N/A	N/A
Sum	33204	139.3	468	5859	18304

Table 4. Current generation fuel mix. Actual investment commissioning during 2016 (*Does not include 150 MW capacity in gas-fired mobile reserve plants.)

The hydropower generation capacity has increased by approximately 433 MW in 2016. The amount of wind power under construction has increased to 4202 MW. The reason is that wind farms must be built by 2021 to receive support from the green certificate scheme[6]. According to NVEs estimates, the total accumulated solar power in Norway is estimated to 27 MWp, but only 13.6 MWp is connected to the grid.
Monitoring balance of supply and demand on the national market, the level of expected future demand and envisaged additional capacity being planned or under construction

NVE has delegated the responsibility for power system planning in Norway to 17 owners of the distribution network (33 – 132 kV) that are responsible 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 today's 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.

The plan is submitted to NVE for consent. NVE monitors the level of expected future demand and envisaged additional capacity. The network development plan is also important in NVE's evaluation of the applications for a license to build energy plants or network installations.

[6] According to rules of 2016.

2.3.2 *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. NVE considers the economy, public and private interests and environmental issues for every project.

NVE delegates the responsibility for power system studies 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 NVE's 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

In October 2014, the TSO (Statnett), was granted licenses to build two HVDC cables to respectively Germany and UK, each with a capacity of 1400 MW. The Norwegian TSO in cooperation with the German TSO (Tennet) is developing the NordLink-cable to Germany, which is expected to be commissioned in 2020. In addition, Statnett and National Network in UK have signed a cooperation agreement with the aim of commissioning the DC cable between Norway and UK within 2022.

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. An application for the technical specifications have been submitted to NVE. The ministry of petroleum and Energy is awaiting a application for trading license of the interconnector. If given licence, North Connect could be commisioned by 2022.

Gridplan Grand Oslo: a series of licenses have been given to Statnett to replace older cables and lines and ensuring security of supply to the Oslo region. Work will begin in the start of june 2017.

Western Corridor: The TSO Statnett is planning voltage upgrades in the Southern and Western transmission grid from 300 to 420 kV. This will enable renewable integration, increase security of supply and This will a result in numerous application for licenses in grid segments and transformers, totaling an expected cost in range 750 to 915 million euros.

Ørskog-Sogndal: The 285 km, 420 kV OH line from Sogndal to Ørskog was to be commissioned in December 2016. The line has improved the security of supply in the Mid-Norway area, RES integration and net transfer capacity.

Ofoten-Balsfjord: The 150 km 420 kV OH line for Ofoten to Balsfjord is under construction and is expected to be commissioned in 2017. This line will improve the security of supply in the North of Norway. Expected load growth and RES integration will benefit from this investment.

Balsfjord-Skaidi: The 300 km 420 kV OH line for Balsfjord to Skaidi was granted license in 2015. This line will improve the security of supply in Finnmark. Expected load growth and RES integration will benefit from this investment. It is expected to be commissioned in 2021.

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 15 billion euros. The historically high network investment level will ensure a reliable power supply, facilitate renewables 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 2020, with financial aid through a green certificate market. This will together with the installation of smart metering in all Norwegian households by 2019 and new HVDC cables to Germany and UK cause a high level of for investment in the distribution and transmission network in Norway in the coming years, as illustrated in Figure 12.

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

Statnett is planning to invest NOK 50-70 billion over the next decade. The historically high network investment level will ensure a reliable power supply, facilitate renewables projects and industrial and commercial development throughout Norway. Norway and Sweden have a mutual agreement of installing 26.4 TWh of new renewable energy within 2020, with financial aid through a green certificate market. This will together with the installation of AMI in all Norwegian households by 2019 and new HVDC cables to Germany and UK cause a high level of for investment in the distribution and transmission network in Norway in the coming years, as illustrated in Figure 12.

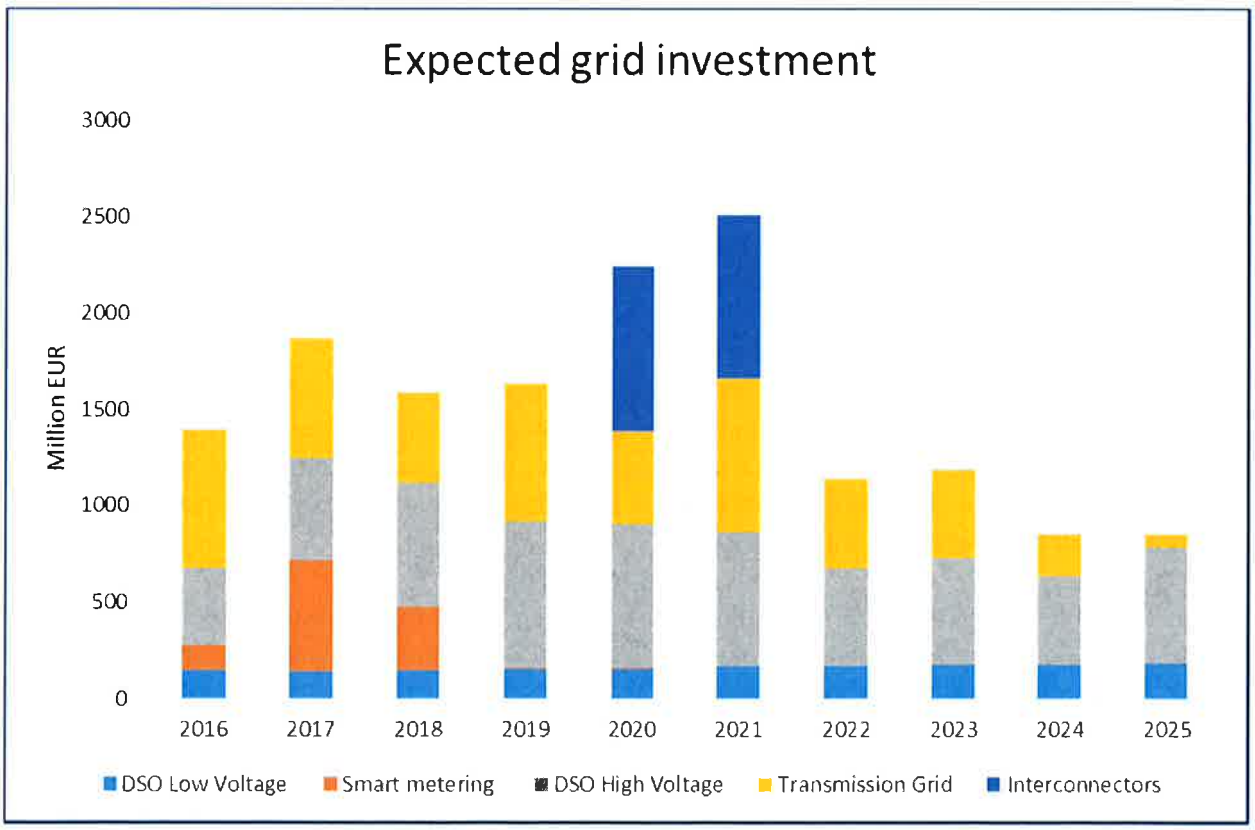

Figure 12. Expected investment levels in the Norwegian network. 1 EUR = 9,23 NOK in 2016.

In the period after 2022, it is expected that the network investment levels will normalize at approximately 1 billion EUR each year, but the need for further investments is possible.

2.3.3 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.

Further, NVE 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).

3 THE GAS MARKET

All though Norway is a large gas producer only 958 GWh[7] (2016) is distributed in gas distribution networks. The Norwegian gas market is small and is expected to remain small.

There are two regional 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 also use injected tail gas from LNG production facilities. There is no transmission network in Norway as defined in EUs third Natural Gas Directive[8].

NVE 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[9], and to have separate accounts for distribution, LNG and storage.

In 2016, NVE started to prepare a proposal for a new regulation for gas distribution in order to prepare for the implementation of the above mentioned Natural Gas Directive into Norwegian law. The proposal for a new regulation shall be in compliance with the Natural Gas Directive and adapted to local market conditions. In this proposal, NVE will propose a system to fix or approve tariffs, or the tariff methodologies. Further, third party access to gas distribution networks will also be addressed.

[7] Based on information from the gas suppliers.
[8] Directive 2009/73/EC of the European parliament and of the council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC.
[9] With an exception for small facilities.

4 CONSUMER PROTECTION AND DISPUTE SETTLEMENT IN THE ELECTRICITY MARKET

4.1 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 Ombudsman. 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 2016, the Norwegian Parliament granted MNOK 20 to reduce network tariffs for customers in areas with the highest distribution costs.

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.

4.2 Dispute settlement

NVE has been authorized to monitor compliance with, and take decisions according to the Energy Act and regulations laid down in accordance with the Act. NVE handles complaints and disputes regarding network regulation and tariffs, 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 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 suppliers. The Board is managed by a legal professional. In 2016, the Norwegian Electricity Appeal Board received 398 written complaints and reached a decision in 60 cases.

Appendix

Table 6. 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

Table 7. 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

Table 8. Energy supplied and some continuity indicators in Norway, regarding 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	16.8	15.8	32.6
1997	101 987	16.5	24.0	40.5
1998	106 228	13.9	13.6	27.6
1999	106 525	11.8	19.0	30.8
2000	104 193	8.9	18.1	27.0
2001	108 361	5.1	14.2	19.3
2002	107 656	4.9	15.0	19.9
2003	105 145	4.9	16.9	21.8
2004	109 306	4.4	11.6	16.0
2005	111 804	5.7	9.9	15.6
2006	106 380	4.1	11.7	15.8
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	107 055	4.0	33.2	37.2
2012	110 698	3.8	8.0	11.8
2013	112 118	3.8	24,7	28,6
2014	114 527	4.3	12,4	16,6
2015	115 110	4,5	16,4	20,9