Report on the activities of ElCom 2018

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1 Foreword by the President

Carlo Schmid-Sutter
President of ElCom

2018 can be regarded as a very positive year from the point of view of the regulator. In comparison to previous years, the supply situation was not tense throughout the year, including the winter months. Electricity prices were stable and policy-makers discussed and addressed the main energy issues.

Despite the cold temperatures in February and March, the supply situation was not tense in terms of either energy or the grid. Electricity generation capacity was high and all nuclear power plants in Switzerland were connected to the grid throughout the year – with the exception of Beznau 1 and – for a short time – Leibstadt. The run-of-river power plants produced a large amount of electricity due to high water levels and the reservoir levels were also higher than in the previous year.

In order to monitor the medium and long-term supply security, we completed the Adequacy 2025 study in early summer and published the results. On the basis of the studies we came to the conclusion that for a probable scenario, supply in Switzerland is guaranteed for 2025 and we therefore do not need to propose any measures to the Federal Council in accordance with Article 9 of the Federal Electricity Supply Act.

If stress scenarios are applied, for example if France had problems with its nuclear power plants and Leibstadt and Gösgen were out of operation at the same time, the situation would be more severe. Although the probability of such a scenario occurring is low, we have recommended that preparatory measures be taken for such a case – for example in the form of a strategic reserve. We have also suggested – in view of the increasing imports – that a substantial proportion of energy should continue to be generated in Switzerland in the future.

The situation with tariffs is as stable as the supply situation. In 2019, tariffs for an average household in Switzerland rose by just 0.1 cents to 20.4 cents per kilowatt hour compared with 2018. While network use tariffs fell slightly, energy tariffs rose by 0.2 cents to 7.4 cents/kWh. Feed-in remuneration at cost remained at its legally specified maximum of 2.3 cents/kWh.

Despite stable overall tariffs, the large differences in network tariffs were repeatedly highlighted in the media and subsequently on the political stage in the year under review. There is considerable variation (between 7.9 cents/kWh and 12.8 cents/kWh) in network tariffs in Switzerland depending on the canton. If one goes further and looks at individual network operators, the differences are even greater, with tariffs ranging from zero to just under 19 cents/kWh.

There are various factors that can lead to different network tariffs for network operators.

There are factors that the network operators cannot influence: topography, settlement and energy density, different load profiles and sometimes also power plant concessions. The latter lead to the famous network use tariffs of zero or near zero. There are also factors that can be influenced by the network operators and the owners themselves. These include efficiency and differing profit motives: whether the focus is provision of a public service concept or pure profit maximization.

The often-cited synthetic valuation and the revaluation of historically valued networks belong to the category of different profit motives. Both methods were approved by the Federal Supreme Court. The impact on tariffs is considerable: Today, nine percent of the residual values in the distribution network are still derived synthetically, which results in "recoverable" capital costs of CHF 160 million per year. This was despite the fact that only half of all network operators have synthetically valued their networks. At the time the Federal Electricity Supply Act was introduced, some 90 percent of network operators were taking advantage of the opportunity to upgrade historically valued grids. ElCom does not know how much these upgrades have cost to date. On a positive note, although synthetic valuation and revaluation are purely historical phenomena (neither are still in use), they will continue to have an effect for many years to come.

It is the responsibility of policy-makers and not ElCom to assess the legitimacy of the network tariff differences mentioned. ElCom's responsibility is to assess the legality of the tariffs. It is in the nature of the cost-plus regulatory system that the cost structure of each network operator is relevant. Although the network must be efficient, this efficiency may require different resources from different network operators. If the differences in network tariffs are felt to be too great – even though the regulator has recognised that the network costs comply with the law – the cantons and the Federal Council can take appropriate measures to harmonise them. No such measures have been taken to date.

It is currently difficult to predict what the future holds for network tariffs and the regulation thereof. One option is to expand the Cost-Plus Regulation and supplement it with the Sunshine Regulation. This would mean a comparison of network operators by means of a few clear, informative indicators. The upcoming revision of the Federal Electricity Supply Act will create the necessary legal basis for the publication of this data. If the Sunshine Regulation does not have the desired effect, a second option is an incentive regulation. However, we consider this option to be subject to considerable risks. There is a significant risk that too little will be invested. Restructuring would also lead to legal uncertainty and lengthy legal proceedings, which would entail considerable additional costs for the regulator and the network operators. Experience in other countries indicates that incentive regulations often do not lead to a reduction in network prices. For these reasons, we believe that the best way forward is to maintain the status quo with some adjustments, such as the Sunshine Regulation.

I hope you enjoy the rest of this report and it gives you a good insight into the activities of ElCom.

2 Focus on supply security

Transformers play an important role for the increasing electricity imports into Switzerland. They couple the European transmission network (380 kV) into the Swiss transmission network (220 kV). The image shows a phase-shifting transformer at Beznau substation.

At a press conference at the end of May, ElCom announced that according to the adequacy studies the supply situation would be guaranteed in the short and medium term. Does this mean that shutting the Mühleberg nuclear plant in 2019 will not present a problem for supply security in Switzerland?
That is correct. The adequacy studies for 2020 and 2025 show that supply security is guaranteed in the short and medium term. This also takes into account certain stress factors. If all the nuclear power plants in Switzerland are connected to the grid, if the situation in Europe is stable and if import availability is high, there will not be a problem with supply security without Mühleberg in 2025. However, the results of the calculations show that the vulnerability of supply security will increase sharply, especially with the decommissioning of several Swiss nuclear power plants.

According to ElCom, the situation looks less positive in the long term. Supply security is sometimes threatened in these stress scenarios. What exactly are the dangers and what does this mean in concrete terms?
If, contrary to our basic scenario, stress factors are added, for example if – during a cold winter – France has only limited access to its generation facilities due to a technical malfunction, this would have an impact on imports and consequently on supply security in Switzerland. If domestic production is also low – e.g. nuclear power plants are no longer connected to the grid in Switzerland, low reservoir levels and low output from run-of-river facilities – the situation would be even worse. The worst-case scenario would be load shedding. In order to minimise this risk for Switzerland and to ensure that the situation remains stable in the future, we are calling not only for a strategic reserve but also for the creation of legal incentives in

the Federal Electricity Supply Act in order to maintain domestic winter production.

Is it right to say that you would welcome a strategic reserve but do not believe that this alone is sufficient and you are therefore calling for further measures? What form would such measures take and who would pay for them?

We welcome the fact that the Federal Office of Energy is proposing the establishment of a strategic reserve within the framework of the revision of the Federal Electricity Supply Act. This measure could support supply in the event of sporadic risks in the short term. However, we are calling for additions to the legal framework so that, if necessary, structural measures can be taken immediately to maintain domestic winter energy generation.

In concrete terms, this means that when Switzerland's nuclear power plants are decommissioned, replacement capacity must be available in winter or, alternatively, imports must be guaranteed. However, we can only influence imports from neighbouring countries indirectly. With regard to replacement capacity, we have always taken the view that we are technologically neutral and therefore do not make recommendations for the precise instruments. It is up to the policy-makers to conduct the evaluations.

The issue of financing is interesting and must also be addressed by policy-makers in consultation with the PSCs. It is clear that such measures will come at a cost. However, it is equally clear that incentives for investment must be created. This must be taken into account in the cost-risk analysis. If measures can guarantee supply security in the long term, we believe that investment is fundamentally worthwhile. Of course, it is important not to neglect the aspect of cost efficiency when choosing a solution.

It has not yet been decided whether there will be an electricity agreement between Switzerland and the EU. What would the effect on supply security in Switzerland be in the event that no agreement is concluded?

The EU's prerequisite for an electricity agreement with Switzerland is the framework agreement. Without an electricity agreement, Switzerland often lacks a say in central decision-making and committees. In terms of supply security, an electricity agreement would be desirable for factors including network stability. Unscheduled load flows that occur during trading from Germany to France, for example, impact the Swiss electricity network. With an electricity agreement, Switzerland would have the opportunity to participate in flow-based market coupling and address such issues. However, this does not mean that an electricity agreement would solve all the problems of Swiss supply security. If no agreement is concluded, the challenges must be addressed in a different way.

"Even an electricity agreement would not solve all the problems of Swiss supply security."

Renato Tami
Head of the Technical Secretariat

2.1 Overview

In accordance with Article 22, paragraphs 3 and 4, of the Federal Electricity Supply Act, ElCom is responsible for monitoring supply security. If there are signs of a significant threat to the domestic supply in the medium or long term, Article 9 of the above act stipulates that ElCom must propose suitable measures to the Federal Council. These may take the form of efficient electricity use, the procurement of electricity or strengthening and expanding the electricity networks. Supply security is assured if at all times the desired quantity of energy is available at the necessary level of quality and at reasonable prices across the entire electricity network.

In order to fulfill this mandate, ElCom monitors the medium- to long-term supply security by means of comprehensive monitoring in the areas of networks, generation, prices, tariffs and the environment. Important results from these monitoring activities for the year under review are presented in the following chapters.

2.2 Supply security: review and outlook

2.2.1 Supply security report

The 2016 report identified particular need for action in the areas of generation and network expansion. In 2016 and 2017, improvements were made at the transformer level (in Beznau, Romanel and Veytaux) between the 380 and 220 kilovolt levels. The installation of new transformers at Mühleberg began in 2017, while upgrading of the transformers in Laufenburg is planned for 2019. Furthermore, the section between Chamoson and Chippis, which has been contentious for many years, can now be realised due to a decision by the Federal Supreme Court. The procedures for increasing the voltage of the critical network sections between Chippis and Bickigen as well as Bassecourt and Mühleberg were opened. As a result of this concrete progress, the expansion of the network appears somewhat less critical than in the 2016 report. However, it must again be emphasized that various transmission line projects continued to be delayed as they are still blocked by objections. Supply security in the distribution network can be described as very good. Network availability has reached a very high level of quality over the past six years. This is also confirmed by the annual country comparison performed by the Council of European Energy Regulators (CEER).

The issue of production remains the focal point. Based on the identified need for action, ElCom initiated additional investigations into system adequacy in 2017. The two steps were to examine supply security for 2020 and then for 2025. ElCom's detailed findings and conclusions can be found in the two reports on system adequacy (cf. Section 2.2.4).

One new focal point is the development of the national and international legal framework. On an international level, following the entry into force of the codes, the rules on interconnected operations negotiated under private law will be systematically implemented on the

basis of EU law. If, after the development of the relevant methodologies, Switzerland is confronted with a *fait accompli*, it will only be possible to represent Swiss interests to a limited extent. This development is critical with regard to supply security, because technical issues will only be regulated in consultation with Switzerland if necessary. This could impair network security (capacity calculations), which would have far-reaching consequences for the energy industry (import availability). From a regulatory perspective, an electricity agreement between Switzerland and the EU would help more systematic regulation of cross-border issues. An agreement would almost certainly make it easier to defend and assert Swiss interests. This could be helpful in those cases in which the de facto situation is that it is impossible or only possible to a limited extent for Switzerland to influence decisions. However, even if an electricity agreement is concluded, there is no guarantee that it will be possible to improve enforcement of, or to fully enforce Switzerland's interests.

2.2.2 Review of winter 2017 / 2018

In terms of temperature, winter 2017 / 2018 was a normal winter for the country as a whole. The water reserves were at a high level at the beginning of the winter and imports were available to a high level on average. As a result, supply security in Switzerland was generally not tense.

Electricity consumption increases at lower temperatures due to electric heating. In February there were typical winter temperatures and a cold spell at the end of the month in Switzerland and all neighbouring countries. This resulted in peak loads of up to 10.2 GW in Switzerland and 92.8 GW in France. In the last three days of February, France was dependent on imports and even partially suspended the allocation of capacity for exports to Switzerland.

At the beginning of the winter, energy generation from French nuclear power was considerably reduced with around 30 percent of plants unavailable. In December, increased demand in France and Italy led to above-average use of Swiss water reserves. On 19 December, Leibstadt nuclear power plant resumed operation after a prolonged outage.

Winter brought plenty of snow in the mountains. The intense precipitation in January contributed to the fact that in February snow reserves reached a seasonal peak for the last 20 years. This also helped the supply situation in Switzerland. With the return of Unit 1 of the Beznau nuclear power plant at the end of winter, all five Swiss nuclear power plants were back in operation for the first time in three years.

In January, the winter storms Burglind and Evi led to many network operation problems. However, operational measures meant that these did not lead to any major supply interruptions. In the first half of the winter, imports were at times above average, while in the second half of the winter exports predominated. In January there were high transit flows to Italy, and Switzerland was in export operation for about a third of the time, which is a relatively high level.

1.1.1 Situation in winter 2018 / 2019

Winter started with very mild temperatures and high levels in the reservoirs despite the initially persistent dry spell. The production availability of the French nuclear power plants was normal. All five Swiss nuclear power plants were also connected to the grid.

In September, Belgium decided not to procure a strategic reserve for the winter of 2018 / 2019. It was the first time it had not procured a strategic reserve since 2014. From October to December, however, up to six of a total of seven Belgian nuclear power plants were not available. Some of these outages were planned while others were unplanned and occurred at short notice. This led to price fluctuations of up to 500 Euro / MWh on the futures and spot market. The supply interruptions that had initially been announced in Belgium were avoided in 2018. To achieve this, the transmission network operator Electrabel made use of additional domestic production and flexibility as well as generation capacity in neighbouring countries. According to the government, the supply situation in Belgium remained tense in the first quarter of 2019.

At the end of October, a 380 kV transmission line on the Albula Pass was damaged by Hurricane Vaia. Four masts buckled and the transit flow capacity to Italy was reduced by 900 MW and the situation will continue until the planned recommissioning at the end of July 2019. Occupational safety concerns on high-elevation mountains during the winter meant that it was decided not to introduce a temporary emergency solution for this winter. There was no danger of any negative effects on supply security in Switzerland.

2.2.4 Adequacy 2025 study

ElCom conducted a detailed study into electricity supply security for 2025. The study is based on probabilistic calculations for the European energy system with a special focus on Switzerland. ElCom's basic assumption was that no electricity agreement with the EU will be concluded by 2025. This leads to the assumption that imports into Switzerland will only be available to a limited extent in future. A basic scenario and three stress scenarios were examined, with assumptions regarding further restrictions on imports from Germany, France and Italy as well as reduced domestic and foreign generation availability.

On the basis of the results, ElCom came to the conclusion that in the most probable scenarios, i.e. the basic scenario and the mildest stress scenario, it will be possible for the market to guarantee supply security.

In the two severe stress scenarios, however, there are significant indicators of a supply interruption. These scenarios cannot be ruled out in the event of a chain of unfortunate circumstances. In these unlikely scenarios, the extent to which reserves can be called upon within and outside of the market is likely to be crucial.

2.3 Unscheduled flows

In an interconnected network, the actual flow of electricity never corresponds exactly to the traded and planned flows. The deviation between physical and trade flows through the transmission network as an unscheduled flow, e.g. about 30 percent of the quantity traded from Germany to France physically flows through Switzerland.

With the introduction of flow-based market coupling in the Central Western Europe region, excluding Switzerland, trading capacities from Germany to France increased significantly, which led to some bottlenecks in the Swiss network, particularly in winter. ElCom, Swissgrid and the SFOE were in intense dialogue with the relevant bodies in Central Western Europe. An interim solution looks likely for the second half of winter 2018/2019. Talks regarding a permanent solution are ongoing.

In view of the forthcoming expansion of Central Western Europe into the CORE region, ElCom also took part in the consultation on the methods for calculating capacity in CORE in order to demand that the networks of third countries be correctly taken into account.

2.4 Cyber security

Electricity networks are increasingly controlled and monitored using intelligent information and communications technology. These systems offer the network operator more control options and enable more efficient system operation as well as the provision of new services. However, this increasing networking of information technology increases threats such as the risk of hackers penetrating the electricity network and compromising the availability[1], integrity[2] and confidentiality[3] of data or damaging technical equipment. Such an incident could lead to considerable financial damage and above all to reputational damage on the part of the network operator concerned. In extreme cases, a large-scale power outage according to the scenarios of the Federal Office for Civil Protection (FOCP) could lead to injuries or even deaths as well as environmental damage. This makes cyber security a key issue in ensuring supply security.

According to Article 22 paragraph 3 of the Federal Electricity Supply Act, ElCom is responsible for monitoring the electricity markets with a view to ensuring secure and affordable supply in all parts of Switzerland. This implicitly includes information technology risks and therefore also regular monitoring of the state of network operators' cyber security.

For this reason, ElCom decided to provide an overview of the status of organisational and technical cyber security measures at the 92 largest network operators. It does not examine the status of the entirety of their cyber security measures. The focus is on risk management, raising employee awareness and

dealing with external service providers, as well as fundamental issues relating to network architecture and the detection of cyber incidents. The following comments and recommendations therefore only apply to the subject areas examined which ElCom based on existing standards and industry documents.

Increasing networking means that cyber security is continuing to grow in importance. ElCom welcomes the efficient, risk-based implementation of the Association of Swiss Electricity Companies (VSE) industry documents *ICT Continuity, Handbuch Grundschutz für Operational Technology in der Stromversorgung (Handbook on Basic Protection for Operational Technology in Electricity Supply)* and *Richtlinien für die Datensicherheit von intelligenten Messsystemen (Guidelines for the Data Security of Intelligent Measurement Systems)* in accordance with the FOCP's CIP guidelines. ElCom also assumes that these will be implemented. Based on the results of the survey, ElCom considers the improvement of organisational measures, in particular the development of guidelines and training programs, and the protection of OT as well as guaranteeing supply through a redundant system to be of central importance. ElCom welcomes the efforts to establish a CERT sector in the sense of subsidiarity.

1 Availability means that the systems and data to be protected can be accessed and used by an authorised entity upon request.
2 Integrity means the correctness and completeness of the processed data and the correct functioning of the systems.
3 Confidentiality refers to the protection of systems and data against unauthorised access by persons or processes.

2.5. Network availability

2.5.1 Network availability

The quality of supply is to some extent defined by the degree of network availability. In Switzerland, the development of network availability has been closely monitored since 2010. For this purpose, ElCom uses the two internationally recognised indices, SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index). SAIDI quantifies the average duration of interruptions per end user, while SAIFI indicates the average frequency of interruptions per end consumer. Figures concerning all unscheduled interruptions that last longer than three minutes and occur as the result of natural phenomena, human error, operational problems or external influences, are integrated into the calculations for both indices.

For the purpose of monitoring network availability, ElCom evaluates interruptions to supply from the 96 largest Swiss network operators, who account for 89 percent of the country's energy turnover via their networks. In 2017, the 96 largest network operators experienced 4,814 unscheduled interruptions (cf. Table 1), a slight increase compared to the previous year. However, the number of interruptions on its own is not sufficient to make reliable conclusions regarding network availability. It is only when this figure is combined with the duration of interruptions and the number of end consumers that are affected that such an evaluation can be made.

	2013	2014	2015	2016	2017[1]	Unit
Interruptions	4'615	4'039	4'401	4'328	4'814	Number of unscheduled interruptions
SAIDI	15	13	11	9	10	Minutes per end consumer
SAIFI	0.28	0.22	0.23	0.20	0.21	Interruptions per end consumer

Table 1: Development of supply quality in Switzerland from 2013 to 2017 (unscheduled interruptions only)

In 2017, the average duration of unscheduled interruptions per end consumer was ten minutes. This figure represents a nationwide improvement by one minute compared to the previous year. The average frequency of unscheduled interruptions per end consumer in 2017 was 0.21, which was slightly higher than in the previous year.

The development of network availability in Switzerland has been generally positive since 2013. The higher SAIDI and SAIFI figures in 2013 were primarily attributable to extraordinary natural phenomena (storms and snowfall). The high quality of supply in Switzerland is also confirmed in international comparisons. According to the CEER Benchmarking Report 6.1 on the Quality of Electricity and Gas Supply, Switzerland is among those countries with the highest quality of electricity supply in Europe.

1 The data relating to supply security in 2018 will be published in June 2019 on ElCom's website.

2.5.2 Import capacity

Alongside network availability, the available import capacity is also a key factor for Switzerland's electricity supply security and, for this reason, ElCom also monitors the availability of cross-border capacities (referred to as "net transfer capacity", or "NTC"). ElCom is therefore monitoring the development of available cross-border net transfer capacity, which comprises import NTC and export NTC. NTC indicates the level of cross-border transport capacity that can be used in neighbouring countries without infringing the applicable safety standards. Swissgrid defines the level for the four Swiss borders together with the operators of the neighbouring transmission networks. The proportion of the import capacity of the Principality of Liechtenstein, which belongs to control zone Switzerland, is included in the calculation of the import capacity from Austria. Table 2 presents an overview of the trend in available import capacities.

NTC (MW)	2014	2015	2016	2017	2018
Neighbours to the north	4'799	5'225	5'245	5'265	5'034
France	3'093	3'073	2'974	3'007	2'772
Germany	1'094	1'373	1'468	1'501	1'396
Austria	612	779	803	757	866
Italy	1'722	1'722	1'717	1'722	1'722

Table 2: Available import capacity for Switzerland, 2014 to 2018

Because the exchange of energy with the neighbouring countries primarily takes place via the 380 kV network, but imported electricity is supplied to end customers in Swiss distribution networks via the 220 kV network, it is above all the available capacity of the coupling transformers (380 / 220 kV) that determines the maximum possible import capacity. Between 2014 and 2018, the import capacity on the individual national borders remained relatively stable for Italy and rose slightly for Germany and Austria, even though import capacity from Germany fell slightly in 2018. However, this was offset by the increase in import capacity from Austria, especially in the final quarter of 2018. The commissioning of the new substation in Rüti (SG) in autumn 2017 is likely to have contributed to this. Swissgrid has also been optimising import capacity on the German and Austrian borders with new planning and forecasting systems since winter 2015. In France, on the other hand, import capacities have declined markedly.

2.5.3 Export capacity

In view of the high transit flows through Switzerland (from north to south) and its neighbouring countries, the available export capacity to Italy and France is also an important factor for Switzerland's supply security (see Table 3). The extent of this export capacity also has a significant influence on the utilisation of Switzerland's import capacity on the borders with France, Germany and Austria. After the two 380 kV lines over the Albula Pass (GR; Filisur-Robbia and Pradella-Robbia-Sils) were damaged by Hurricane Vaia at the end of October 2018, export capacity to Italy was reduced by 900 MW. The two lines are not expected to be back in operation until summer 2019. Moreover, in recent years the Italian transmission network operator TERNA imposed capacity reductions on a more frequent basis in order to ensure network stability within Italy, in particular during periods of low consumption (e.g. in summer, during holidays and on public holidays). Added to this are the capacity reductions in winter to ensure the security of the Swiss network. For these reasons, export capacity to Italy fell in 2018.

NTC (MW)	2014	2015	2016	2017	2083
Italy	2'557	2'948	2'986	2'986	2'654
France	1'113	1'188	1'125	1'180	1'184

Table 3: Trend in Switzerland's export capacity (NTC) to Italy and France, 2014 to 2018

2.5.4 Retrofitting decentralised energy generation plants

Many of the photovoltaic systems (PV systems) installed in the Swiss control zone and in the entire interconnected European network are configured so that they switch off completely if the frequency reaches 50.2 Hz. This suddenly eliminates a relevant amount of electricity generation from the grid. This behaviour could endanger the system. In order to contain this problem, it

must be ensured throughout Europe (including the Swiss control zone) that no further systems are connected to the grid unless they comply with the necessary protection settings.

ElCom therefore issued Directive 1/2018 on 6 March 2018 and published it on its website. The directive expressly requires distribution network operators in the Swiss control zone to implement suitable technical connection requirements in order to immediately ensure that all newly commissioned decentralised energy generation plants in their network areas comply with the parameters for frequency stability stipulated in Industry Recommendation NA/EEA-CH 2014 by the Association of Swiss Electricity Companies (VSE) in addition to all other specifications required for secure network operation.

Furthermore, on 15 June 2018 the network operators were informed about a retrofitting programme with the aim of reducing the total output of all non-compliant PV systems in the Swiss control area to a maximum of 200 MW. ElCom attaches great importance to achieving this goal with the minimum possible effort for the network operators and producers involved. The obligation to retrofit non-compliant PV systems as part of the retrofitting programme therefore only affects PV systems with a connected capacity of ≥ 100 kVA for the time being. Feedback from the network operators will allow ElCom to assess whether the specified goal can be achieved by taking these systems into account. Otherwise, even smaller PV systems will have to be included in a second round of the retrofitting programme.

2.6 System services

In order to guarantee supply security, sufficient capacities have to be available for the production of electricity, and there have to be adequately dimensioned transmission and distribution networks for supplying energy to end customers. Since it is not possible to store electricity in the network, the quantity of energy fed into the grid always has to be the same as the quantity that is taken out of it. Despite high-quality production and consumption forecasts performed by energy suppliers, precise planning for this purpose is not possible. This means that even minor deviations from the targeted quantities have to be continually offset.

As a rule, this balancing procedure is carried out by adjusting the production of electricity to the current level of consumption. This constant balancing of production and consumption requires power plants whose production can be efficiently regulated. The balance energy provided by these power plants is purchased in a market-based procedure, and the associated costs have to be passed on to end customers via the system services tariff, which is used for charging for other services that are required for the safe operation of the network, including balance management, self-contained start and independent operation capability, voltage stability and compensating active power losses. However, balance energy represents the most important segment in financial terms. In the year under review, the costs for balance energy amounted to around CHF 76 million and were thus lower than they have ever been before. Figure 1 shows the development of the secondary reserve energy price over the past five years. The increase in 2016 was attributable to the tense supply situation in Switzerland during the winter. A comparison over a period of several years indicates that the prices for reserve energy have generally stabilised with the exception of 2016.

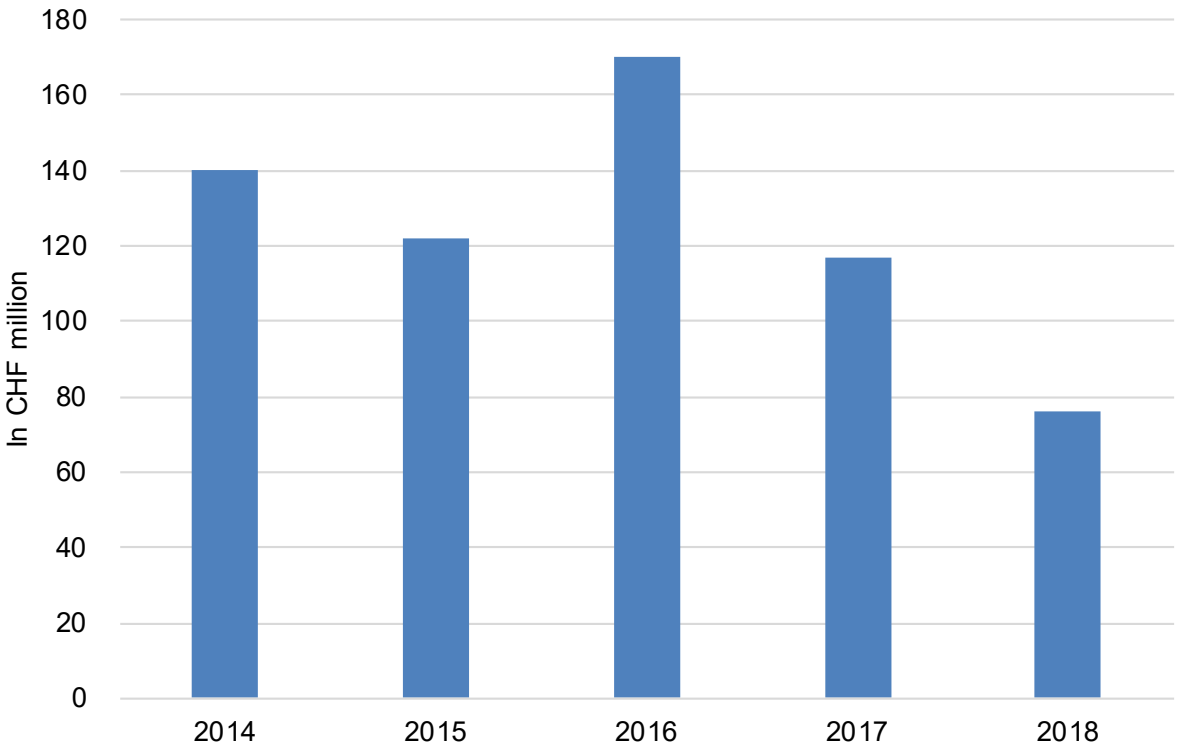


Figure 1: Development of the price of reserve energy from 2014 to 2018

Since 2016, Swissgrid has been procuring a portion of reserve energy for the spring. On the one hand this assures the availability of water reserves, and on the other it increases planning security for the operators of storage power plants. Advance procurement is important for risk management and for the players involved to gain a better understanding of their specific roles. In the year under review, the costs for balance energy amounted to around CHF 15 million. In comparison, the costs of early procurement amounted to around CHF 22 million in 2017 and around CHF 32 million in 2016. The cost reduction is attributable to optimisation of the tendering stage and to low market prices.

3 Networks

Around 640 network operators maintain the Swiss electricity network. The image shows a medium-voltage power line in the Simmental, Bern.

3.1 Facts and figures relating to Switzerland's electricity networks

The Swiss electricity network extends over a total length of around 202.262 kilometres, which is five times the circumference of the Earth. Of this, the local distribution networks (network level 7) account for 70 percent, while Swissgrid's national transmission network accounts for just over three percent. As part of regular cost accounting reporting, ElCom surveys the Swiss electricity networks according to various equipment classes each year. The number of network operators in Table 4 refers to the network operators that have provided information on the equipment classes. In recent years, there has been a slight increase in the quantity of installations at the plants in most categories. As expected, the number of overhead lines and mast transformer stations has fallen, while the number of cables and transformer stations increased as a result of progress in cabling. The electricity network grew by three percent between 2013 and 2017. In 2017 there were just under 5.6 million end consumer measurement points and just over 5.1 invoice recipients. According to the Federal Statistical Office (FSO), there were just over 0.6 million companies in Switzerland (2016) and the population of Switzerland was just under 8.5 million (2017). Population growth between 2013 and 2017 was just over four percent.

Type of installation	2013	2014	2015	2016	2017	Unit
Pipe system, high voltage (NL 3), medium voltage (NL 5) and low voltage (NL 7)	111'626	116'477	119'621	119'277	120'509	km
Cable, high voltage (NL 3)	1'976	2'031	1'911	1'924	1'992	km
Cable, medium voltage (NL 5)	32'833	33'544	33'870	34'044	34'675	km
Cable, low voltage (NL 7)	75'127	76'311	77'590	78'011	79'269	km
Cable, connection to household (NL 7)	50'972	52'569	53'931	54'240	55'011	km
Supply line and cable (NL 1)	6'750	6'750	6'750	6'629	6'590	Line-km
Overhead line, high voltage (NL 3)	7'059	7'158	6'904	6'738	6'791	Line-km
Overhead line, medium voltage (NL 5)	11'151	10'914	10'590	10'061	9'784	Line-km
Overhead line, low voltage (NL 7)	10'227	9'719	10'653	11'621	8'150	Line-km
Substation, NL 2, NL 3, NL 4 and NL 5	1'097	1'314	963	893	1'056	Quantity
Transformer, NL 2	155	152	146	148	151	Quantity
Switching field, NL 2[1]	163	177	165	159	164	Quantity
Transformer, NL 3[2]	82	81	78	79	77	Quantity
Switching field, NL 3[1]	2'449	2'545	2'606	2'577	2'600	Quantity
Transformer, NL 4	1'144	1'145	1'143	1'142	1'150	Quantity
Switching field, NL 4[1]	1'952	2'110	2'078	2'011	2'078	Quantity
Transformer NL5[2]	286	317	190	75	72	Quantity
Switching field, NL 5[1]	29'468	26'727	28'226	30'836	29'934	Quantity
Transformer station, NL 6	51'862	52'425	53'405	53'024	53'144	Quantity
Mast transformer station, NL 6	5'831	5'685	5'748	5'402	5'457	Quantity
Cable distribution box, low voltage (NL 7)	170'285	171'712	174'897	174'377	174'917	Quantity
Measurement points (all consumers)	5'318'529	5'393'370	5'452'650	5'512'743	5'573'672	Quantity
No. of network operators	672	659	649	643	636	

1) Switching fields encompass the upper and lower field at the respective network level, except in the case of network level 2, for which the upper switching field is allocated to network level 1 in accordance with Article 2, paragraph 2 of the Electricity Supply Ordinance.
2) Transformers at network levels 3 and 5 handle different voltage series within the network level (e.g. at network level 3, 110 and 50 kV).

Table 4: Installations in the Swiss electricity networks

The total value of the Swiss electricity network is just under CHF 21 billion. Around 90 percent of this is attributable to the distribution network. The residual value of the installations in the distribution network has slightly increased compared to the previous year, while at the same time the revenue from end consumers for the use of the distribution network (excluding fees and payments to the state and charges for renewable energy) fell by around 2 percent to just over CHF 3.4 billion.

The following figures show for the distribution network how ownership and network use revenues are divided according to the size of the companies. In both figures, the 100 largest network operators are divided into groups of ten, and all the remaining operators are grouped together in a separate category (Rest). The ten largest companies (dark blue) therefore own 43 percent of all declared assets (Figure 2). This is about the same as the next 90 companies. The approximately 540 small network operators (Rest – shown in light blue) have a share of 15 percent, almost one percentage point less than five years earlier.

A similar distribution can be seen in network use remuneration (Figure 3). The ten largest operators (dark blue) received just under 46 percent of all revenues, increasing their share by 1.3 percentage points compared with five years earlier. The share of the remaining group of small network operators (light blue) is slightly declining and stands at 14 percent.

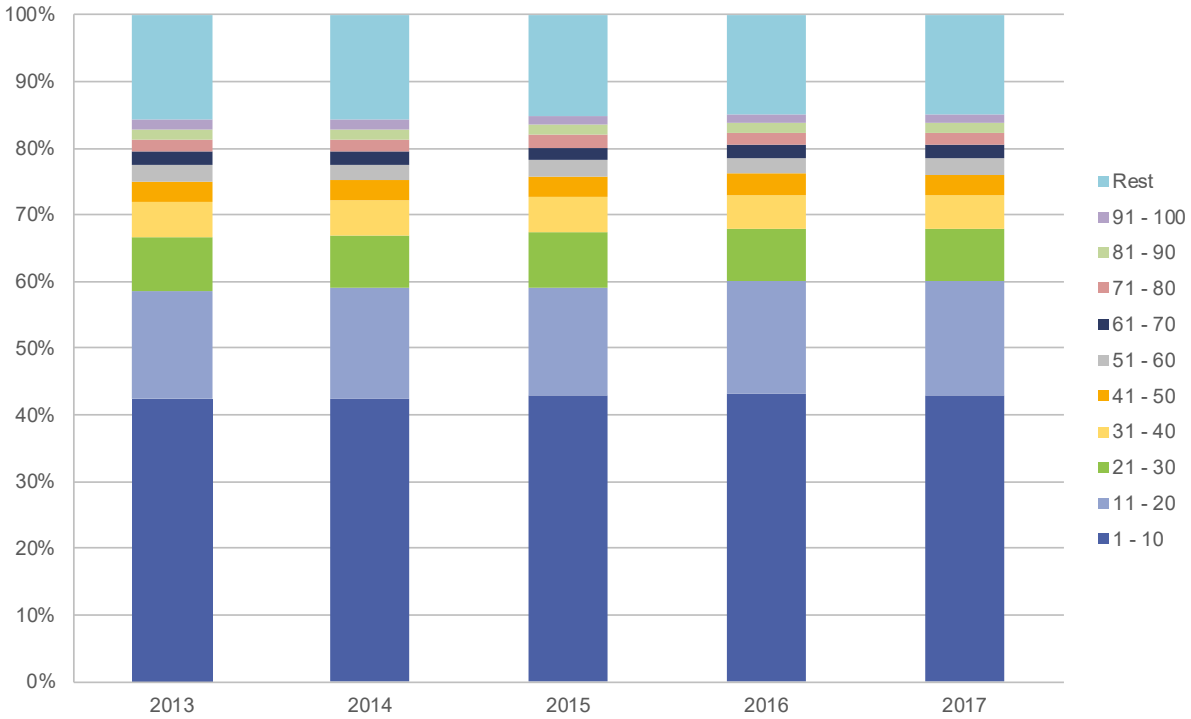


Figure 2: Proportional holdings in the distribution network by company size

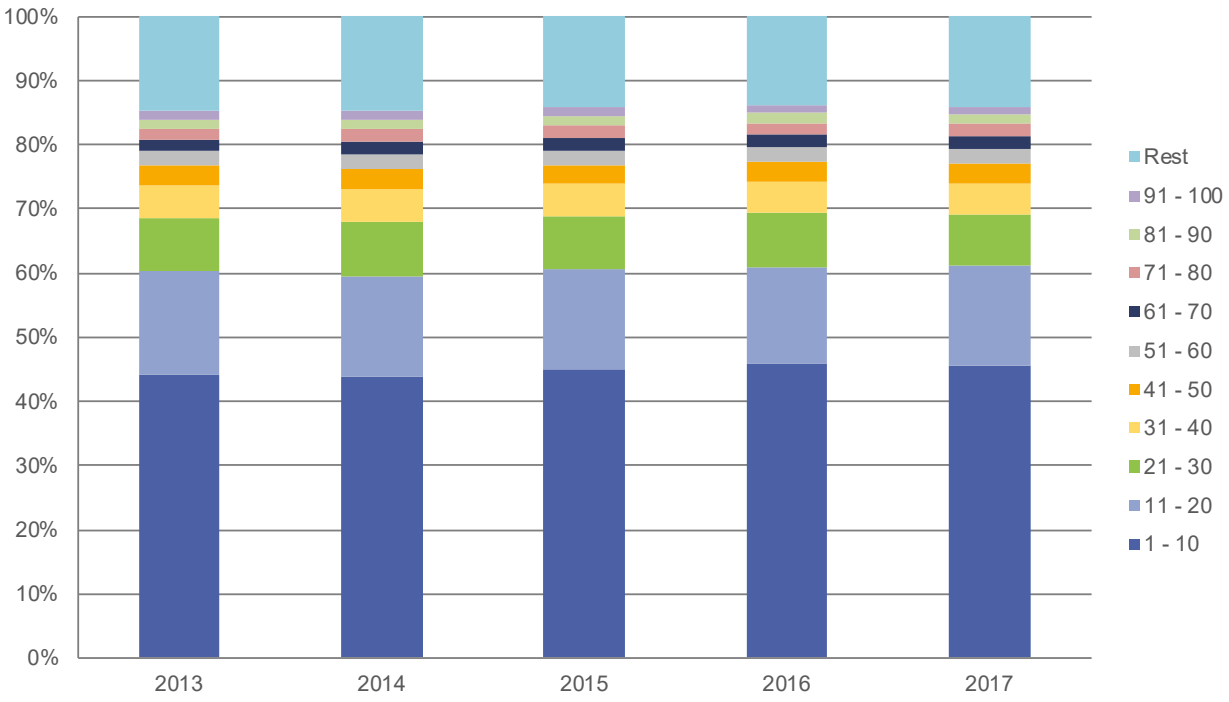


Figure 3: Proportion of network utilisation revenue (distribution network) by company size

The distribution network operators declared total network costs (including fees and charges as well as surcharges on the transmission network) of just over CHF 4.6 billion for 2017. These are based on the operating and capital costs of a "secure, high-performance and efficient network", plus tax expenditure and fees and payments to the state (including surcharges on the transmission network). The largest component of distribution network costs is operating and capital costs, which account for 72 percent of the total, or CHF 3.3 billion (Figure 4). If this amount is added to the direct taxes and compared with the network use remuneration mentioned above, the surplus amounted to just over CHF 15 million for 2017. The share of fees and charges has risen by ten percent to 26 percent over the last five years. This group includes fees and charges demanded by cantons and municipalities, as well as national legally required charges for renewable energies. The increase can be primarily explained by the gradual increase in the national legally required charges for renewable energies from 2014. However, the municipalities and cantons have also increased their fees and charges.

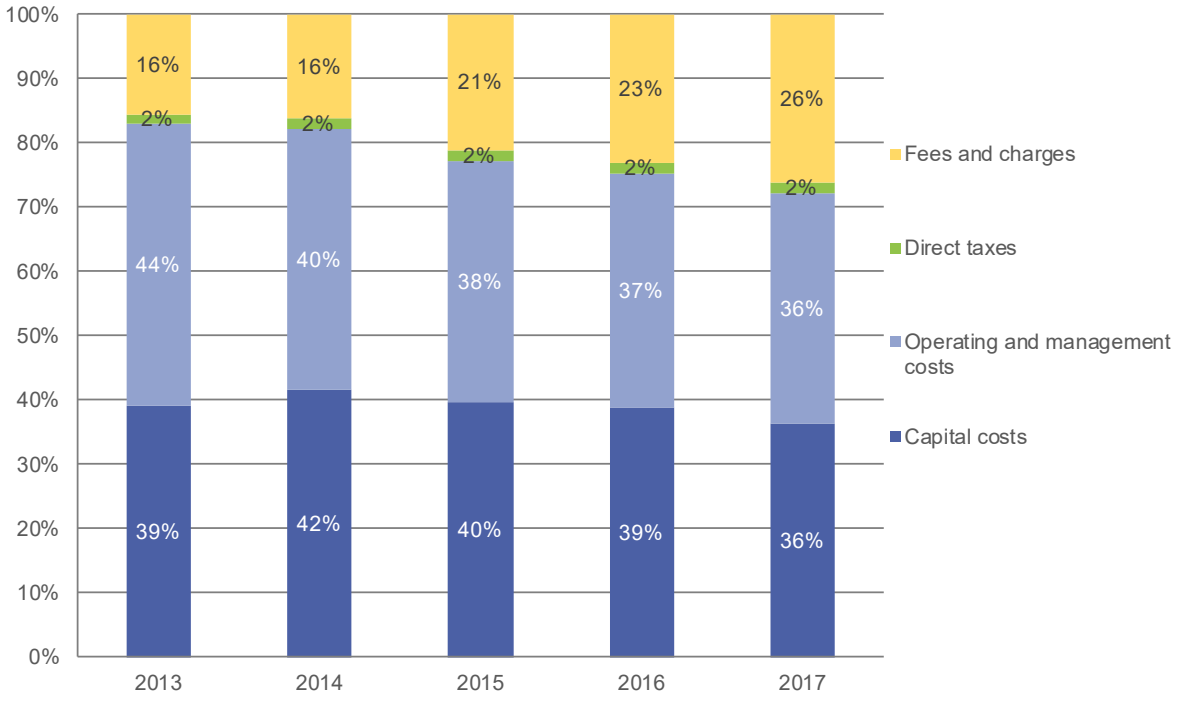


Figure 4: Breakdown of distribution network costs

In its 2017 Annual Report, Swissgrid reported network use costs of CHF 549 million and system service costs of CHF 200 million. If these accumulated costs of just over CHF 0.7 billion for the transmission network are added to the distribution network costs amounting to just over CHF 4.6 billion, this results in total costs of just under CHF 5.4 billion for the Swiss electricity network. Figure 5a shows how these are distributed among the individual network levels. The local distribution network (network level 7) is by far the most costly, accounting for almost half of the total. A further fifth of the costs are incurred on NL5. In comparison, the shares of costs at the transformation levels (network levels 2, 4 and 6), which form the links between the various transmission levels, were low. The share of costs of the high-voltage network operated by Swissgrid (network level 1, including system services) was 14 percent. Figure 5b shows the distribution of network costs excluding fees and charges. It is noticeable that the costs in Swiss francs and their share in total costs are significantly reduced on network level 7 compared to Figure 5a. This is because fees and charges are primarily on network level 7 and to a lesser extent network levels 5 and 3.

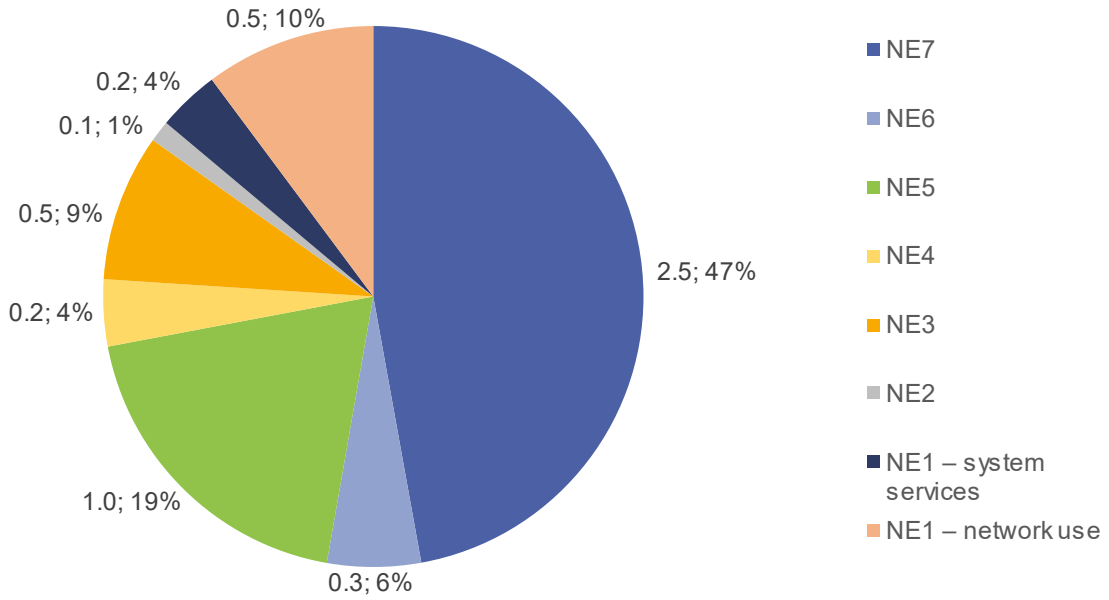


Figure 5a: Costs in billion CHF and breakdown of the shares of costs of the Swiss electricity network (including fees and charges as well as surcharges on the transmission network) by transmission network (network level 1) and distribution network (network level 2 to 7) in 2017

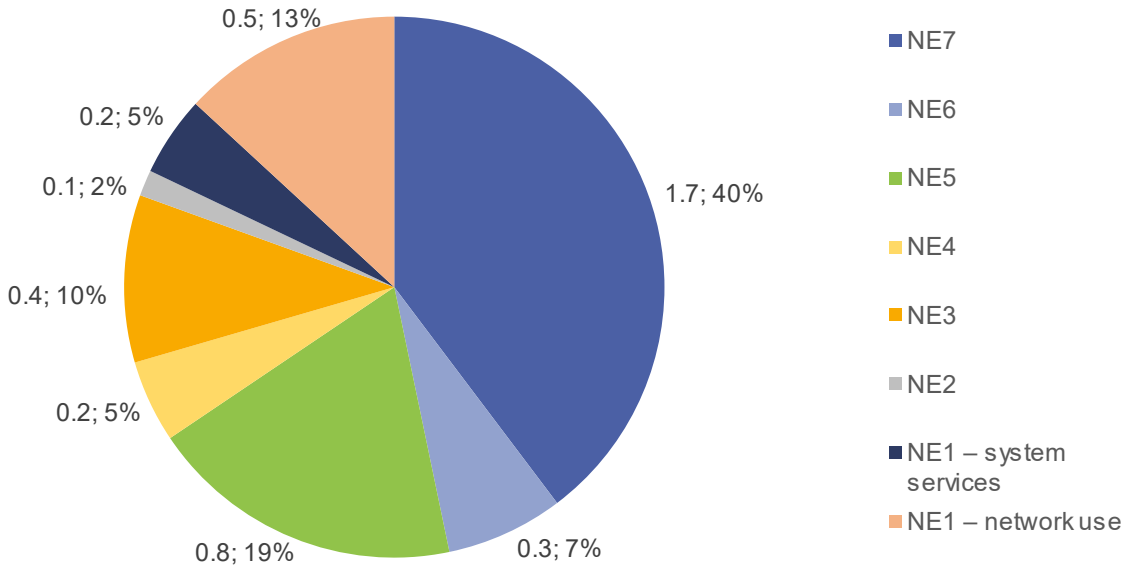


Figure 5b: Costs in CHF billion and breakdown of the shares of costs of the Swiss electricity network (including fees and charges as well as surcharges on the transmission network) by transmission network (network level 1) and distribution network (network level 2 to 7), 2017

3.2 Grid expansion and planning

3.2.1 Long-term planning of the transmission network

Several federal-level decisions regarding the sectoral plan and planning approval procedures are pending in the coming years. Among others, criteria listed in the Federal Electricity Supply Act must be taken into account. ElCom, too, is involved in these procedures and needs to have objective and transparent planning fundamentals at its disposal in order to make the necessary assessments.

In accordance with the Electricity Networks Strategy that was adopted by Parliament in December 2017, Swissgrid will from now on base its long-term planning on the scenarios developed by the Swiss Federal Office of Energy (SFOE). ElCom approved the long-term plan (Federal Act on the Expansion and Upgrading of the Electricity Networks [amendment of the Federal Electricity Act and the Federal Electricity Supply Act] of 15 December 2017, published in the 2017 Federal Gazette, pp. 7,909 ff.).

Swissgrid completed the report on the Strategic Grid 2025 at the beginning of 2015 and presented it to the public in April 2015. With this report, the long-term planning of the transmission network has now been coordinated across Switzerland, and this essentially meets the requirements specified in Article 8 paragraph 2 and Article 20 paragraph 2a of the Federal Electricity Supply Act. From the point of view of ElCom, the report represents a significant milestone in the Swiss-wide planning of the transmission network, but it can also contribute towards the improvement of cross-border coordination in the areas of financing and use of the grid. The magnitude of the investments for the expansion and maintenance of the grid appears to be plausible. The preservation of the value of the transmission network can be assured on the basis of the defined planning.

The Strategic Grid 2025 report takes due account of the requirement for balanced investments as specified in Article 22 paragraph 3 of the Federal Electricity Supply Act. However, the uncertainty with respect to efficiency is probably considerably greater than the comprehensive, exact calculations regarding the indicated net use might suggest. For further discussion within the scope of long-term planning and the evaluation options in the sectoral plan and planning approval procedures, the uncertainties need to be quantified with the aid of sensitivity analyses. This will enhance the significance of the cost / benefit analysis. With respect to cross-border financing, discussions concerning the methodology need to be intensified between Swissgrid and ElCom, as well as within all relevant bodies. Based on the report released by Swissgrid, it is now possible to assess the previously difficult-to-evaluate criterion of efficiency using a method that is as objective as possible and based on transparent assumptions. This is, of course, a welcome development. However, the uncertainties with respect to evaluation of the benefits are also reflected in the criterion of efficiency. In view of this, the same sensitivity deliberations have to be applied here as those regarding the uncertainties relating to the benefits.

3.2.2 Long-term planning of the distribution networks

In accordance with Article 8 paragraph 2 of the Federal Electricity Supply Act, distribution network operators are obliged to carry out long-term planning in order to maintain secure, high-performance and efficient network operation. This obligation applies to networks

with a voltage below 36 kV. With a strict application of the Federal Electricity Supply Act, this concerns 50 network operators. In the past, ElCom's policy has been to initially deal with the classification of long-term planning at the transmission network level and only then to more closely examine a potential "rollout" onto the distribution network with voltage levels of 36 kV and higher. ElCom discussed specific issues relevant from the point of view of the regulator with the operators of the distribution network relating to long-term planning, in particular the uncertainties with respect to the recoverability of costs for various expansion options (e.g. assumptions regarding the addition of renewable energy production that were of relevance in terms of investments and their recoverability).

In the view of ElCom, there is no need for action with regard to the fundamental method of preparing long-term planning. ElCom will address this topic again as soon as the legal framework relating to "intelligent electricity supply networks" has been more clearly defined. For the time being, ElCom recommends that network operators should use the document entitled "Long-term planning for network levels 2 and 3" published by the Association of Swiss Electricity Companies (VSE) as a reference tool and contact the Technical Secretariat of ElCom if they have any questions regarding the recoverability of the costs associated with the various expansion options.

3.2.3 Participation in the sectoral plan and planning approval procedures

In the procedures for the electricity transmission lines sectoral plan and the planning approval procedure, ElCom checks compliance with the criteria set out in the Federal Electricity Supply Act ("a secure, high-performance and efficient network"). In spring 2018, ElCom, the SFOE and ESTI concluded a cooperation agreement to improve coordination within the framework of the procedures. Any differences shall be decided by DETEC in accordance with this agreement.

In 2018, ElCom was included in the support group for the Niederwil-Obfelden electricity transmission lines sectoral plan procedure (SÜL 611) as part of its official duties. It also submitted its comments on the planning approval procedure for La Bâtiaz. At the distribution network level, ElCom commented on several projects concerning voltage increases as part of the planning approval process.

3.3 Investments in the grid infrastructure

As part of its monitoring tasks, ElCom monitors whether sufficient investments are being made to ensure that the electricity network remains in good condition.

3.3.1 Investments in the transmission network

Taking into account the past annual results, the bottom-up budget of CHF 145.4 million was reduced by CHF 12.9 million to CHF 132.5 million in the form of a realisation discount. Although there were differences in the various projects, changes to planned investments in the 2017 realisation period were insignificant. Actual investments for the 2017 network projects amounted to CHF 140.1 million.

3.3.2 Investments in the distribution network

Between 2013 and 2017, the distribution network operators invested around CHF 1.4 billion annually (Figure 6). During this period, write-offs increased from just over CHF 800 million to over CHF 900 million. As a result, the investment surplus fell from around CHF 580 million to just under CHF 420 million. Since the reliability of Switzerland's electricity networks is very high, also by international comparison, and was greatly improved during the period under review (cf. Section 2.4), ElCom still considers the investments in the distribution network to be sufficient.

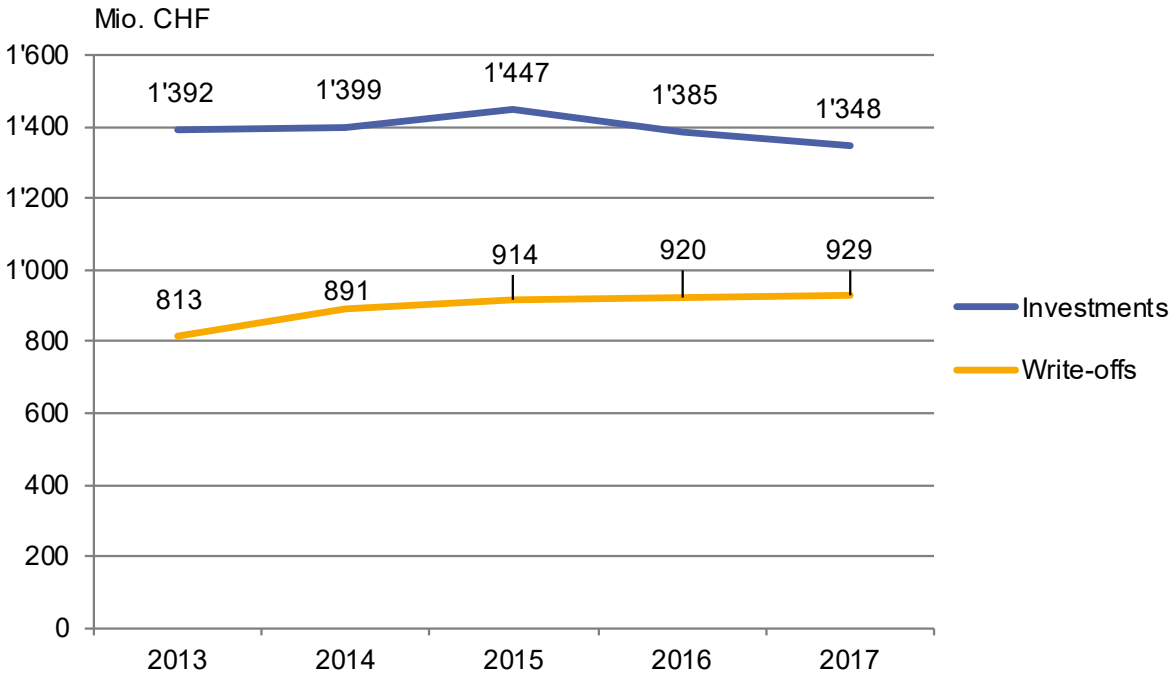


Figure 6: Trend in investments and write-offs in the distribution network

3.4 Increases in network capacity

Additional network capacity may become necessary in order to connect producers of electricity from renewable energy to the distribution network. Swissgrid refunds the associated costs by incorporating them into its calculation of the system services tariff. This form of remuneration therefore requires the approval of ElCom, which relies on a directive that serves as a guideline for network operators when submitting applications. This directive also specifies the criteria for the assessment of such applications. In the year under review, ElCom evaluated 131 applications for the remuneration of costs associated with increases in network capacity. In the past eight years, ElCom has issued a total of 809 associated rulings (cf. Figure 7).

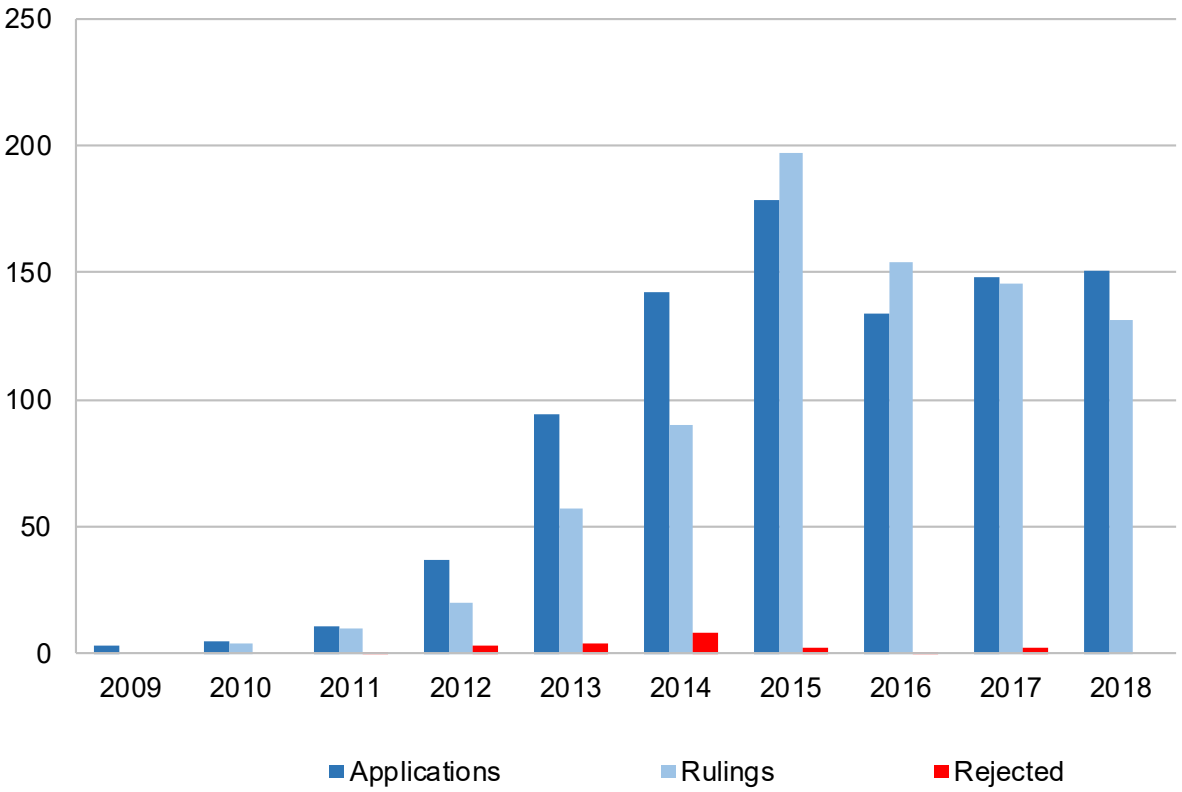


Figure 7: Trend in the number of rulings on network capacity increases

As of the end of 2018, the total costs for network capacity increases reached CHF 86.9 million, with a total power plant output of 297.1 MW. Table 5 presents an overview of the key data relating to network capacity increases in the period from 2009 to 2018.

	Total	PV	Wind	Other[1]
No. of rulings	809	772	4	33
Minimum generator output [kW][2]	4	4	3'000	22
Maximum generator output [kW][2]	74'000	8'303	16'000	74'000
Total generator output [kW]	297'119	132'250	30'000	134'870
Minimum costs [CHF][2]	3'500	3'500	1'805'003	16'697
Maximum costs [CHF][2]	9'262'389	746'912	9'262'389	2'117'200
Total costs [CHF]	86'932'047	59'982'321	15'946'730	11'002'996
Average costs [CHF][3]	108'665	78'511	3'986'682	343'844

	Total	PV	Wind	Other[1]
Minimum relative costs [CHF/kW][4]	3	3	346	3
Maximum relative costs [CHF/kW][4]	9'719	9'719	819	3'498
Average relative costs [CHF/kW][4]	293	454	532	82

1) For example, biomass, small hydropower plants, applications involving different types of installations
2) Per application/ruling
3) Corresponds to the average value of approved costs of network capacity increases per ruling
4) Relative costs = ratio of costs to installed capacity

Table 5: Figures relating to rulings on network capacity increases pronounced between 2009 and 2018

3.5 National grid operator

The former owners of the transmission network were required by law to transfer the entire network to the national grid operator, Swissgrid. The transfer of further transmission grid facilities to Swissgrid continued in 2018. This in turn resulted in an increase in the share capital of the national grid operator.

3.6 Rulings and decisions relating to networks

The dispute regarding the voltage conversion from 12 to 20 kV in a medium-voltage network, which was referred back to ElCom by Federal Supreme Court Ruling 2C_805/2016, was finally resolved by the decision of 8 February 2018. After the rejection, ElCom had only to decide on the binding date for the implementation of the voltage conversion at an end consumer. ElCom also expressed its opinion on the obligation to pay network use remuneration in connection with concessions in Ruling 212-00276 of 13 September 2018. The applicant took the view that the energy purchased from third parties and flowing through its network was not exempt from the payment of network use remuneration. The respondent took the view that it was purchasing concession energy and therefore did not have to pay network use remuneration on the basis of the concessions in conjunction with Article 14 paragraph 5 of the Federal Electricity Supply Act. In its preliminary interpretation of the concessions (cf. ElCom Ruling 212-00276 of 11 April 2017 concerning ElCom's competence to assess concessions), ElCom came to the conclusion that, in particular, the wording of the concessions argues that, in this specific case, energy import is not exempt from the payment of a network use remuneration as defined by Article 14 paragraph 5 of the Federal Electricity Supply Act and that therefore a network use remuneration is to be paid in accordance with the applicable tariff. An appeal against this ruling is pending before the Federal Administrative Court.

4 The Swiss electricity market

Swissgrid has operated the Swiss transmission network since 2009. The image shows power lines of the transmission network in the Linth Plain.

4.1 Structure of network operators in Switzerland

The number of network operators in Switzerland fell by almost 6 percent to 644 between 2014 and 2018. There has been a clear trend towards fewer network operators for some time now. The reasons for this are network takeovers and mergers between municipalities. According to Switzerland's official municipal register, the number of municipalities fell from 2,408 to 2,255 (6 percent) between 2013 and 2017. During this period, Switzerland's population grew by just over four percent. This resulted in an increase in the number of end consumers per network operator. However, a typical distribution network operator remains small (Figure 8), and on average supplies just over 1,500 end consumers. Only 81 network operators supply more than 10,000 end consumers, while eleven of them supply more than 100,000 end consumers. Together, Swiss network operators supply more than 5.1 million customers with electricity.

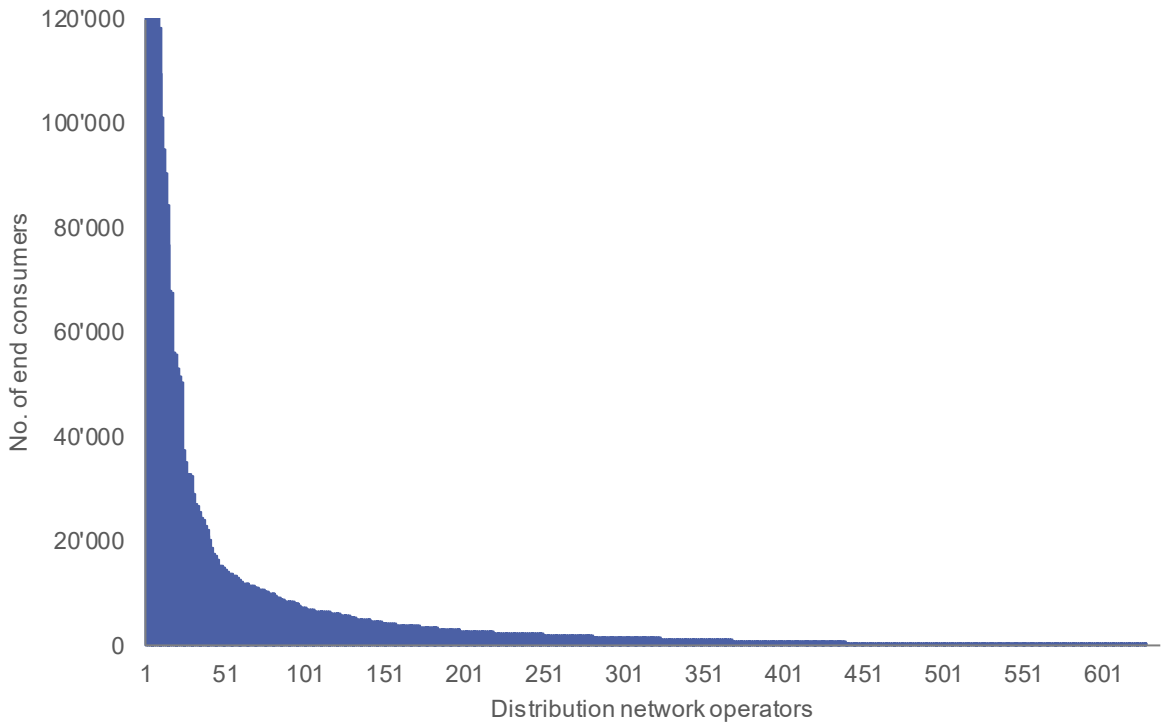


Figure 8: Number of end customers per distribution network operator. For the sake of legibility, the vertical scale has been cut off at 120,000 end consumers, which concerns eight distribution network operators.

Many network operators also supply energy to customers with free market access (cf. Section 4.3) or are active in other business areas, e.g. electrical installations and building technology. The statutory provisions on the separation of network operation from the other areas (unbundling) are therefore becoming increasingly important. One of their aims is to prevent energy supply companies in the monopoly sector from gaining an advantage over other companies in the competitive sector. Another aim is to protect end customers from extraneous costs in relation to the universal service. ElCom therefore paid particular attention to the accounting unbundling of network operations, the prohibition of cross-subsidisation and the prevention of the use of information advantages from the network sector in the year under review. In particular, it developed internal principles and informed network operators of the topic and the legal requirements at appropriate events. The Swiss Federal Office of Energy (SFOE) is responsible for prosecution of criminal violations of the regulations on unbundling.

4.2 Market access and change of supplier

In this initial stage of liberalisation of the Swiss electricity market, only major consumers (those with an annual consumption of at least 100 MWh) may exercise their right to free market access, i.e. they have the right to freely choose their electricity supplier. They have until the end of October of each year to decide whether they want to switch from the universal service. Once in the free market, a major consumer can no longer return to the regulated universal service.

ElCom regularly conducts a survey of the largest distribution network operators in order to determine the number of potential and effective end consumers on the free market. This currently includes 79 network operators, which supply a total of 4.1 million or almost 80 percent of end consumers in Switzerland. Of the 34,000 end consumers with free market access rights (0.8 percent of all end consumers), 22,900 (67 percent) have exercised their rights. End consumers in the supply regions of these network operators account for a total of 42.9 TWh (around 80 percent) of end consumption in Switzerland[4]. Just over half the supplied energy (22.7 TWh of a total of 42.9 TWh) is consumed by end consumers with right of access to the free market. Those consumers who have chosen to access the market consume 18.1 TWh (or 80 percent) of the available energy.

The right to freely choose an electricity supplier was exercised on a relatively small scale in the initial years after the market was liberalised (Figure 9). Due to falling market prices, the number of end consumers who exercised their rights increased sharply in subsequent years. In 2019, the share of end consumers on the free market fell slightly. This decrease is due to the fact that the number of consumers entitled to free market access has grown faster than the number of consumers who have actually opted for free market access. According to the latest figures, two-thirds of all consumers entitled to market access have exercised this right to date (orange curve). They consume four fifths of the energy of customers with the right to free market access (blue curve). This means that the number of consumers who have not yet exercised their right to market access is relatively low.

4 The average end consumption in Switzerland between 2008 and 2017 was 53.8 TWh. (Excluding public transport and lighting, source: Swiss Federal Office of Energy)

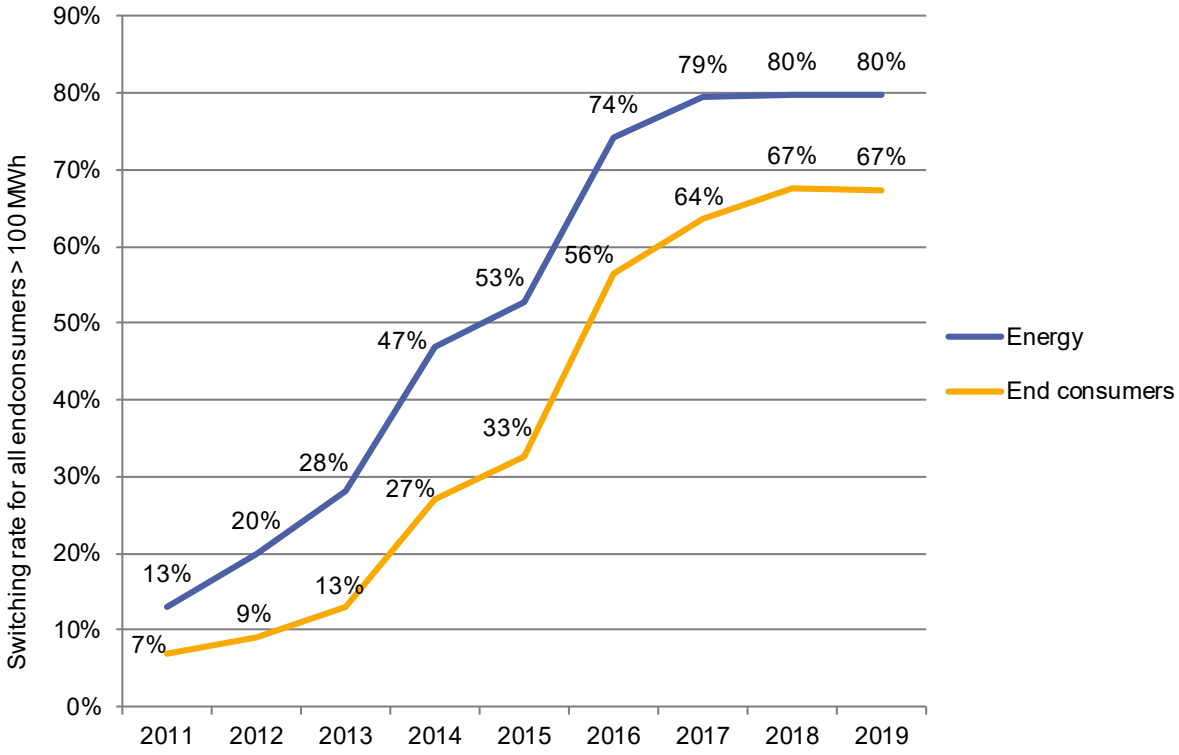


Figure 9: Switching to the free market

The following figure 10 shows the distribution of the quantity of energy sold as a function of the size of the network operator. The largest ten network operators (dark blue) supply just under 43 percent of the energy sold to end consumers in the distribution network. If expanded to the 50 largest network operators, the share rises to over 70 percent of energy supplied. The next 50 largest network operators together supply one tenth, while the remaining network operators supply one sixth of the energy consumed by end consumers.

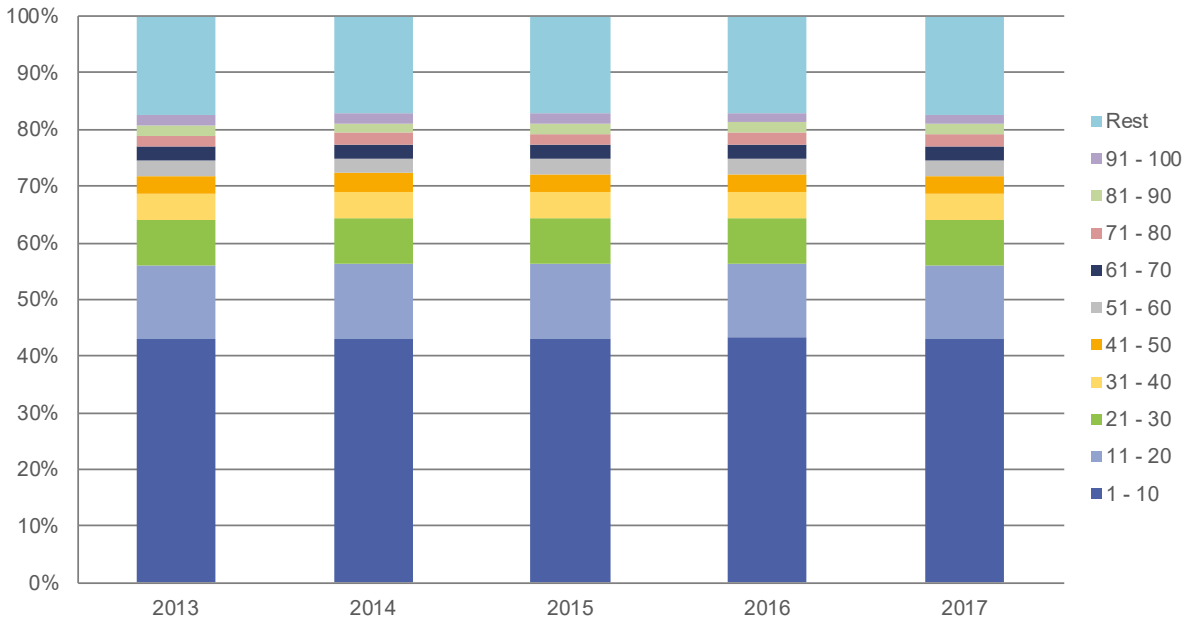


Figure 10: Proportion of energy supplied via the distribution network, by company size

4.3 Transmission network tariffs

As we can see from the overview in Table 6, the tariffs for the use of the transmission network remain subject to considerable fluctuations. The system service tariff will be reduced by 25 percent in 2019 compared to 2018. In addition to lower costs for reserve energy capacities, the reduction of existing surpluses also resulted in lower tariffs. The network use tariffs, which are regulated by Article 15 paragraph 3 of the Federal Electricity Supply Ordinance (30 percent working tariff, 60 percent demand tariff, 10 percent basic tariff), were reduced by around 18 percent compared to the previous year. In contrast, the tariff for active power losses was increased from 0.08 to 0.14 cents / kWh.

	2015	2016	2017	2018	2019
Network use					
Working tariff [cents per kWh]	0.22	0.25	0.25	0.23	0.19
Power tariff [Swiss francs per MW]	36'100	41'000	41'000	38'200	31'100
Fixed basic tariff per exit point	336'300	387'700	387'700	365'300	288'000
General system services tariff [cents per kWh]	0.54	0.45	0.40	0.32	0.24
Individual system services tariff					
Active power losses [cents per kWh]	0.11	0.11	0.08	0.08	0.14

Table 6: Trend in transmission network tariffs for network use and general system services for distribution network operators and end consumers (source: Swissgrid AG).

In order to compare the tariffs of the various network operators, ElCom converts the two components, demand and basic tariff, into cents per kWh. If the individual tariff components of the transmission network are summarised in cents per kilowatt hour, this results in a figure of 0.97 cents per kWh for 2018. On average, a typical household with an annual consumption of 4,500 kWh (category H4: 5-room apartment with electric cooker and tumble dryer, but without an electric boiler), pays 9.4 cents per kWh for network use (cf. Figure 11). The share represented by the transmission network in the tariffed network costs for these households is around 10 percent.

4.4 Distribution network tariffs

General tariff structure

The partially revised Electricity Supply Act of 23 March 2007 and the amendments to the Electricity Supply Ordinance of 14 March 2008 entered into force on 1 January 2018. This also amended certain provisions on the structure of network use tariffs. Many network operators have therefore adjusted these for 2019. In this context, ElCom answered numerous questions on the admissibility of various structures. Some of these are included in the amended Communication entitled *FAQ ES2015: Fragen und Antworten zur Energiestrategie 2050 (FAQ ES2015: Frequently Asked Questions on Energy Strategy 2050)*, which can be found on the ElCom website. Factors including the aforementioned legislative amendments, the introduction of smart meters, the increased use of decentralised energy generation plants and the associated desire for increased flexibility of network load caused some network operators to additionally introduce new and, in some cases, dynamic tariff models for network use tariffs and energy supply tariffs. ElCom dealt with the issue and with numerous enquiries. Some of these are included in the Communication entitled *Fragen und Antworten zu neuartigen und dynamischen Netznutzungs- und Energieliefertarifen (Frequently Asked Questions on Novel and Dynamic Network Use and Energy Supply Tariffs)*, which can be found on the ElCom website. Following the publication of the tariffs by the network operators at the end of August 2018, it became apparent that not all tariffs were in compliance with the law. ElCom therefore called on the network operators to review their tariffs for 2019 and adjust them if necessary.

In 2019, the average electricity price for a household with consumption profile H4 was 20.4 cents/kWh (Figure 11). Projected over one year, this corresponds to an electricity bill of CHF 918 for a consumption of 4500 kWh. The electricity price is made up of four elements: the network use remuneration, the energy price, the fees paid to the state and the federal charges for the promotion of domestic renewable energy. The network operators must publish the first three components by the end of August before the respective tariff year at the latest. The median electricity price in 2019 is the same as in the previous year. However, there have been changes to the individual components. While network tariffs fell by 0.2 cents/kWh, energy tariffs rose by 0.2 cents/kWh. Charges for renewable energies and the fees paid to the state remained constant. Network operators have declared both the cheapest and their standard products since 2018. The latter is charged to end consumers if they do not actively select another electricity product. It refers exclusively to energy. As a result, comparisons between the tariffs for the distribution network with previous years are only possible to a limited extent from 2018 onwards.

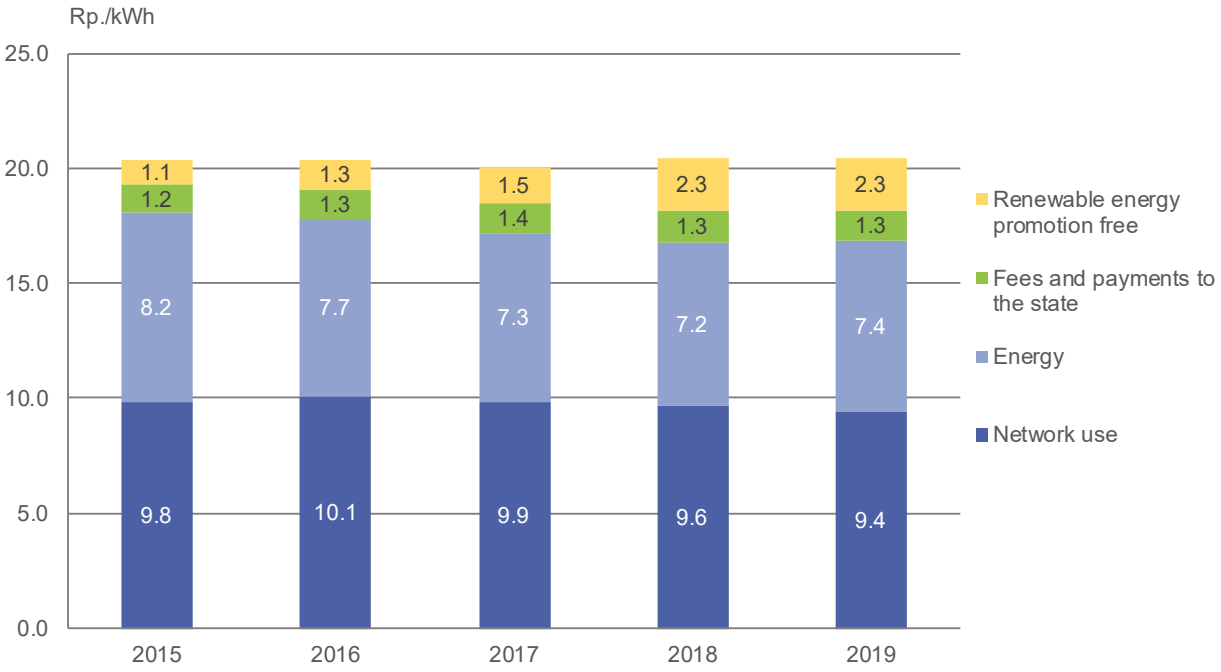


Figure 11: Cost components of the overall electricity tariff for consumer profile H4 (excluding value-added tax)

The tariffs in Figure 11 refer to national medians. Considerable differences in tariffs often exist at the cantonal and municipal levels. Detailed information about the tariffs of each municipality can be accessed on the ElCom website (www.elcom.admin.ch), together with an interactive map, by clicking on the link to the overview of electricity tariffs ("Electricity Price – Overview"). Figures 12 to 15 compare the median cantonal tariffs. The further away the cantonal tariffs are from the Swiss median, the deeper red (higher tariff) or green (lower tariff) the colouring. The changes in colour therefore depict the development of the cantonal tariffs in relation to the comparable national level. For example, the network tariffs in the canton of Basel-Stadt were relatively low in 2015 (light green) but are somewhat higher now (orange).

The following maps depict the respective situations in 2015 and 2019. Network and Energy are the only tariff components that can be directly influenced by network operators and are controlled by ElCom. The median network use remuneration fell by around 0.5 cents/kWh, while median energy tariffs fell by around 0.7 cents/kWh during the period under review. In the last ten years, energy tariffs have fallen by 1.5 cents/kWh or just under 20 percent.

Network use

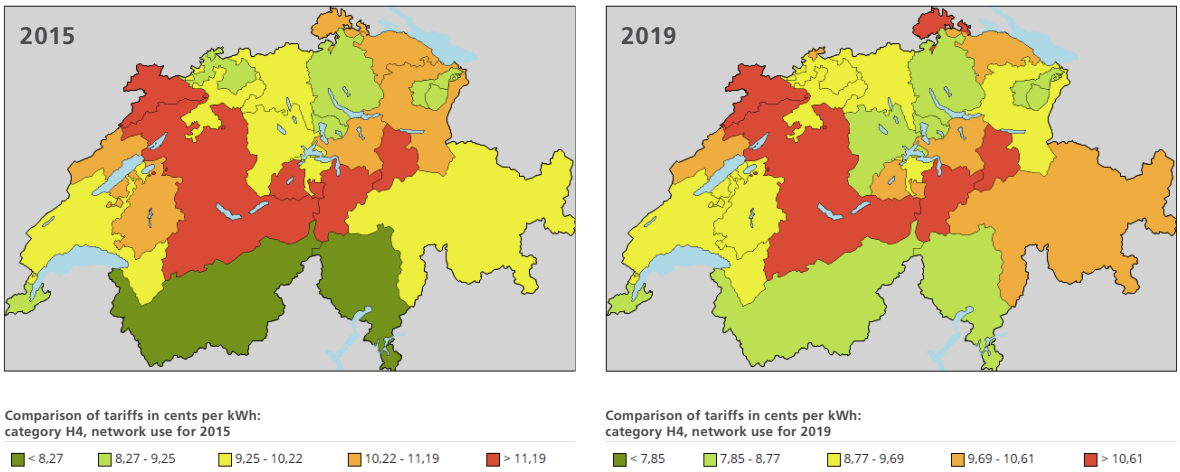


Figure 12: Comparison of average cantonal tariffs (median) for network use for consumer profile H4 in 2015 and 2019

Energy

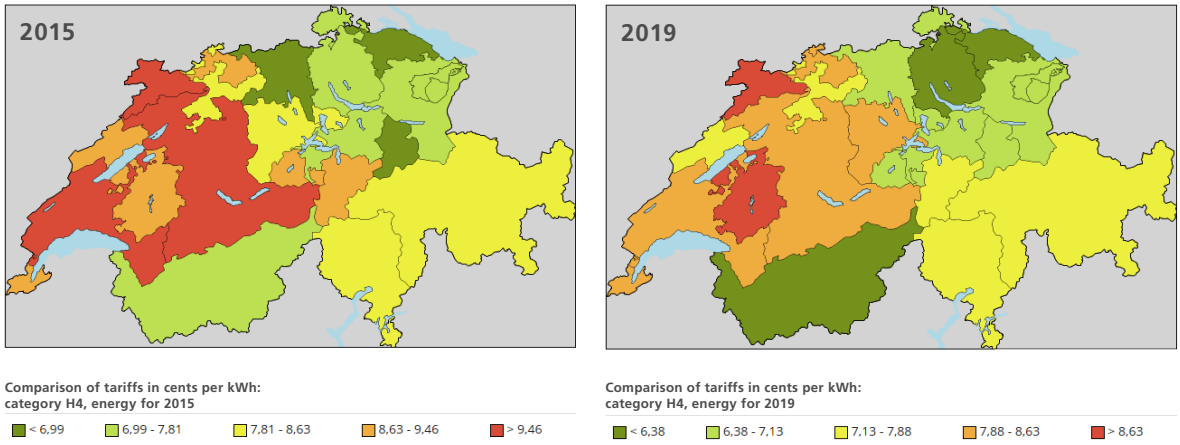


Figure 13: Comparison of average cantonal tariffs (median) for energy for consumer profile H4 in 2015 and 2019

Figure 14 shows the median cantonal and municipal fees and payments to the state. It does not take into account the uniform Swiss-wide federal fee for the promotion of renewable energy[5]. Fees and payments to the state are not controlled by ElCom; they are determined in local political decision-making processes. The median value of fees and charges remained constant during the period under review. It is noticeable that there are often high and low, but rarely medium amounts (coloured yellow).

5 Since the network surcharge is uniform throughout Switzerland, it is not shown here. However, the total is depicted in Figure 15.

Fees and payments to the state

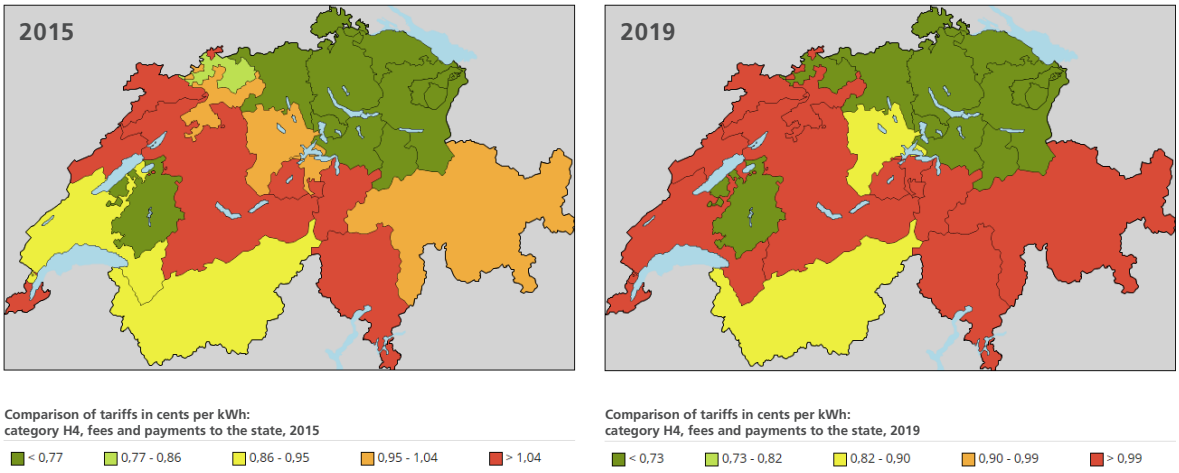


Figure 14: Comparison of cantonal tariffs (median) for cantonal and municipal fees and payments to the state for consumer profile H4 in 2015 and 2019

Taken together with the total tariff, the median hardly changed during the period under review. The total tariff also includes the network surcharge for the promotion of renewable energy. This was successively doubled from 1.1 cents / kWh to 2.3 cents / kWh between 2015 and 2019. As a result, the share of the electricity tariff accounted for by network surcharges and fees paid to the state rose from 11 to 18 percent in the period under review. Due to the increase in network surcharges, the median total electricity tariff remained roughly the same despite lower network and energy tariffs.

Overall electricity tariff

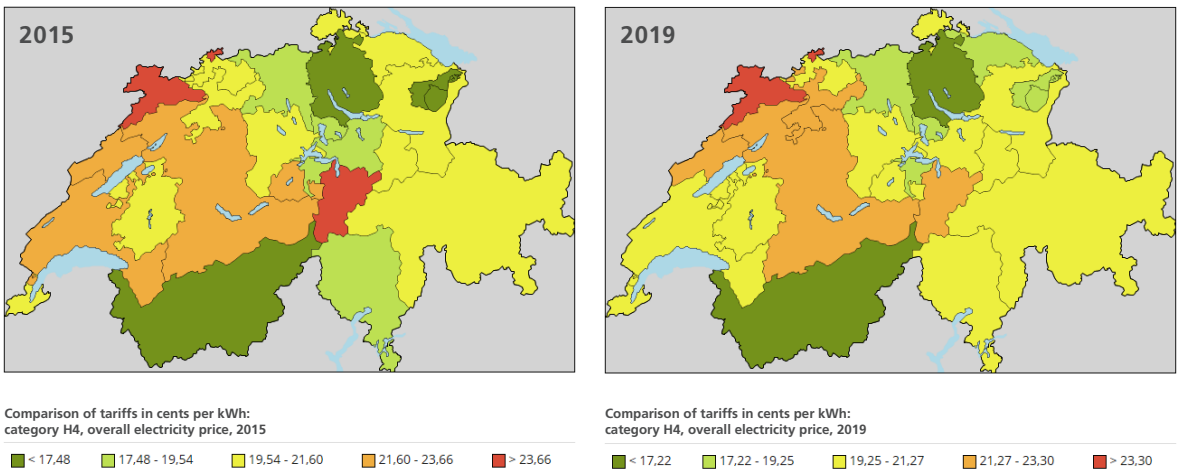


Figure 15: Comparison of average cantonal tariffs (median) for the total electricity tariff for consumer profile H4 in 2015 and 2019

4.5 Examination of tariffs

In the year under review, ElCom examined the conformity of tariffs in different ways in line with its past practice:

- Each network operator is required to submit its cost accounting by the end of August, which forms the basis for the network and energy tariffs for the following year. ElCom uses around 180 tests in order to check the cost accounts for errors, inconsistencies and implausible figures, and returns its evaluations to the network operators for adjustment where necessary. A total of more than 10,000 comments were sent to the network operators. The 627 network operators who submitted their cost accounts on time or after the first reminder received ElCom's evaluation in the year under review together with a request to check any required changes and either implement them or substantiate the original figures.

- ElCom conducts targeted audits on network operators who have unlawful or implausible figures in their cost accounting even after adjustment. In the year under review and the year before, ElCom particularly reprimanded the inadmissible calculation of coverage differentials from the previous years and excessively high profits from the implementation of the CHF 95 Rule. With respect to coverage differentials, this involves the calculation of coverage differentials in one year and the amount carried forward to the following year. By contrast, the CHF 95 Rule concerns the costs and profits relating to the distribution of energy among end consumers of the universal service. The tariffs of 32 network operators were subjected to close examination and corrected where necessary.

- ElCom also examines whether the network operators fulfil various requirements relating to tariffs, costs and compliance with the CHF 95 Rule. In a total of 92 cases the balance was found to be in order. Towards the end of the year under review, ElCom informed these network operators that it would not be opening proceedings against their tariffs the following year.

Network evaluation:
Here the focus was on the same problems as in previous years. In the year under review, ElCom again identified installations for which the synthetic values were not derived correctly, were inadequately documented or were calculated on the basis of a very low number of historically valued installations. Synthetic values have to be derived in a transparent and comprehensible manner based on the acquisition and production costs of a sufficient number of similar installations. Otherwise, there is a risk that they could exceed the value of a similar installation and thus infringe Article 13 paragraph 4 of the Federal Electricity Supply Ordinance.

Various companies only make write-offs for the first time in the year after their facility was put into operation instead of in its first year of operation, or only after the definitive booking has been made in the system. This is contrary to Article 13 paragraph 2 of the Federal Electricity Supply Ordinance, which stipulates that facilities must be written off linearly to a residual value of zero over their entire useful life. Delayed write-offs increase the residual value of the facility, and thus the imputed interest costs, in an unlawful manner.

Operating costs:
As in previous years, the majority of adjustments imposed by ElCom concerned recoverability and the distribution of costs by segment. In accordance with Article 15 paragraph 1 of the Federal Electricity Supply Act, the costs of a secure, high-performance and efficient network are defined as recoverable costs. This means that other costs that do not fall under this definition are non-recoverable. These include marketing and sponsoring costs, for example, as well as various non-network-related activities such as public lighting or administrative activities for other business areas.

With respect to the distribution of costs by segment, it was often the case that remuneration for network use was charged on the basis of excessive common costs. Furthermore, in some cases network operators apply factors that are not proportionate, appropriate or comprehensible, which contravenes Article 7 paragraph 5 of the Federal Electricity Supply Ordinance.

Energy costs:
In the area of energy supply to universal service end consumers, the main focal points in the year under review were the average price method and the CHF 95 Rule.

Average price method:
With its final vote on 15 December 2017, Parliament maintained adherence to Article 6 paragraph 5 of the Federal Electricity Supply Act and ElCom's average price method. The latter concerns the question of how the costs of electricity procurement are to be shared between end consumers caught in the monopoly (universal service) and free market customers.

On the basis of the cost accounting data submitted to ElCom, it was possible to identify a number of network operators who had charged their fixed end consumers disproportionately high energy costs in recent years and had therefore possibly not applied the average price method in accordance with the practice of the courts and ElCom.

In the year under review, ElCom called on twelve conspicuous network operators to recalculate the costs of energy supplies to universal service end consumers in accordance with legal requirements and court rulings and to offset the corrected amount against the coverage differentials. It was also necessary to ask two other suppliers to submit the data required for the assessment first.

By the end of the year, five network operators had fully complied with ElCom's request and these cases had been closed. An official tariff review procedure had to be opened against five companies. In the remaining cases, there are still some differences with regard to actual implementation and one network operator proved to be conspicuous in another area.

CHF 95 Rule:
ElCom has also focused on the CHF 95 Rule and requested various network operators to make adjustments. The CHF 95 Rule was developed by ElCom in order to facilitate an assessment of the reasonable administrative and distribution costs and profits of network operators relating to the distribution of energy to end consumers of the universal service.

In the year under review, ElCom also conducted an in-depth analysis of the cost and profit situation with regard to energy sales. It found that the thresholds of CHF 95 and CHF 150, which had applied up to that point, no longer led to appropriate energy tariffs. Although network operators as a whole have significantly reduced energy distribution costs over recent years, they have increased their profits and end consumers have not benefited from the increased efficiency. ElCom therefore set new thresholds of CHF 75 and CHF 120 from 1 January 2020 for reviewing the energy tariffs of universal service end customers. In future, the adequacy of the thresholds will be reassessed every two years. ElCom set out the detailed application of the CHF 75 Rule in Directive 5/2018.

4.6 Judicial practice

The Federal Administrative Court dealt with the recoverable energy costs of Repower AG in Decision A-1344/2015 of 28 June 2018. The issued to be assessed was how the average price method (cf. Decision of the Swiss Federal Supreme Court 142 II 451 E. 5) should be applied to a group of companies. The Federal Administrative Court came to the conclusion that, due to the open wording, the structures regulated by corporate law of a group of companies with close economic interdependence are not necessarily decisive for the allocation of costs between fixed end consumers and independent customers. With regard to economic interdependence, it advocated an overall view of the entire corporate group in this specific case. With regard to the energy portfolio, it supported ElCom's practice of taking into account not only the generation and procurement sources designated for supplying fixed end consumers, but also the entire energy portfolio, including procurement of distributors and other trading activities. The case was referred back to ElCom in order to reassess the inclusion of the long-term foreign supply contracts. The Federal Supreme Court did not lodge an appeal against this decision (Decision 2C_739/2018 of 8 October 2018).

4.7 Sunshine Regulation

The aim behind the "Sunshine Regulation" is to make the quality, costs and efficiency of network operators more visible with the aid of a transparent and standardised comparison process. This form of regulation is a supplement to the existing tariff auditing procedures. Here, selected indicators relating to quality of supply and services, as well as to costs and tariffs, measure the quality, costs and efficiency of the provision of services by the individual suppliers. In addition, compliance indicators demonstrate adherence with the legally stipulated deadlines and regulatory requirements. This direct comparison of network operators is intended to create incentives to eliminate any identified weaknesses without the need for in-

tervention on the part of the regulator. For comparison purposes, network operators with similar structures are grouped together.

For the calculation of the indicators, ElCom essentially uses data that are submitted each year by the network operators within the framework of cost accounting and supply quality surveys. ElCom also uses data from the Federal Statistical Office (FSO) that are publicly accessible. This means that there are practically no additional administrative costs for network operators associated with the Sunshine Regulation.

ElCom was involved in activities relating to the Sunshine Regulation throughout the entire year under review. As in the previous year, the creation of a legal basis within the framework of the revision of the Federal Electricity Supply Act was again an important topic. The aim is to publish the results of the individual network operators.

In the first few months of the year under review, the focus was on the formation of groups for comparison purposes and on the calculation of the various indicators. ElCom divided the approximately 640 network operators into a total of eight groups based on topographic criteria, population density and the quantity of energy supplied to end consumers (energy density). It also calculated the necessary indicators for the fourth round. The individual results of the comparisons were successively submitted to the operators in summer 2018, grouped by national language. As in the previous years, the results of the comparisons were only sent to the network operators to whom they applied. A new inclusion was the reporting of the number of energy products for the first time in the year under review. Another new inclusion was a comparison of the information sent to end consumers in the event of planned interruptions.

As in previous years, ElCom published numerous explanatory documents in relation to Sunshine Regulation on its website. These publications are aimed primarily at the network operators concerned, but also at interested members of the public.

4.8 Issues relating to measurement services

In order to implement Federal Supreme Court Ruling 2C_1142/2016 of 14 July 2017, ElCom resumed the procedure regarding the change of measurement service provider in 2017. The question to be answered was whether commissioning a third party would jeopardise safe operation of the network. ElCom held a meeting with the parties. The questions discussed were whether billing measurements have an influence on the safe operation of the network, the extent to which commissioning a third party endangers the safe operation of the network and what measures can be taken to avoid this. The network operator did not claim any threat to the secure operation of the network and accepted the applicant's request to transfer the measurement services to a third party as defined by the guidelines published by the network operator. At the request of the parties, ElCom dismissed the case in the spring on the basis that it had no grounds.

In October 2016, ElCom decided to conduct an in-depth investigation into measurement costs and measurement equipment in Switzerland due to the high measurement tariffs in many areas. Between May and October 2017, the meters used in Switzerland in 2016 as well as the measuring points, measuring services costs and, in particular, the costs of the load output measurements were collected using remote reading. The evaluation of the survey was completed in spring 2018. The results were published in a report in June 2018.

The report was based on a questionnaire. This was completed by 94 percent of the network operators contacted. These operators are responsible for 99 percent of all measuring points. The measurement cost survey therefore includes practically all network operators and measurement points in Switzerland.

Of the total of 5.4 million measuring points recorded, around 90 percent were read on site in the year under review. Around 8 percent are intelligent measuring systems (smart meters), while around 2 percent are load output measurements. Measurement costs for networks with intelligent measurement systems are 23 to 58 percent higher. The total annual measurement costs per measurement point for most network operators are between CHF 20 and CHF 100 (median CHF 48). No economies of scale were identified. The median share of measurement costs in total network costs (excluding upstream costs and system services) is 6 percent.

The report shows that the measurement costs for load output measurements with remote transmission and data evaluation exceed the CHF 600 per year (the amount that ElCom describes as inconspicuous) in the case of some 25 percent of suppliers. 50 percent of network operators have reported costs up to a maximum of CHF 600. Despite all the criticism expressed by the network operators, costs of CHF 600 are therefore realistic for efficient measurement. Even taking into account transmission costs, which are not part of the CHF 600 mentioned, it is possible to realise costs of under CHF 600. A comparison of costs for load output measurements with remote transmission and the tariffs reveals substantial differences for some network operators. For example, 60 percent of suppliers charged higher tariffs per load output measurement than they had shown in the costs (including transmission costs). The median tariff for these network operators was CHF 900, while the median cost was CHF 575. 117 network operators charged tariffs over CHF 1,000. High tariffs for load output measurements and, in ElCom's opinion, the inadmissible double charging of measurement tariffs for two load output measurements at the same location represent a considerable cost item in the operation of power generation plants. They can hinder investment in renewable energy.

ElCom was approached with a number of questions as a result of the new legal bases in measurement services that entered into force at the beginning of 2018 as part of the Energy Strategy 2050. These concerned in particular the handling of intelligent measuring systems and the recoverability of measuring costs. ElCom collected the questions and published them with the relevant answers in April 2018 in its Communication entitled FAQ ES2015: *Fragen und Antworten zur Energiestrategie 2050 (FAQ ES2015: Frequently Asked Questions on Energy Strategy 2050)*. The document was updated in October 2018.

Another step taken by ElCom in October 2018 was to publish a communication on the permissibility and recoverability of the use of intelligent measurement systems. The reason behind this communication is the legal obligation for distribution network operators to use intelligent metering systems in accordance with the requirements of the Electricity Supply Ordinance from 2018 for newly connected power generation plants and for end consumers switching to the free market. The Electricity Supply Ordinance prescribes for these measuring systems in particular the conducting of a safety test and subsequent approval by the Federal Institute of Metrology (METAS). However, approved measurement systems are not expected to be available on the market before the second half of 2019. For 2018, the Federal Electricity Supply Ordinance therefore contains an explicit exception provision that permits the use of intelligent measurement

systems even if they do not yet fully meet the requirements of the Federal Electricity Supply Ordinance. However, according to its wording, this exception will no longer apply from the beginning of 2019. ElCom's communication included the statement that smart meters that do not (yet) meet the requirements of the Electricity Supply Ordinance may also be used for the two purposes mentioned until smart meters that comply with the Electricity Supply Ordinance are available from 2019 onwards.

In December 2018, ElCom, together with METAS, also published a leaflet on the use of intelligent metering systems in a *Zusammenschluss zum Eigenverbrauch* (merger for own consumption). The communication sets out the extent to which the intelligent measurement systems used within the framework of a merger for own consumption are subject to the Electricity Supply Ordinance and the Measuring Instruments Ordinance as well as the Ordinance of the Federal Department of Justice and Police on Measuring Instruments for Electrical Energy and Power.

4.9 Feed-in remuneration at cost, non-recurring remuneration

The promotion of electricity generation from renewable energy was fundamentally restructured as of 1 January 2018. Since that date, it has no longer been ElCom's task to assess Pronovo AG's decisions in this field. Under the transitional legislation, however, it remains responsible for pending cases. In the year under review, ElCom pronounced a total of 196 rulings relating to feed-in remuneration at cost, non-recurring remuneration and the return delivery tariff.

Feed-in remuneration at cost, non-recurring remuneration

In 12 proceedings, ElCom implemented a decision of the Federal Administrative Court dated 5 June 2017 (A-195/2016) and determined that the photovoltaic systems in question were visually integrated. It therefore considers these installations to be integrated and, in the interests of legitimate expectations, has awarded a one-off compensation, which covers the actual costs incurred in adapting the installation to the requirements of an earlier SFOE directive that is incompatible with the Energy Ordinance.

Numerous complaints to ElCom concerned communications in which Swissgrid AG adjusted the higher remuneration rate for integrated photovoltaic systems to the lower rate for attached systems. ElCom made two pilot decisions on this issue, in which it overturned the decisions of Swissgrid AG on the grounds of absence of justification and violation of the right to be heard. Pronovo AG then reversed its categorisation decisions and ElCom issued 168 dismissal orders. Appeals against two of these have been submitted to the Federal Administrative Court.

ElCom issued six rulings regarding refusal to authorise extension of time limits for project

progress reports. In four cases, the complaint was rejected because the delay was caused by the complainant (lack of professional planning, reflected in the lack of maturity of the project). In two cases, the complaint was approved as the delay was not due to any fault on the part of the complainant; the reason was an appeal by environmental protection associations against the special permit. This appeal was submitted to the Federal Supreme Court and was unfounded from the outset as it concerned an area in which a small hydropower plant could be constructed without spatial planning measures. The deadlines for project progress and commissioning notification have been extended.

In one case, ElCom qualified a *GSE IN-ROOF SYSTEM* as an integrated system. In another case, it did not intervene because the complainant had not paid the advance on costs within the time limit set.

In one case, the final account of a programme from competitive tenders was disputed. With reference to the conditions applicable to the specific call for tenders, ElCom has a claim to payment of the entire amount of subsidy promised.

The Federal Administrative Court decided that a power generation plant that has undergone considerable extensions or renovation must achieve the required minimum generation level calculated on a daily basis even in the year of decommissioning and that hypothetical offsetting is not permissible. If the required minimum generation level is not reached, the plant is set to the market price.

5 Market surveillance

Since 2016, Swiss market participants which are active in European electricity wholesale markets and thus fall under REMIT have had to provide ElCom with detailed information on their trading activities.

5.1 Market transparency in wholesale electricity trading

ElCom collects and evaluates the data required for monitoring wholesale electricity trading. In 2018, ElCom's work focused on monitoring the Swiss electricity market and analysing the activities of Swiss market participants abroad. Within the framework of these activities, ad-hoc analyses were carried out to analyse events such as extremely cold days in February 2018 and exceptionally hot days in August 2018. In addition, the six suspicious trading reports transmitted to ElCom by organised markets were processed in detail. The main objective of the investigation of these incidents was to determine whether market manipulation or trading based on inside information had taken place in the case of unplanned power plant outages. Inexplicable or conspicuous market behaviour was discussed with the market participants concerned in order to reduce behaviour with a disruptive effect on the market in the future. The aim is to ensure that wholesale energy trading prices are determined by competitive conditions.

The work of the Market Surveillance Section focuses not only on the integrity of the Swiss electricity market but also on its transparency. For this reason, ElCom has published a weekly futures market report since February 2018 and a weekly spot market report since October 2018. The aim of these market reports is to present interested market participants with the current status of electricity prices and their development in Switzerland and neighbouring countries over the previous week. They also explain the influence on the prices of CO2, coal and gas, which are considered to have an effect on electricity prices. The futures market report focuses on longer-term products such as annual, monthly and quarterly contracts in Switzerland, Germany, France and Italy. The spot market report shows hourly and weekly

contracts and the most important fundamental data used to understand price movements. The main components of this are electricity production per technology, demand, temperatures, commercial border flows between Switzerland and the neighbouring countries of Germany, France and Italy, as well as generation forecasts for wind and solar electricity generation in Germany. The reports have been well received to date.

In June 2018 another workshop on market surveillance for Swiss market participants took place. These workshops have already become a tradition. This time the titles of the presentations were "Market Surveillance from Different Perspectives" and "Possible Applications of Blockchain Technology in the Energy Industry". The 70 participants confirmed the relevancy of and interest in these topics. Distributed ledger technology (DLT) – above all blockchain – is on everyone's lips. During and after the break the participants discussed the question of whether blockchain technology has the potential to make processes in the energy industry more efficient.

In 2018, exchange with the market surveillance departments of the neighbouring regulatory authorities regarding various topics continued to function very well. One or two bilateral coordination meetings per year have been established. During these meetings an exchange of methodological experience takes place. There were also meetings with FINMA in this context. Furthermore, an exchange with the Swiss stock exchange Six was also launched. The main purpose of this exchange is to improve expertise in market surveillance activities and to further develop the analysis of market activities.

The Market Surveillance Section has also intensified its work with international bodies. The Market Surveillance Section has assumed one of the presidencies of the CEER Market Integrity and Transparency Working Group (CMIT).

5.2 Market Surveillance: facts and figures for 2018

At the end of 2018, 65 market participants were registered with ElCom and six registered reporting mechanism (RRMs) were connected to ElCom's database for the delivery of the data to be reported. ElCom also has its own interface to the ENTSO-E and EEX transparency platforms.

The amount of data transmitted to ElCom increased significantly in 2018, as with previous years. 85 percent of the reported data fell into the Standard Contracts category. Over 23 million transactions (bids and concluded transactions) were registered. This corresponds to 30 percent more energy trading transactions compared to 2017. The ratio of bids to concluded transactions was around 2.5:1. More than 90 percent of the transactions were processed on the spot market. Futures and forwards therefore accounted for less than 10 percent of the total number. Compared with standard contracts, the number of reported non-standardised contracts was very low: only 3,200 were reported in 2017.

In addition to data relating to energy trading transactions, in the year under review fundamental data were also recorded in the market surveillance system. This included the feed-in of electricity from power plants of all types and energy generation from renewable sources, as well as import and export capacities at the country's borders, the water levels in the reservoirs and scheduled and unscheduled outages of power plants. A total of more than

4.2 million reports relating to fundamental data were received in 2018.

The inclusion of fundamental data from Switzerland and neighbouring countries in the monitoring activities meant that significant improvements were made to the analyses conducted. The more comprehensive the overall view, the more efficient and sound the monitoring of the electricity market can be.

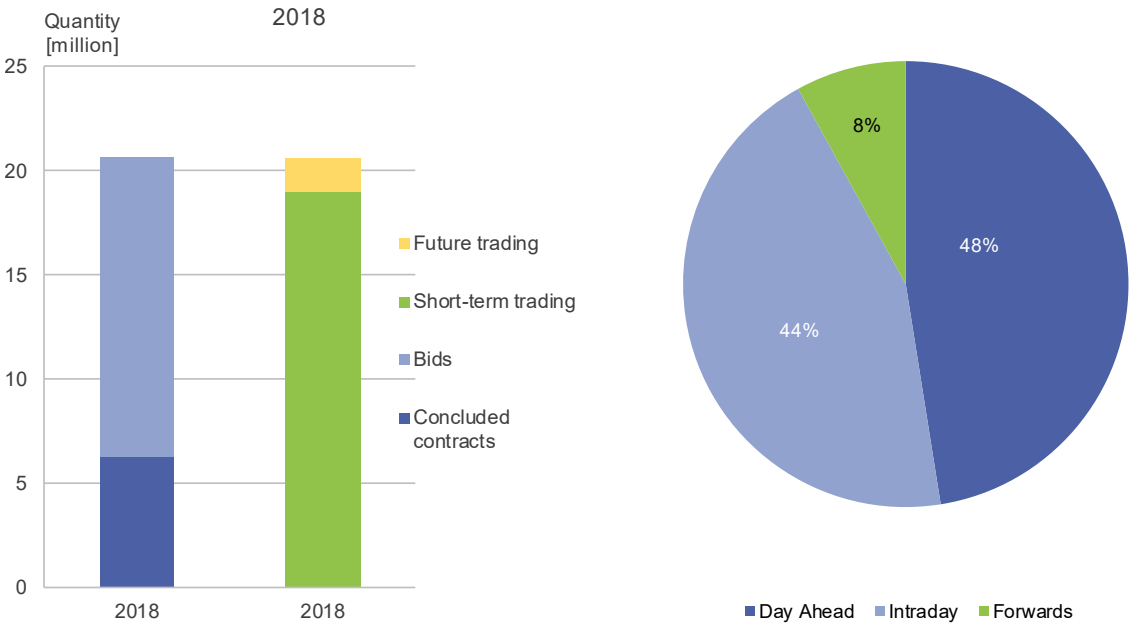


Figure 16: Standard contracts reported for 2018. Left: Distribution of bids / transactions and short-term / futures trading in 2018. Right: Distribution in 2018 of next-day short-term / same-day short-term / futures trading

5.3 Capacity withholding analysis

Day-ahead auctions are important in electricity trading. Auctions are held the day before for electricity supply on the following day. Market participants must submit their bids for the purchase and sale of electricity by a fixed time. The most important auction for Switzerland is the auction for hourly products. Bids may be submitted for supply or purchase for any hour of the next day. After the auction closes, the auction platform calculates the supply and demand curve and the resulting market clearing price per hour that each market participant pays or receives if his bid is above (buy) or below (sell) the clearing price. Not offering a significant amount of electricity generation in the auction can drive up the market clearing price. Electricity suppliers can benefit from this.

The behaviour of Swiss market participants in this regard was examined for the periods February / March and July / August 2018. February 2018 saw unusually low temperatures. Demand is usually high when temperatures are low, which is why high prices can also be observed. The purpose of the analysis was to clarify whether capacity withholding (not submitting a bid) had taken place and whether it had affected market prices. Temperatures in the summer of 2018 at times reached over 35 degrees. Here, too, it was examined whether an influence on prices can be observed at very high temperatures.

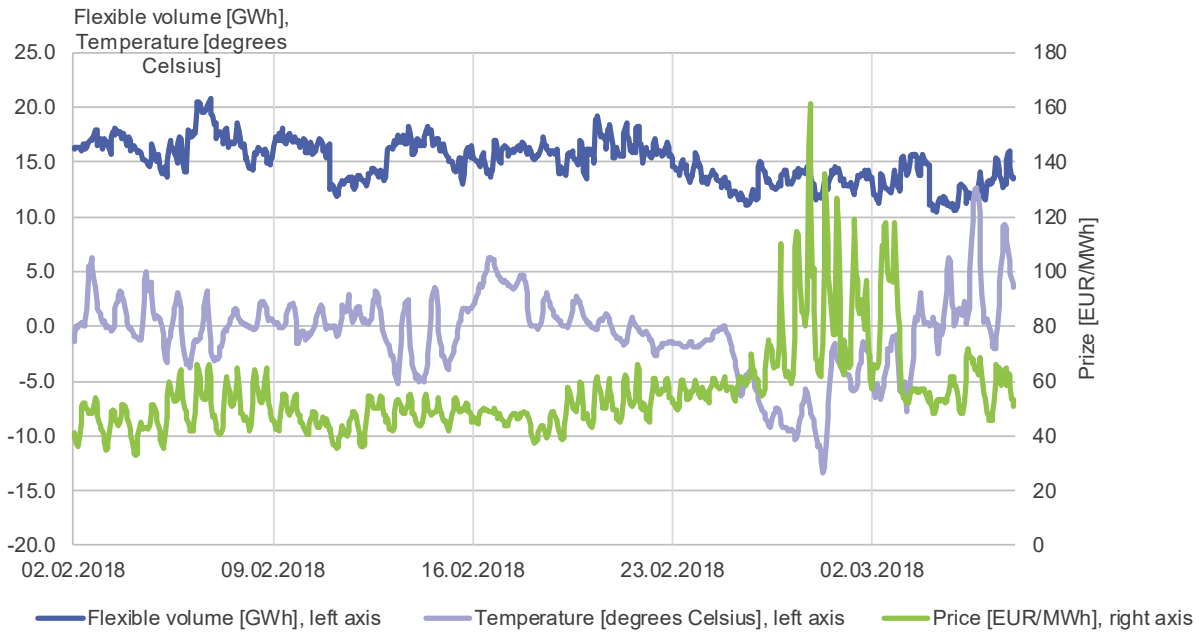


Figure 17: Total flexible volume in the Swiss day-ahead auction, February / March 2018

In the coldest phase, there is a slight decrease in the volume offered. However, there are several reasons to explain this. For example, if a market participant increasingly uses its generation capacity in the electricity balancing market because more attractive conditions prevail there, the volume that this market participant can bring into the day-ahead market decreases accordingly. In the event of very cold temperatures, however, the appetite to take risks in electricity trading also decreases, because price peaks cannot be ruled out due to high demand and illiquidity in the intraday market.

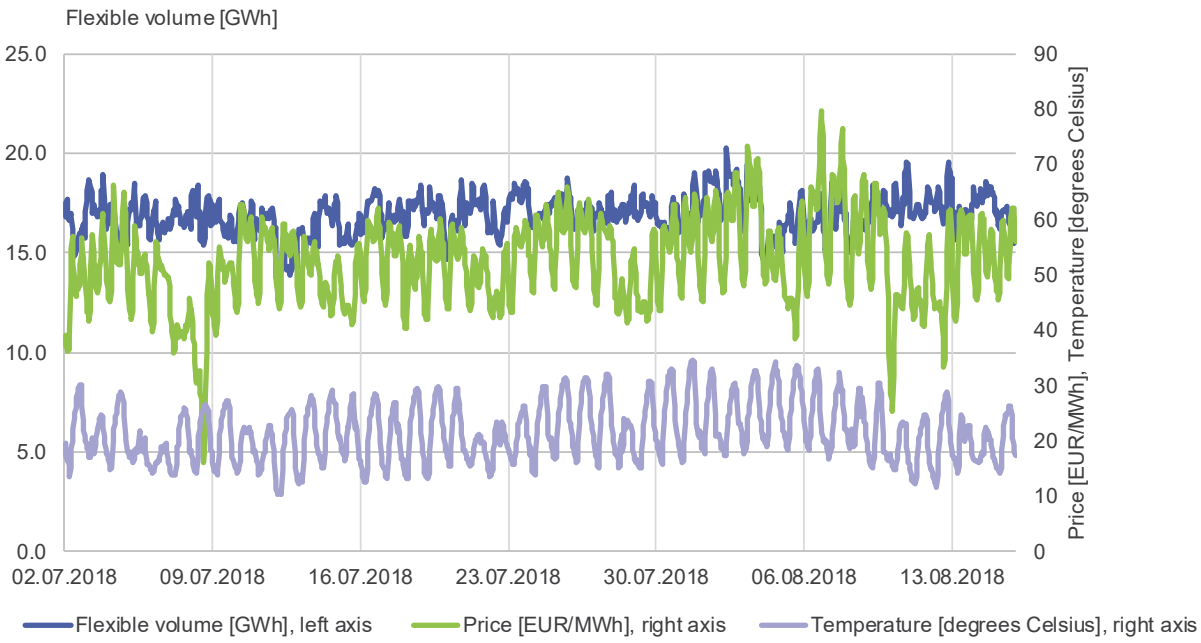


Figure 18: Total flexible volume in the Swiss day-ahead auction, July / August 2018

In summer, even with very high temperatures, there is no apparent tendency to withhold generation capacity. The analysis shows that the day-ahead market in Switzerland works well with regard to capacity withholding. A regular review should ensure that this remains the case.

5.4 Introduction of XBID and withdrawal of FITS

On 13 June 2018 the Cross-Border Intraday (XBID) market project was launched in the EU. XBID is a target model developed by the European Commission which creates the basis for continuous cross-border intraday electricity trading based on continuous allocation of cross-border capacities. It therefore allows what is known as implicit trading. Traders can buy or sell electricity across borders in a single step. Switzerland is excluded from participation in XBID.

With the introduction of XBID, the previous system, the Flexible Intraday Trading Scheme (FITS), was withdrawn. FITS enabled implicit intraday trading at the borders between Switzerland and Germany and between Switzerland and France. Traders were able to acquire the cross-border capacity required for cross-border energy transactions at the same time and without any additional effort. Since the introduction of XBID, it has been necessary to take to steps in cross-bor-

der energy transactions at the borders between Switzerland and Germany and between Switzerland and France: in addition to the actual energy transaction, it is also necessary to acquire the necessary cross-border capacity. This change increases the risk of capacity hoarding (i.e. a large amount of capacity is purchased and later returned without using the capacity for energy transport). This prevents the same opportunities existing for all market participants with regard to cross-border energy transactions. ElCom considers the hoarding of large capacities to be market manipulation. The Market Surveillance Section will therefore continue to monitor the behaviour of market participants at borders.

This change in intraday trading has a clear impact on the liquidity of the Swiss intraday market. Figure 19 shows the volume traded in the Swiss intraday market before and after the introduction of XBID. The decline in volume after the launch is striking.

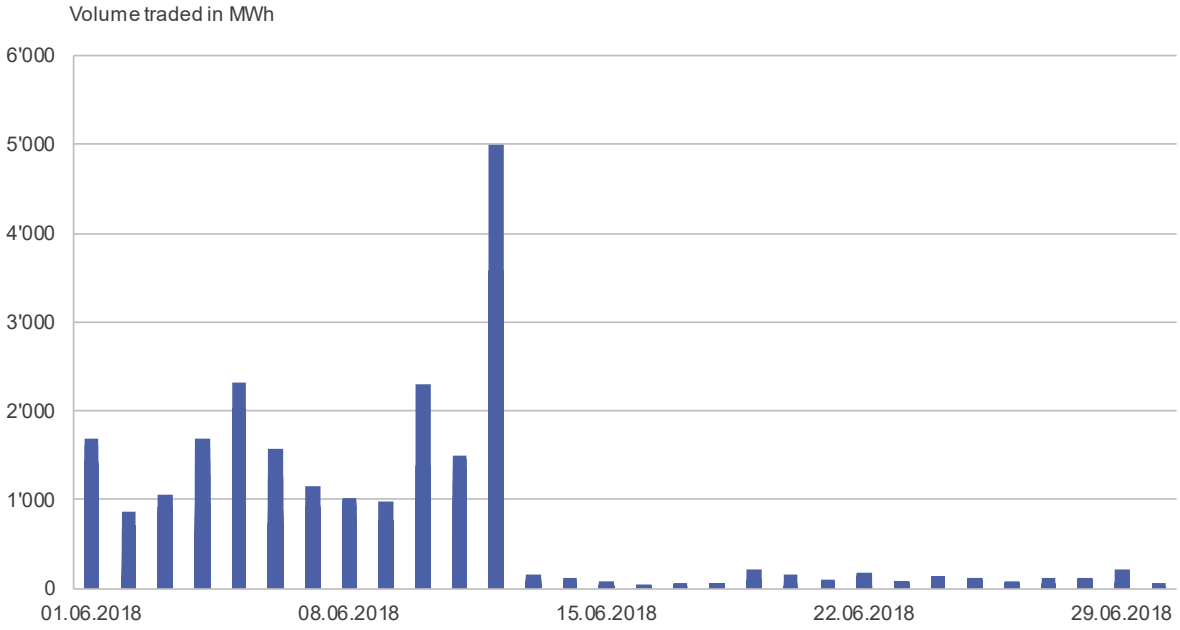


Figure 19: Volume traded in the Swiss intraday market before and after the introduction of XBID

At the same time, the activity of Swiss market participants in intraday trading increased in Germany and France. Figures 19 and 20 show the volume traded by Swiss market participants on the intraday markets in Germany and France before and after the introduction of XBID. There has been a marked increase.

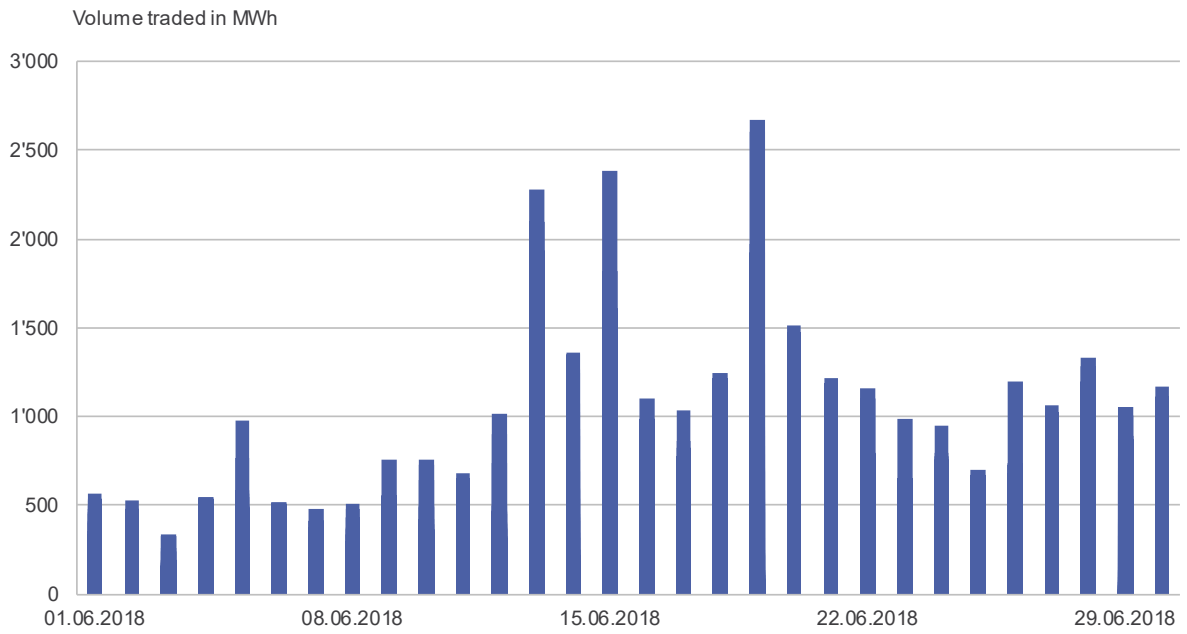


Figure 20: Volume traded in the German intraday market before and after the introduction of XBID

6 International activities

In northern Germany, large amounts of electricity is generated by wind turbines. However, the construction of transmission lines between the north and south of Germany is behind schedule. The image shows a wind farm in the North Sea off Lower Saxony, Germany.

Even more than in previous years, the entire international scene is affected by the fact that the Third Internal Energy Market Package is being implemented in the EU (mainly by way of EU directives and network codes). This will comprehensively reorganise the energy markets and influence almost every aspect of cross-border exchange of electricity. Because of Switzerland's strong links with neighbouring European countries, the changes are highly significant for Switzerland, both economically and in terms of supply security.

6.1 Congestion management

The Swiss transmission network is connected to the networks of neighbouring countries via 41 cross-border transmission lines. These connecting lines are indispensable for supply and network security as well as for Swiss exporters.

Since the available import and export capacities are limited, they are allocated in accordance with Article 17 paragraph 1 of the Federal Electricity Supply Act in accordance with market-based procedures. However, there are two exceptions: the first is supplies under long-term contracts concluded before 31 October 2002 (in particular some contracts still in force with France). The second exception is that priority is given to supplies from border hydroelectric power plants (specifically power plants on the Rhine on the border with Germany).

The largest part of the capacities of cross-border lines is thus allocated within the framework of "explicit auctions". In contrast to "implicit auctions", in which the transport right is automatically granted to the highest bidder when electricity is sold on the market, explicit auctions award the transport right separately to the energy transaction.

In recent years, the EU has gradually harmonised the rules for management of connecting lines and congestion management, which has led to significant changes compared to the previous practices of transmission network operators.

Implicit auctions, also known as market coupling, have become more efficient and have become the rule throughout most of the EU. The position of implicit auctions will be further strengthened by the gradual introduction of flow-based market coupling. This process identifies bottlenecks within networks so that they can be remedied by appropriate investment. Limiting cross-border capacity between countries and price zones is also the best way of preventing these bottlenecks from shifting to the border.

The EU and ACER will seek to enhance export and import opportunities, thereby enhancing competition and supply security. This presupposes avoidance of any distortion of trade flows between price zones and countries in favour of purely internal or domestic flows, whereby international trade flows are diverted from the cheapest to the most expensive price zone due to price differences on the market.

Unplanned load flows must be reduced to ensure a positive outcome in this regard. As the physical flows do not necessarily correspond to the planned trade flows, they limit the options for exchange at borders and often require costly interventions to reduce the risks to network stability (re-dispatch, etc.).

For these reasons, the price zone which included Germany (which must expand its national network), Austria and Luxembourg was divided into two as of 1 October 2018. This led to a price increase in Austria.

ACER's supervisory report on the 2017 electricity market (October 2018) stresses factors including the need to improve the calculation of cross-border capacity in order to improve market integration and supply security on a pan-European level, while reducing the negative effects of unplanned load flows.

The report also discusses certain developments in Switzerland, including the significantly higher economic loss that Switzerland incurs in the use of its cross-border capacities with the EU compared with 2016, which is estimated at between €110 million and €120 million. This loss is mainly due to the fact that Switzerland is excluded from the market coupling mechanisms established in the EU as long as no bilateral electricity agreement is concluded.

The development of EU regulations, some of which apply to Switzerland, is likely to lead to increased bottlenecks, especially in the Swiss network, despite positive aspects such as adjustments to support network voltage. They influence both trade and physical flows within and outside of the EU, which is increasingly overloading Swissgrid’s network. It cannot be ruled out that Swissgrid will have to restrict export and import capacities in order to ensure the stability of the Swiss network.

6.2 Border power plants

There are 30 hydropower plants along Switzerland's borders that produce electricity from watercourses adjacent to neighbouring countries. The distribution of electricity is often regulated by long-standing treaties between Switzerland and the respective neighbouring country in the case of these border power plants. For some of these border power plants, the contractually agreed quantity of electricity is distributed to the neighbouring country via the cross-border transmission network. Capacities in the cross-border transmission network are allocated through auctions. Some power plants receive capacity outside the auction procedures and therefore free of charge ("priority").

The Federal Supreme Court Ruling of 6 November 2017 was a landmark ruling on priorities in two cases (2C_390/2016 and 2C_391/2016). On 12 September 2018, the Federal Administrative Court issued a ruling (A-5323/2015) on a third case. This ruling is largely based on the Federal Supreme Court ruling. Thus, in these three cases, ElCom pronounced a new ruling on the granting of priorities.

Until the end of 2014, a cooperation agreement existed between Swissgrid and the owners of the German transmission networks, which included the priorities in the cross-border transmission network provided for in the applicable Swiss legislation. This agreement was terminated by the German transmission network operators at the end of 2014. The new cooperation agreement that entered into force on 1 January 2015 does not include any clauses governing priorities. In the view of the German transmission network operators, the granting of priorities runs contrary to European as well as German law. Against this backdrop, the Federal Supreme Court concluded that granting these priorities was impossible without the cooperation of the German transmission network operators. However, the Federal Supreme Court believed that Swissgrid would only be liable to pay compensation if it could be held jointly responsible for the refusal by the German transmission network operators to conclude an agreement that respects the right to grant priorities. Within the framework of the new ruling, ElCom now has to assess the degree of joint responsibility of Swissgrid and any resulting liability to pay compensation. A further application by a border power plant concerning the granting of a priority for cross-border energy supplies is pending with ElCom.

ElCom contacted the German Federal Network Agency (BnetzA) in order to find an equitable solution for dealing with the different Swiss and German laws regarding priority for border power plants.

Since 1 October 2017, a new provision has been in force. This provision gives priority to border power plants. In the year under review, two new applications for priorities were received as of 1 October 2018 in accordance with the newly applicable provision. The proceedings have been suspended for the time being.

6.3 Merchant Lines

Merchant lines are cross-border transmission lines that are exempt from the obligation to grant network access to third parties. While the transmission capacity is managed by the network operators, its utilisation is reserved for the investors. This exemption is limited to a specific time frame, upon expiry of which the line is transferred to the ownership of the national grid operator. Switzerland currently has two merchant lines at the Italian border. The Federal Administrative Court has yet to rule on the extent of the capacity that is exempt from non-discriminatory access by third parties.

6.4 Auction proceeds

Swissgrid allocates limited cross-border transmission network capacities via auctions. The proceeds of these auctions are shared equally for each border between Swissgrid and the respective foreign transmission network operator. Auction proceeds may be used to cover the costs of cross-border electricity supplies, to cover the recoverable costs of the transmission network or for the maintenance and expansion of the transmission network (Article 17, paragraph 5, Federal Electricity Supply Act). Swissgrid applies to ElCom for permission to use the auction proceeds in the desired manner, and ElCom ultimately decides on how they are to be used (Article 22 paragraph 5c of the Federal Electricity Supply Act). In the period from 2009 to 2012, around CHF 40 million were used for reducing the recoverable costs of the transmission network. The majority of the 2013 auction proceeds were to be used for the maintenance and expansion of the transmission network. Since, in the previous years, investments in the transmission network were not carried out to the extent originally planned, and given the costs associated with court rulings, Swissgrid applied to ElCom for the proceeds from 2013 to 2018 to be used exclusively for reducing the network tariffs.

In the year under review, ElCom communicated to Swissgrid its expectations regarding the future use of auction proceeds. The plan is that by 2022, 65 percent of auction proceeds will be used for the maintenance and expansion of the transmission network, while the remaining 35 percent will be used to reduce recoverable costs. A path for achieving the desired targets was also defined. As a result, Swissgrid's proposal on the use of the auction proceeds for 2019, which was created in the year under review, proposed using 35 percent of auction proceeds for the maintenance and expansion of the transmission network, and using the remaining 65 percent to reduce recoverable costs. ElCom decided in favour of the requested use of the auction proceeds.

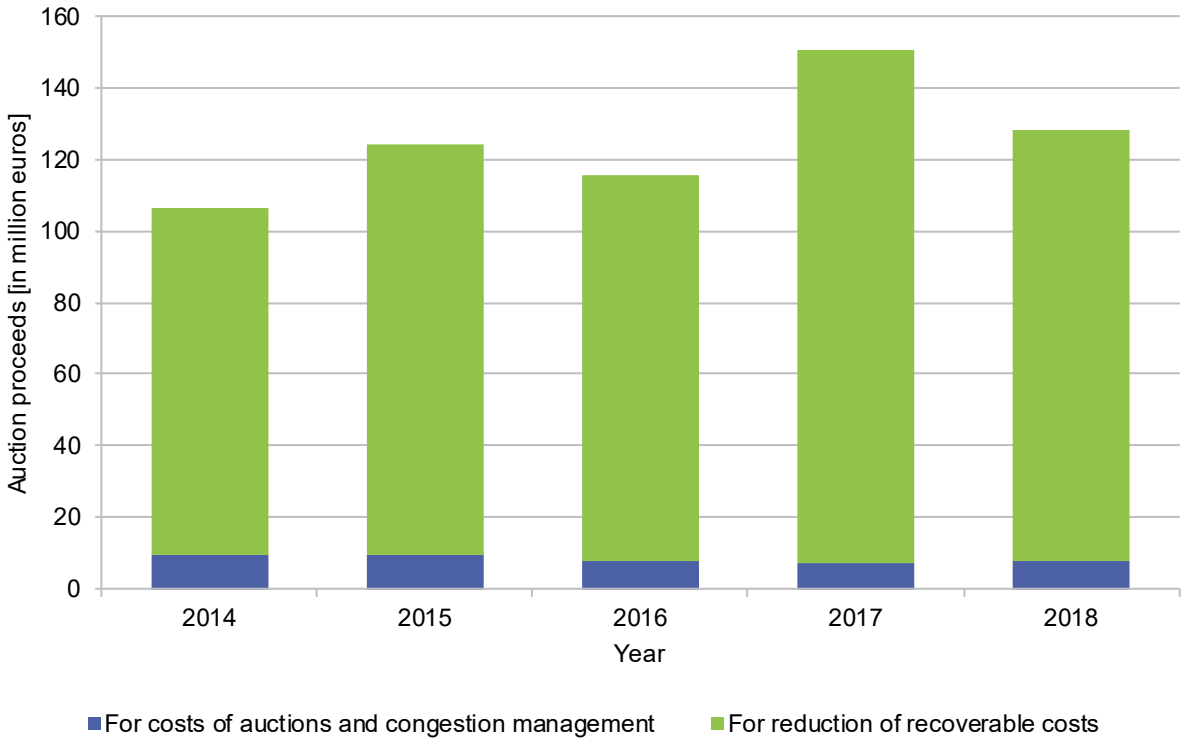


Figure 21: Use of the auction proceeds, 2014 to 2018

Figure 21 shows how the auction proceeds generated at Switzerland's borders were allocated between 2014 and 2018. The figures for 2018 are still provisional because the definitive calculations were not available at the time of going to press.

6.5 International platforms for reserve energy

Reserve energy must compensate for short-term fluctuations in consumption and generation. This makes reserve energy a central component of electricity supply security. The Third Market Package systematically extends the procurement and use of reserve energy beyond national borders. Considerable price advantages in procurement (and ultimately for

the consumer) and better protection against possible shortages are expected in some cases.

To this end, IT trading platforms will be established between some or all of the countries concerned. Switzerland is involved in all the platforms either as a member or an observer. The platforms for the exchange of primary balancing power (frequency containment reserves [FCR]) and imbalance netting (IN) are already active and certain aspects of them will be adapted. The platform for tertiary reserve energy (RR/TERRE) will be operational by the end of 2019. The two remaining platforms for the exchange of secondary reserve energy (aFRR, mFRR) are still at an early stage of development.

Switzerland's participation in the latter three platforms is subject to a proviso on the part of the EU, according to which the EU Commission decides on participation on the basis of statements by the TSO association ENTSO-E and the European agency ACER. ENTSO-E issued a positive opinion in 2017, while ACER did so in 2018. The European Commission's statement is still pending and is undoubtedly being influenced by the discussions on the Brexit modalities and the EU-Switzerland framework agreement.

ElCom aims to participate in the platforms, as it sees considerable risks from non-participation. These specifically consist of the very short-term occurrence of unplanned, unannounced large electricity flows via the Swiss network, which can lead to congestion and outages. The heavily interconnected network means that such local failures can also directly affect the entire region around Switzerland.

6.6 International bodies

The European Union has completed extensive legislative revisions that were launched at the end of 2016 entitled "Clean Energy for All Europeans". These were in response to the Paris Climate Agreement. Some of the revisions need to be adapted by 29 March 2019, in particular because of the Brexit negotiations between the EU and the UK.

This EU clean energy package also includes Directive (EU) 2018/2001 of 11 December 2018 on the Promotion and Use of Energy from Renewable Sources. It is a cornerstone of the European strategy to maintain the EU's competitiveness in the global energy market and reduce CO2 emissions by 2030 and beyond until 2050. The Directive will replace the current Directive 2009/28 on 1 July 2021.

The revision of Regulation (EC) No 714/2009 and Directive 2009/72 on the Internal Market in Electricity, Regulation (EU) No 713/2009 on the Agency for the Cooperation of Energy Regulators (ACER) and the proposal for a Regulation on Risk Prevention in the Electricity Sector and repealing Directive 2005/89/EC will also affect the organisation of the electricity market. The political agreements

reached at the end of 2018 will be formalised by the time of their official publication. Official publication is expected at the beginning of 2019, which will be marked by transition to, and implementation in, the EU.

These revisions, most of which will enter into force from 2020 / 2021, will strengthen the integration of the internal electricity market, which has intensified in the EU since 2009, in the period 2020-2030 and beyond. They also affect the conclusion of a bilateral electricity agreement between Switzerland and the EU, which is currently on hold.

ElCom has observer status in the ACER Electricity Working Group and its subgroups. It coordinates and represents Switzerland's interests in these bodies and in the regional groups that implement the EU network codes. This cooperation is particularly important from the point of view of the security of the Swiss network. The term of office of the director in office since the establishment of ACER was extended on an interim basis in September 2018. A suitable successor is to be appointed in 2019. Following the decision to end the joint presidency of ACER and CEER, which has been cultivated since the establishment of ACER, Clara Poletti (Autorità di Regolazione per Energia Reti e Ambiente [ARERA], Italy) was appointed President of ACER and Annegret Groebel (Bundesnetzagentur [BNetzA], Germany) was appointed President of CEER.

Together with the SFOE and Swissgrid, ElCom is also involved in the work of the Pentalateral Energy Forum (PLEF) to ensure network security in winter. It participates in the discussions on the further development of capacity management on the northern Italian border. ElCom is an observer at the European Electricity Regulatory Forum, the only meeting of which (2018) was devoted to the revision of the European legal framework. ElCom also has observer status at the Council of European Energy Regulators (CEER). CEER was actively involved in this revision. The most important elements of the CEER strategy for 2019-2021 are the promotion of digitisation, decarbonisation and the dynamic regulation of the gas and electricity sector for the benefit of consumers. In 2018, ElCom did not participate in the work of the OECD Network of Economic Regulators (NER).

7 Outlook

2019 will be another exciting year for ElCom. With the Energy Strategy 2050, the entry into force of the Electricity Networks Strategy in mid-2019 and the revision of the Electricity Supply Act in 2020, Switzerland's energy policy is undergoing fundamental change. Legislation in the electricity sector is undergoing numerous fundamental changes. This has far-reaching regulatory consequences for ElCom. ElCom will adapt its regulatory activities accordingly and review the new legal provisions on an ongoing and timely basis.

The Electricity Networks Strategy creates new legal framework conditions with regard to network development, in particular for the construction of cables and overhead lines. The aim of the strategy is to develop the Swiss electricity networks in good time and in line with demand in order to guarantee supply security. ElCom's Electricity Networks Strategy involves new statutory tasks for ElCom, such as participating in developing scenarios, reviewing Swissgrid's long-term plan and monitoring the electricity transmission lines sectoral plan and planning approval procedures.

In terms of the revision of the Electricity Supply Act, the supply situation in the six winter months is particularly important for ElCom. In the medium and long term, in view of the loss of electricity production from nuclear energy, it is highly likely that more energy will have to be imported into Switzerland in the future. As Germany and other European countries have phased out nuclear energy or are planning to do so, and energy production from coal in Europe will also be reduced, the export capability of neighbouring countries will be reduced. This increases the import risks for Switzerland. ElCom is addressing these problems and is drawing attention to the additional winter generation required in the consultation on the revision of the Federal Electricity Supply Act.

In concrete terms, ElCom is calling for far-reaching instruments and measures to be included in the Federal Electricity Supply Act in order to create incentives for such generation. On the basis of the analyses from the system adequacy studies, ElCom is recommending that the revision should ensure that the equivalent of a substantial part of the Swiss nuclear power plants' output in winter, which will cease to exist, continues to be produced domestically. It should be noted that the construction of new power plants will require a few years' lead time. In principle, ElCom welcomes the preparation of a strategic reserve, but points out that this would already be possible under current law pursuant to Art. 9 of the Federal Electricity Supply Act.

The relationship between Switzerland and the EU also remains relevant for supply security. Whether a framework agreement – the basis for an electricity agreement according to the EU – will be reached is difficult to assess at this stage. It has been possible to achieve certain successes as regards local supply security – for example with regard to unplanned load flows – even without framework agreements. With a view to future negotiations and supply security, an electricity agreement would nevertheless be welcome.

Further personnel changes will be implemented within ElCom during the legislative period which ends in 2019. Three members of the commission will reach the maximum term of office of twelve years this year and will resign at the end of the year. The Federal Council will decide on their successors.

8 About ElCom

ElCom, from left to right: Carlo Schmid-Sutter (President), Dario Marty, Brigitta Kratz (Vice President), Christian Brunner, Laurianne Altwegg, Matthias Finger, Sita Mazumder

ElCom is responsible for monitoring the Swiss electricity market and securing compliance with the Federal Electricity Supply Act. As an independent state supervisory authority, ElCom is playing an active role in the transition from a monopolistic electricity supply system to a competition-based electricity market. It is the responsibility of ElCom to monitor electricity prices in the universal service. ElCom also monitors whether the network infrastructure is maintained and expanded so that supply security is guaranteed for the future.

Key electricity sector data
ElCom supervises wholesale electricity trading and the electricity sector, including Swissgrid. Its supervisory activities include network use tariffs, electricity tariffs for fixed end consumers, supply security, the condition of the electricity networks and the allocation of network capacities in the event of congestion at the country's borders.

No. of network operators: approximately 650
No. of network levels: 7
Lengths of electricity networks: Network level 1 – approx. 6,600 km | network level 3 – approx. 8,800 km | network level 5 – approx. 44,000 km | network level 7 – approx. 142,000 km (overhead lines and cable, including building connections)
Transformers: network level 2 – 151 | network level 4 – 1,150 | network level 6 – approx. 59,000 (including mast transformers)

Total network use revenue: CHF 3.4 billion

Annual investments: approx. CHF 1.4 billion

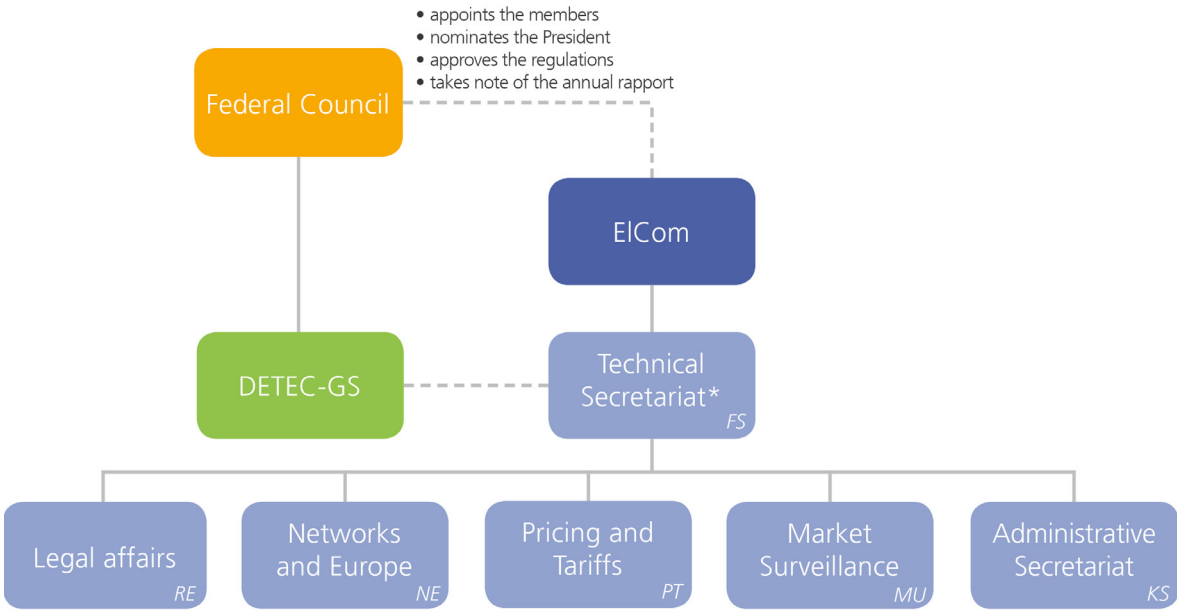
Annual electricity consumption: 59 TWh
Production: 61 TWh
Electricity imports: 37 TWh | **Electricity exports:** 31 TWh

ElCom possesses wide-ranging competencies for performing the following duties in particular:

- Examining all network use remuneration: in the liberalised energy market, the use of the networks for electricity transmission is compensated via network use remuneration. ElCom examines the lawfulness of this form of remuneration.
- Supervising electricity tariffs for fixed end consumers (universal service, i.e. households and other end users with an annual consumption below 100 MWh) and all those end consumers who do not opt for network access.
- Ruling on disputes associated with free access to the electricity network: since 1 January 2009, major consumers (i.e. those with an annual consumption of at least 100 MWh) have been able to freely choose their electricity supplier.
- Monitoring electricity supply security and the status of the electricity networks.
- Defining the procedures for the allocation of network capacities in the event of congestion in cross-border transmission lines, and coordinating activities with European electricity market regulators.
- Carrying out comprehensive supervision of the national grid operator (Swissgrid AG) following transfer of the ownership of the transmission network to Swissgrid AG.
- Supervising wholesale electricity trading.

8.1 Organisation and personnel

ElCom comprises five to seven independent members appointed by the Federal Council, plus a Technical Secretariat. It is not subject to any directives of the Federal Council and is independent of the administrative authorities.



*Administratively linked to the general secretariat of DETEC

Figure 22: ElCom organisation chart

8.1.1 Commission

The seven commission members are independent of the electricity industry, and they all hold part-time mandates. On average, the commission holds a plenary meeting once a month and its members also attend meetings of the five committees: Pricing and Tariffs, Networks and Europe, Legal Affairs, International Relations and Market Surveillance.

In the year under review, the Commission consisted of the following members:

President:

- Carlo Schmid-Sutter (since 2007): former member of the Council of States, attorney-at-law and notary public

Vice Presidents:

- Brigitta Kratz (since 2007): attorney-at-law, tutor in private law at the University of St Gallen
- Antonio Taormina (2014 to 31/03/2018): Mathematics Degree, Federal Institute of Technology, Zurich, former member of the management board and head of Energy Western Europe at Alpiq

Members:

- Laurianne Altwegg (since 2015): Degree in Political Science, responsible for energy, environment and landscape at the Western Switzerland Consumers Association (FRC)
- Christian Brunner (since 2014): Degree in Electrical Engineering, Federal Institute of Technology, Zurich, former Director of Alpiq Networks Business Unit
- Matthias Finger (since 2007): PhD (political science), Professor of Management of Network Industries at the Swiss Federal Institute of Technology, Lausanne
- Dario Marty (since 01 / 04 / 2018): Degree in Electrical Engineering (University of Applied Sciences), former Head of the ESTI
- Sita Mazumder (since 01 / 01 / 2018): PhD in Economics, Professor of Economics and Computer Science at the Lucerne School of Information Technology, Lucerne University of Applied Sciences and Arts

Committees

In the year under review, the Commission operated the following committees:

Pricing and Tariffs

- Sita Mazumder (Chair)
- Laurianne Altwegg
- Christian Brunner
- Carlo Schmid-Sutter

Legal Affairs

- Laurianne Altwegg (Chair)
- Brigitta Kratz
- Carlo Schmid-Sutter

Networks and Europe

- Dario Marty (Chair from 01 / 04 / 2018)
- Christian Brunner (Chair until 31 / 03 / 2018)
- Matthias Finger
- Brigitta Kratz

International Relations

- Antonio Taormina (Chair until 31 / 03 / 2018)
- Christian Brunner (Chair from 01 / 04 / 2018)
- Matthias Finger
- Brigitta Kratz
- Dario Marty
- Carlo Schmid-Sutter

Market Surveillance

- Matthias Finger (Chair)
- Christian Brunner
- Carlo Schmid-Sutter
- Antonio Taormina (until 31 / 03 / 2018)
- Sita Mazumder

Resignations and new appointments

In the year under review, Brigitta Kratz, Vice President of ElCom, announced she would resign at the end of 2018. Brigitta Kratz has been Vice President of the Commission since the creation of ElCom in 2007. The resignation was due to the limited term of office in the context of staggered succession planning. The Federal Council appointed Andreas Stöckli, Professor of Administrative Law at the University of Fribourg, to the Commission as successor to Brigitta Kratz. Laurianne Altwegg will be the Vice President of ElCom from 2019.

Representation of gender and language regions

There are three female and four male ElCom commission members, i.e. the ratio of women to men is 43 percent. In terms of representation of language regions, the ElCom commission members are as follows: German-speaking region: 5 persons; French-speaking region: two persons.

8.1.2 Technical Secretariat

The Technical Secretariat provides the Commission with technical and specialised support, prepares ElCom's decisions and implements them. It conducts administrative proceedings and carries out the necessary clarifications. It is independent of any other authorities and is solely subject to the directives of the Commission. At the administrative level, the Technical Secretariat is affiliated with the General Secretariat of the Federal Department of the Environment, Transport, Energy and Communications (DETEC). The Administrative Secretariat is ElCom's central contact point for the general public, the electricity industry and the media. It coordinates the activities of the Commission and the Technical Secretariat and provides the Commission with administrative support.

As of 31 December 2018, the Technical Secretariat employed 45 personnel on a full- or part-time basis, including 3 apprentices. This corresponds to 37.3 full-time equivalents (FTE). The employees are made up of 17 women and 28 men, which represents a female proportion of 38 percent. The average age of all employees is 43.3. Breakdown by national language:

- Italian: 2 employees
- French: 5 employees
- German: 38 employees

Head of the technical Secretariat (45 employees)

Renato Tami
lic. iur., attorney-at-law and public notary

Networks and Europe (9 employees)

Michael Bhend
engineer (Federal Institute of Technology)

Pricing and Tariffs (12 employees)

Stefan Burri
PhD in political science

Market Surveillance Section (6 employees)

Cornelia Kawann
Diploma in Engineering, MBA

Legal Affairs (10 employees)

Nicole Zeller
attorney-at-law

Administrative Secretariat (7 employees)

Barbara Wyss
PhD in economics

8.2 Finance

In the year under review, ElCom had a budget of CHF 11.7 million at its disposal. Its effective expenditure amounted to almost CHF 10.3 million. This amount covered ElCom's entire personnel and operating costs, including the additional expenditure associated with the final activities for its market surveillance IT systems, additional expenses in the area of electricity supply security and projects in connection with the replacement of existing IT systems.

On the income side, ElCom received a total of CHF 4.9 million, the main sources of which were payments of supervisory fees by Swissgrid for ElCom's cooperation with foreign authorities and court costs paid by parties involved in legal proceedings.

8.3 Events

ElCom-Forum 2018

The ninth edition of the ElCom Forum took place at the Kursaal Bern on 29 November. Around 300 people from the energy sector attended presentations and discussions on national and international supply security. Federal Councillor Doris Leuthard spoke on the coming challenges in Swiss energy policy, with particular regard to the revision of the Electricity Supply Act. The political panel debated the question of whether and how Switzerland can successfully complete its energy system transformation.

The ElCom Forum 2019 will take place at the Congress Center Basel on 15 November.

Information events for network operators

As in previous years, ElCom again held a total of six information events at a variety of venues in Switzerland in spring 2018. The main topics were the Energy Strategy 2050, the Electricity Networks Strategy, network planning and news from ElCom and the SFOE. A total of just under 600 people took part in the six events. Both the participants and the employees of ElCom and the SFOE regarded this as a welcome opportunity sharing professional experience.

Market surveillance workshop

As in previous years, a workshop focusing on market surveillance at ElCom was held in Bern in the year under review. The focus of the 2018 workshop, in addition to current developments in monitoring the energy wholesale market, was the topic of blockchain.

9 Annex

9.1 Facts and figures

A total of 330 new cases were received in 2018. In the year under review, 115 of these cases were successfully concluded, i.e. 35 percent of cases were concluded in the year in which they were received. In 2018, a total of 509 cases were brought to a conclusion. In 2018, the surplus from previous years, in particular from 2017, was massively reduced, continuing the trend from previous years. The number of general enquiries has also been systematically recorded since 2016. These involve enquiries submitted via the contact form on the ElCom website or by e-mail and which deal with routine matters. Handling these enquiries normally takes from a few hours to one or two days. Occasionally, general enquiries may lead to proceedings. 328 such general enquiries were received in 2018. All but 9 of these were dealt with in full (97 percent). A total of 334 rulings were pronounced in the year under review. A large proportion of these concerned applications for increasing network capacity.

Complaints, etc.	Brought forward from previous years	Received in 2018	Dealt with in 2018	Carried forward to 2019
Specific matters relating to tariffs	74	27	80	21
Feed-in remuneration at cost	204	32	220	16
Increases in network capacity	38	107	77	68
Other cases	60	164	132	92
Total	**376**	**330**	**509**	**197**
General enquiries	9	328	328	9
Total including general enquiries	**385**	**658**	**837**	**206**

Table 7: ElCom activities: statistics for 2018

9.2 Meetings

The members of ElCom attend monthly plenary meetings. In addition, the five committees hold their own meetings and ElCom also organises workshops and other extraordinary meetings. In the year under review, the members of ElCom (in various compositions) attended a total of 14 full-day and 22 half-day meetings within Switzerland. Once a year, ElCom organises a retreat during which its members seek contact with the local network operators.

9.3 Publications (in national languages only)

Directives

06/03/2018	Verhalten dezentraler Energieerzeugungsanlagen bei Abweichungen von der Normfrequenz
25/04/2018	Gestehungskosten und langfristige Bezugsverträge gemäss Artikel 4 Absatz 1 Stromversorgungsverordnung
14/05/2018	WACC Production
19/06/2018	Abrechnungsmethodik für SDL
24/07/2018	CHF 75 Rule
15/08/2018	Netzverstärkung
15/11/2018	Erfassung Versorgungsqualität

Notifications

25/04/2018	FAQ ES2050: Fragen und Antworten zur Energiestrategie 2050
19/06/2018	Verhalten dezentraler Energieerzeugungsanlagen bei Abweichungen von der Normfrequenz – Nachrüstung bestehender Anlagen
05/07/2018	Brief Verdankung und Darlegung Massnahmen zur Messkostenerhebung 2017
24/07/2018	Vereinbarung ElCom, ESTI und BFE bei PGV und SÜL
18/10/2018	Einsatz elektronischer Messmittel mit Lastgangmessung und automatischer Datenübermittlung, welche den Anforderungen der StromVV nicht entsprechen
29/10/2018	Fragen und Antworten zu neuartigen und dynamischen Netznutzungs- und Energieliefertarifen
19/12/2018	Zusammenschluss zum Eigenverbrauch (ZEV) und intelligente Messsysteme für Elektrizität
20/12/2018	Revision StromVG Vernehmlassung ElCom

Reports and studies

31/05/2018	Report on the activities of ElCom 2017
31/05/2018	Schlussbericht System Adequacy 2025
31/05/2018	Stromversorgungssicherheit in der Schweiz 2018
27/06/2018	Bericht Messkosten Schweiz

9.4 Glossary

ACER	EU Agency for the Cooperation of Energy Regulators
aFRR, mFRR	Automatic/manual frequency restoration reserve Frequency restoration reserve
Balance management	Measures for constantly maintaining the electricity and capacity balance in the electricity system. It includes timetable management, data measurement and balance compensation management.
Blockchain	Expandable list of data sets linked together using cryptographic techniques
CBCA	Cross Border Cost Allocation
CEER	Council of European Energy Regulators
CERT	Computer Emergency Response Team
CIP	Critical Infrastructure Protection Strategy
CMIT	CEER Market Integrity and Transparency Working Group
Congestion management	Ensures that the secure operation of the network can be maintained through preventive measures (e.g. NTC specification, capacity auctions) and operational measures (e.g. re-dispatch, reductions).
Control zone	Zone in which the national grid operator is responsible for network control. This zone is physically defined through measurement stations.
CORE	The CORE capacity calculation region consists of the former CWE (Central Western Europe) and CEE (Central Eastern Europe)
Cost-Plus Regulation	Method of cost regulation whereby each network operator determines the operating costs based on its own costs which includes a reasonable profit. This corresponds to the current cost regulation in Switzerland. In contrast, incentive-based regulation determines the costs that an efficient network operator would incur in the relevant network area.

DETEC	Federal Department of the Environment, Transport, Energy and Communications
Distribution network	High, medium or low voltage network for the purpose of supplying electricity to end consumers or electricity supply companies.
DLT	Distributed Ledger Technology
EEX	European Energy Exchange
ElCom	Swiss Federal Electricity Commission
End consumers	Clients who buy electricity for their own consumption. This does not include power plants that buy electricity for their own consumption and for powering pumps in pump storage power plants.
ENTSO-E	European Network of Transmission System Operators for Electricity
ESTI	Swiss Federal Inspectorate for Heavy Current Installations
EU	European Union
FCR	Frequency controlled normal operation reserve
FDJP	Federal Department of Justice and Police
FINMA	Swiss Financial Market Supervisory Authority
FITS	Flexible Intraday Trading System
FOCP	Federal Office for Civil Protection
FSO	Federal Statistical Office
ICT	Information and Communications Technology
IN	Imbalance Netting
kVA	Kilovolt ampere
kWh	Kilowatt hour
kWp	Kilowatt peak

Median	Value in the middle of a data series arranged by size, i.e. half of all the observations are smaller and half are larger than the median figure. (Unlike the average figure, the median is resistant to statistical outliers.)
MW	Megawatt
MWh	Megawatt hour
Net transfer capacity (NTC)	Maximum exchange programme between two network zones that is reconcilable with the safety standards of both zones and which takes technical uncertainties regarding future network situations into account.
Network access	Right to use a network in order to obtain electricity from any supplier or to feed electricity into a network.
Network use	Physical use of a network system based on feed-in or withdrawal of electricity.
OT	Operational technology
PLEF	Pentalateral Energy Forum
PV	Photovoltaic
REMIT	Regulation on Wholesale Energy Market Integrity and Transparency Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on Wholesale Energy Market Integrity and Transparency.
Reserve energy	Power supply that can be drawn on automatically or manually by power plants to maintain the scheduled level of electricity exchange and ensure the continued safe operation of the network.
RRM	Registered reporting mechanism
SAIDI	The System Average Interruption Duration Index (SAIDI) indicates the average duration of interruptions in supply to an end consumer in an electricity supply system.
SAIFI	The System Average Interruption Frequency Index (SAIDI) indicates the average frequency of interruptions in supply to an end consumer in an electricity supply system.

SFOE	Swiss Federal Office of Energy
Strand km	A cable strand (strand km) consists of several conductors (e.g. 1 km with 3 phase or single phase conductors = 1 km). In the case of cable lines, one kilometre describes the absolute length of the cable. For overhead lines, for example, 3 phase conductors correspond to one strand (see VSE document NBVN-CH edition 2007).
System services	The ancillary services necessary for the safe operation of networks. The main components are system coordination, balance management, provision of reserve energy, self-contained start and independent operation capability of generators, voltage stability (including reactive energy), operational measurements and compensating active power losses.
Transmission network	Network used for the transmission of electricity over large distances within the country and for connection to networks outside the country, usually operated within the range of 220 to 380 kV. The following items are integral parts of the transmission network: a) transmission lines and support structures; b) coupling transformers, switching systems and measurement, control and communication equipment; c) systems that are used jointly with other network levels, mainly in association with the transmission network or without which it is not possible to operate the transmission network safely and efficiently; d) switching fields before the transformer at the transfer point to another network level or a power plant.
TSO	Transmission system operator
TWh	Terawatt hour
UREK	Parliamentary Commissions for Environment, Spatial Planning and Energy
VSE	Association of Swiss Electricity Companies
XBID	Cross-Border Intraday Market Project

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