Report on the activities of ElCom 2016

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Carlo Schmid-Sutter
President of ElCom

2016 was an eventful year for the Swiss electricity industry. At the beginning of the year, a below-average production capacity at the 220 kV level, together with limited import capacities, gave rise to a lively debate on supply security. Thanks to favourable weather conditions and the implementation of immediate measures, however, the situation soon eased again. It was only possible to implement the immediate measures thanks to the excellent and timely cooperation of all involved players. Viewed in this light, the potential shortfall also had a positive side: in the impending crisis, the involved players worked closely together to relieve the situation, defined the corresponding responsibilities in workgroups and introduced suitable measures. At the technical level, the installation of central components for the expansion of the network was expedited, e.g. the transformer in Beznau. It is to be hoped that the Swiss electricity industry has learned lessons from the winter 2015/2016 situation.

From the regulator's point of view, the electricity supply system has functioned smoothly in the past few years. The quality of supply is excellent in Switzerland. On average, Swiss consumers only had to anticipate scheduled and unscheduled interruptions totalling 21 minutes in 2015 (the figures for 2016 will only be available in summer 2017). Unscheduled interruptions amounted to only 11 minutes per consumer. These figures are among the best in Europe.

The basic supply tariffs were also satisfactory. Network use costs have remained stable at around ten cents per kilowatt hour since the inception of our surveys in 2009. Energy prices fluctuated between seven and eight cents, while the various cantonal and municipal taxes and fees are within the range of one cent. In the period under review, only feed-in remuneration at cost increased notably, more than tripling to 1.5 cents (a move that was approved by the electorate).

Nonetheless, the regulator anticipates difficult times ahead for Switzerland's supply security. In the short term, i.e. for winter 2016/2017, the situation for Switzerland appears to be relatively calm. The involved players have done their homework and a significantly higher import capacity is available compared with the previous year. This means that any shortage of base-load energy can be offset through imports, subject to availability. The energy situation in Switzerland is also relatively noncritical in the short term, despite the temporary unavailability of Beznau 1 and Leibstadt nuclear power plants.

The challenges for Switzerland will become greater in the medium and long term: the expansion of renewable energy is proceeding at a very slow pace. If we want to compensate the loss of energy from nuclear power plants through the use of renewable energy, we will need around 100 years at the current rate of expansion. This means that we will either have to at least partially fill the gap between consumption and domestic production through our own production, as envisaged by the Federal Council in its Dispatch to Parliament on its proposed "Energy Strategy 2050", or we will have to import more electricity. In the year under review, in its periodical report on supply security ElCom warned about the risks of an excessive dependency on imports. Electricity imports are only possible if the production and transmission infrastructure abroad and the transmission capacity within Switzerland are available in realtime.

A higher import dependency also increases the importance of the international environment. At the operational level, our relations with our neighbouring countries are intact. We have signed a memorandum of understanding with ACER (the EU's Agency for the Cooperation of Energy Regulators) that grants us observer status in various workgroups, but the attitude of Brussels towards Switzerland is distinctly cool. For example, Switzerland is not only denied access to day-ahead market coupling, but is also excluded from the cross-border intraday process. The situation with regard to future negotiations is also problematic. The increasing focus on institutional issues means that the optimisation of interconnected operation, the functioning of the markets and the guarantee of supply security are being downgraded to second place. If formal issues continue to prevail, this will not be in the interests of interconnected operation and supply security.

In its Market Monitoring section, ElCom successfully introduced its MATCH system for monitoring Switzerland's wholesale electricity market (Switzerland's counterpart to the European REMIT system). In the MATCH system, ElCom has been receiving between 40,000 and 45,000 standard transactions a day, excluding OTC transactions and fundamental data. MATCH helps the regulator guarantee a fair electricity price, gain reliable knowledge about the market and obtain an overview of the status of knowledge on the part of foreign authorities regarding sensitive data pertaining to Swiss companies.

In our Prices and Tariffs section we concluded the second, and thus final, test phase for the Sunshine Regulation, and will be introducing this as a regulatory tool in 2017. As during the test phases, we will be informing each distribution network operator about our findings, but will not be publishing these for the time being.

In our Legal Affairs section, the ruling by the Federal Supreme Court in the year under review concerning electricity supplier CKW confirmed the legal conformity of the "averages method" that for many years has been applied for pricing both by ElCom and around 80 percent of the network operators. In view of the parliamentary reaction to this Federal Supreme Court ruling, we will have to wait and see what the consequences will be for those network operators who have not applied this method to date.

Furthermore, in April 2016 ElCom pronounced a fundamental ruling on remuneration for electricity (in particular, solar power) fed into the grid: remuneration is to be based on the purchase price paid by the network operator for procuring electricity without a declaration of origin.

This report provides a comprehensive overview of the activities of ElCom during 2016 – I hope you will find it interesting and informative.

2 Focus on supply security

Reservoirs make a significant contribution to Switzerland's electricity supply security – especially in winter: shown here, Lac d'Emosson, canton of Valais.

In 2016, ElCom's main focus was on supply security. It was possible to ease the threatening supply shortage in winter 2015/2016 by implementing immediate measures. Favourable weather conditions also helped ease the situation. However, in the medium and long term, ElCom envisages higher risks. In our interview, Renato Tami (head of the Technical Secretariat) describes the measures that have already been implemented and the challenges facing us in the future.

On 2 December 2015, Swissgrid reported in a press release that Switzerland was facing a difficult supply situation. What was the problem?
In winter 2015/2016, the supply situation grew precarious due to a series of unfortunate circumstances. A significant shortfall in base-load production arose due to the temporary shutdown of Beznau 1 and 2 nuclear power plants. This primarily had to be compensated by producing more energy from Switzerland's reservoirs, which in turn resulted in low water levels. The extremely dry summer and autumn in 2015 were a further contributing factor: water levels were low not only in the reservoirs, but also in the rivers, and this significantly reduced the output from run-of-river power plants, which are crucial for Switzerland's electricity supply. These circumstances resulted in the need to import more electricity. Although there were available capacities from our neighbours to the north, transformer congestion occurred between the 380 kV and 220 kV levels.

The situation was eased thanks to targeted measures and milder and wetter weather conditions: what action was taken?
The measures relating to the grid and the market that were introduced in response to the difficult situation that arose in winter 2015/2016 quickly took effect. Those relating to the grid were aimed at reducing the load on the 380 kv / 220 kV coupling transformers, for example through the use of an emergency transformer. The market-related activities included, for example, the early procurement of reserve ener-

gy. We also set up various workgroups. These measures, combined with milder and wetter weather conditions and the restart of Beznau 2, resulted in an easing of the situation. The winter 2015/2016 report on supply security, which can be viewed on the ElCom website, provides a detailed overview of the supply shortage.

If we look ahead, can we say that, thanks to the cited measures, a supply shortage like the one that occurred in winter 2015/2016 can be ruled out?

Even with the implemented measures, a supply shortfall can never be entirely ruled out. With regard to the medium-term and long-term supply security we envisage significant problems for Switzerland. The current pace of the increase in production from renewable energy is too slow to offset the loss of production resulting from the decommissioning of the country's nuclear power plants. The most obvious means of replacing the loss in production would be to import more electricity, but a dependency on imports is always associated with a certain degree of risk.

What are the main sources of this risk? Low electricity prices indicate a veritable glut of energy in Europe.

On the one hand, sufficient progress has to be made with the expansion of the network. Although major efforts and progress have been made in this regard since last winter, additional work is still urgently required, for example on the expansion of the transformer at Mühleberg and the Bassecourt to Mühleberg transmission line. On the other hand, a dependency on imports always calls for the readiness of our neighbouring countries to export electricity without restriction and at any time. But as the current situation indicates, it may no longer be possible to take this for granted already in the medium term. In France, energy is in short supply in the critical winter months, and in an annual comparison France has turned from a net exporter into a net importer. Here, together with favourable weather conditions, the availability of France's nuclear power plants is a decisive factor. For each additional drop in temperature by one degree Celsius, France needs an additional output of more than 2,000 megawatts, which is twice the output of Leibstadt nuclear power plant. By way of comparison, in Switzerland each additional one-degree drop in temperature requires an additional output of approximately 70 megawatts. This means that a particularly cold winter in France could result in considerable difficulties for the entire European electricity supply. Germany is decommissioning its remaining nuclear power plants by 2022, including four major facilities in the south of the country, and is behind schedule with its grid expansion on the north-south axis. So here, too, it is by no means certain whether Germany would have sufficient export capacity at all times.

"The idea of stipulating a level of self-sufficiency for Switzerland is an interesting one."

Renato Tami, Head of the Technical Secretariat

Would it therefore make sense to stipulate a level of self-sufficiency for Switzerland, i.e. define the proportion of energy that Switzerland must produce itself?

Various options have been considered for maintaining Switzerland's supply security in the medium and long term, and the idea of stipulating a level of self-sufficiency is an interesting one. In the interest of supply security it is important to address this issue and debate it at the political level without delay. It is only after consensus has been reached on the appropriate level of self-sufficiency that it makes sense to talk about new market models and structures.

2.1 Introduction

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 has to 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 tariffs in the entire electricity network.

In the 2015/2016 winter, Switzerland's supply security came under pressure for a variety of reasons. The problems were addressed on the basis of a special report, and various measures were introduced to prevent a similar situation from occurring in 2016/2017 (cf. section 2.2).

ElCom comprehensively monitors the medium to long term supply security in the areas of networks, production, prices and tariffs, etc. For this purpose it collects data relating to quality of supply, network availability and frequency of interruptions. In addition to monitoring supply security, ElCom also keeps a close eye on the available import capacity at Switzerland's borders with France, Germany, Austria and Italy (cf. section 2.3), and publishes these figures annually.

But supply security also depends on production capacity and the availability of electricity, and in view of this, ElCom also monitors foreign markets and the activities of foreign regulators with respect to capacity mechanisms (cf. section 2.4).

Adequate production capacities and sufficiently dimensioned transmission and distribution networks cannot guarantee the security of supply on their own. Because electricity cannot be stored in the network, the quantity of energy fed into the grid has to always be the same as the quantity that is taken out of it. This equilibrium has to be maintained through the use of balance energy (cf. section 2.5).

2.2 Supply security: review and outlook

2.2.1 Review of 2015/2016 winter

The situation during the 2015/2016 winter was at times critical. The 380 kV / 220 kV transformers proved to be the bottleneck in that they limited the import capacity. ElCom and the electricity industry formed a "Winter" workgroup which closely examined the situation and introduced various measures aimed at easing it. A detailed report on the supply situation in winter 2015/2016 was posted on the ElCom website.

The leaders of the "Winter" workgroup were subsequently brought into another workgroup established by ElCom. As a result of the separation between the networks and production, and trading and distribution activities, that was stipulated in the new Federal Electricity Supply Ordinance, there is no longer an integral overall responsibility for supply security. However, the responsibilities of the individual players are clearly defined: according to the applicable legal provisions, it is the distribution network operators who are responsible for providing the basic supply to end consumers, while the supply to end consumers entitled to free choice of provider is governed by agreements under private law. Swissgrid is responsible for securing the safe, productive and efficient operation of the transmission network, but it is not responsible for providing supply energy.

2.2.2 2016 report on electricity supply security

ElCom publishes a detailed report on Switzerland's medium-term electricity supply security every two years. The latest report was posted on its website in summer 2016. An evaluation of the relevant observation criteria does not yield a uniform picture: while ElCom regards prices and tariffs as non critical from the point of view of supply security, it has identified a need for action in the areas of networks and production.

The development of the criteria for assessing the management of the transmission network system was stable to slightly positive. The critical factor is the import capacity for compensating scheduled and unscheduled shortfalls in production in Switzerland. Based on the findings obtained during winter 2015/2016, certain Swissgrid expansion projects were re-prioritised, including the expansion of the 380 kV / 220 kV coupling transformers by increasing the capacity in Laufenburg and constructing a new transformer in Beznau. In addition to its other assessments, ElCom verified the effectiveness of these measures in cooperation with the Research Centre for Energy Networks at the Federal Institute of Technology, Zurich. The next important step is to increase the voltage of the Bassecourt to Mühleberg transmission line to compensate for the decommissioning of Mühleberg nuclear power plant. The lengthy approval and other procedures associated with transmission line projects represent a major challenge for the above activities.

The security of supply in the distribution network may be described as very good. In the past six years, the degree of network availability has been very high, as has been confirmed in the annual country comparisons carried out by the Council of European Energy Regulators (CEER).

Switzerland has a high proportion of peak-load power plants, which means it also possesses reserve capacities. However, in view of the energy supply situation, the risks for its power plants are tending to increase. Reserve capacity can only be utilised if the necessary primary energy is available.

2.2.3 Situation in winter 2016/2017

As a precautionary measure, the "Winter" workgroup will also convene in the 2016/2017 winter. The situation was still eased up until December, but the reservoirs were subsequently used for production to an excessive extent, which meant their water levels were very low. Thanks to improvements and lessons learned from the previous winter, however, the import capacity was significantly higher, thus ensuring a secure supply even at low water levels.

One of the reasons for the high level of hydropower production was the cold winter weather, but another factor was the partial shutdown of nuclear power plants in France and Switzerland. Due to the widespread use of electric heating in France, electricity consumption increased sharply, as did the electricity price in France, and thus in Switzerland too, making hydropower production lucrative for plant operators.

In October 2016, around one-third of France's nuclear power plants had to be switched off as a precautionary measure due to certain anomalies. Some of these facilities were back in operation by the end of the year. During the most critical period for France, Italy temporarily limited its electricity exports. Swissgrid supported France as far as possible and discussed the situation with ElCom. Even if this did not directly result in a critical situation in Switzerland, it nonetheless drew attention to the risks that go hand in hand with a high dependency on imports.

2.2.4 Longer-term outlook

With the present-day framework conditions and market prices, the owners of Switzerland's power plants do not appear to be in the position to make investments and finance the modernisation of their facilities. The step-by-step decommissioning of the nuclear power plants will result in a reduction in energy production in Switzerland by around 25 TWh per annum in the next few decades. As it appears today, the increase in the use of renewable energy will not take place quickly enough to compensate for this loss. As pointed out above, a dependency on imports is associated with certain risks, and these risks will be further intensified as a result of the planned decommissioning of several major power plants in southern Germany without the simultaneous expansion of the German network.

ElCom has ascertained that the relevant political bodies (Swiss Federal Office of Energy and the Parliamentary Energy Commissions) have taken note of this situation. ElCom will be keeping a close eye on the associated discussions and intends to intervene where necessary in order to guarantee Switzerland's supply security in the future.

2.3 Quality of supply

2.3.1 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 user. 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, flow 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, and supply 80 percent of the energy to their end users. In 2015, the 96 largest network operators experienced 4,401 unscheduled interruptions (cf. Table 1), an increase by more than 400 versus 2014. 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 users that are affected that such an evaluation can be made.

	2011	2012	2013	2014	2015[1]	Unit
Interruptions	4,264	5,038	4,615	4,039	4,401	No. of unscheduled interruptions
SAIDI	16	22	15	13	11	Minutes per end consumer
SAIFI	0.28	0.34	0.28	0.22	0.23	Interruptions per end consumer

Table 1: Development of supply quality in Switzerland from 2011 to 2015 (unscheduled interruptions only)

In 2015, the average duration of unscheduled interruptions per end consumer was 11 minutes. This figure represents a nationwide improvement by 2 minutes versus the previous year. The average frequency of unscheduled interruptions per end consumer in 2015 was 0.23, which was slightly higher than in the previous year.

The development of network availability in Switzerland has been generally positive since 2012. The higher SAIDI and SAIFI figures in 2012 were primarily attributable to extraordinary natural phenomena (storms and snowfall) and the high quality of supply is being confirmed in an international comparison. According to the "6th CEER Benchmarking Report 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 2016 will be published in June 2017 on ElCom's website.

2.3.2 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 monitors the availability of cross-border capacities (referred to as net transfer capacity, or NTC). NTC indicates the level of cross-border transport capacity that is available in neighbouring countries without infringing against 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 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)	2012	2013	2014	2015	2016
France	3,109	3,060	3,093	3,073	2,974
Germany	895	965	1,094	1,373	1,468
Austria	456	512	612	779	803
Italy	1,724	1,726	1,722	1,722	1,717

Table 2: Available import capacity for Switzerland, 2012 to 2016

Because the exchange of energy with the neighbouring countries primarily takes place via the 380 kV network, but imported electricity is supplied to end consumers in Switzerland 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. In the period from 2012 to 2016, the import capacities at the national borders remained relatively stable for Italy and were slightly higher for Germany and Austria. The increases in import capacities in 2014 and 2015 were partly attributable to the transfer (Bassecourt) and construction (Bickigen) of a 380 / 220 kV transformer (physical capacity expansions), but also to the fact that Swissgrid was able to optimise the import capacity at the German and Austrian borders in winter 2015 thanks to new planning and forecasting systems. For France, the import capacities remained fairly stable between 2012 and 2015, but were lower in 2016.

In view of the high transit flows through Switzerland (from north to south), the available export capacity to Italy is also an important factor for Switzerland's supply security. The extent of this export capacity has a significant influence on the allocation of import capacity at the borders with France, Germany and Austria. Export capacity to Italy rose in the past two years because, during this period, Italian transmission grid operator TERNA imposed fewer capacity reductions in order to maintain network stability in Italy.

NTC (MW)	2012	2013	2014	2015	2016
Italy	2,826	2,767	2,557	2,948	2,986

Table 3: Trend in Switzerland's export capacity to Italy, 2012 to 2016

2.4 Capacity mechanisms

The facilities for the production of electricity in central and western Europe are in the throes of a radical restructuring process. The importance of conventional (and in particular nuclear) power plants is on the decline, while an ever increasing number of facilities for the production of electricity from renewable energy are being constructed. This process is also being supported through official promotion programmes. Instead of an initially feared electricity supply shortage, a considerable surplus has been produced on the European electricity market in the past few years, despite the decommissioning of thermal power plants. This trend has been supported by stagnating demand. The surplus, combined with lower fuel costs and declining prices for CO2 certificates, has given rise to a long-term fall in prices on the wholesale electricity markets. On the basis of the Swiss electricity price (SwissIX), it is now only possible to generate around half the yield per kWh compared with the price level that was in place at the end of the previous decade.

In order to be able to secure the economic viability of the existing power plants in the future, two concepts are currently being examined: the first would be to allow market forces to run their course, so that in periods of short supply, electricity prices would under certain circumstances have to be increased by up to four times the average level. This solution would also enable conventional power plants to finance their full costs even though their annual operating hours would be reduced. The sec-

ond option would be for the government to no longer allow free price peaks, i.e. to impose a limit on electricity prices. At the same time, this would secure the provision of sufficient capacities with the aid of capacity mechanisms.

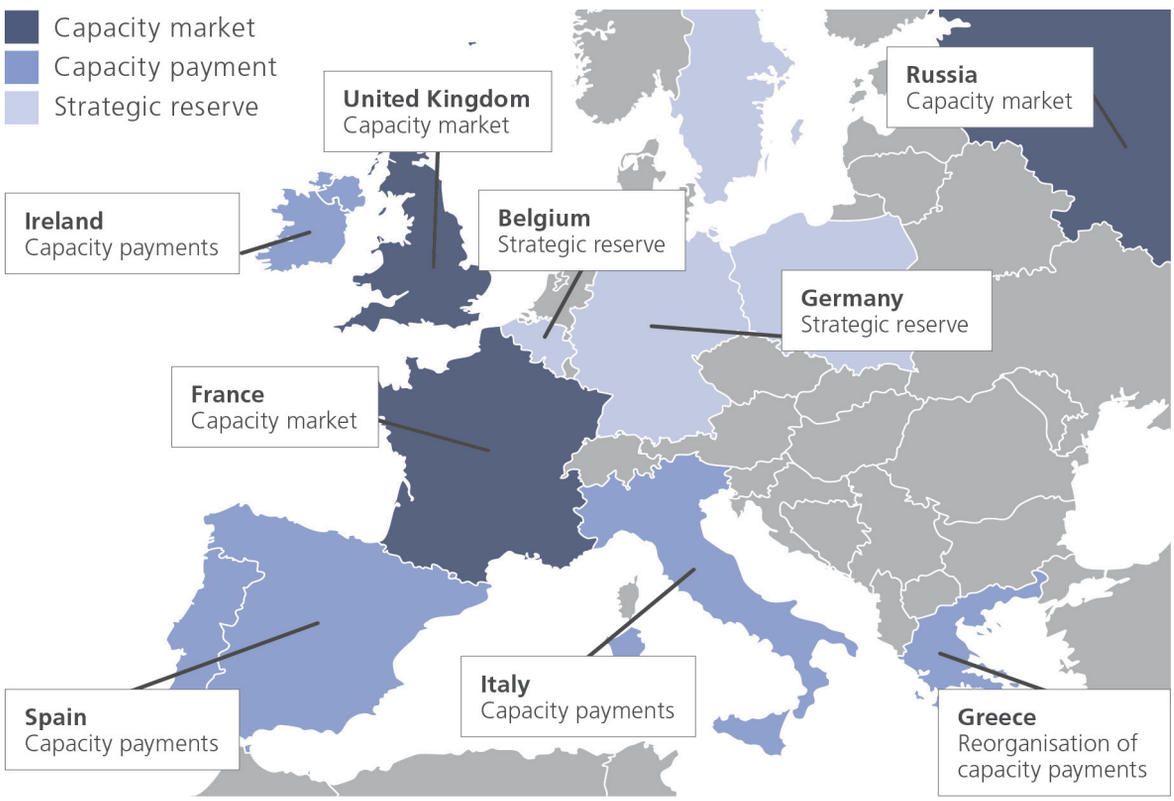


Figure 1: Simplified overview of capacity mechanisms in selected countries of Europe

The introduction of such capacity mechanisms is planned or has already been implemented in many European countries, including within the EU (cf. Figure 1). In an industry study conducted in 2016, the EU Commission identified a large number of capacity mechanisms: 35 previous, current, rejected and planned mechanisms in the eleven countries involved in the study. According to this study, market-wide capacity mechanisms are the most suitable solution if there is a risk to an acceptable supply security in the long term, whereas strategic reserves are a suitable solution for a shorter term risk. After an in-depth examination, the European Commission approved the French capacity mechanism, according to which suppliers from other member states may also explicitly participate. However, the question whether Swiss suppliers can participate has not yet been clarified.

At the present time, the available import options and existing power plant capacities appear to be sufficient for ensuring supply security in Switzerland. But ElCom has also pointed out that ensuring the security of supply by means of electricity imports exposes Switzerland to external risks. Furthermore, it is unlikely that, under the current market conditions and without government

support, new power plants will be constructed in Switzerland that will be large enough to meet the long-term requirements. In view of these developments, ElCom has decided to fundamentally reconsider the necessity of introducing capacity mechanisms in Switzerland. It aims to do this from the point of view of ensuring a secure electricity supply over the medium to long term at acceptable prices.

2.5 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 consumers. Because it is not possible to store electricity in the network, the quantity of energy fed into the grid has to always be the same as the quantity that is taken out of it. Despite high-quality production and consumption forecasts 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 calls for 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 consumers 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 view of the critical network situation during the 2015/2016 winter (cf. 2015 report on the activities of ElCom, section 3.5), a shortage of reserves from reservoirs had to be anticipated in the year under review. This could have resulted in a further scarcity in the supply of balance products because these are primarily provided by storage power plants. In order to prevent this development, Swissgrid carried out a risk assessment concerning the reduction of the total quantities of balance energy. Based on this analysis and the potential reduction of reservoir reserves, Swissgrid decided to reduce the total quantities and procure the minimal quantities in advance.

In the year under review, the costs for balance energy amounted to approximately 169.7 million Swiss francs, with secondary reserve energy accounting for the highest proportion (109.4 million Swiss francs). Figure 2 shows the development of the secondary reserve energy price from 2012 to 2016. For 2016 the prices including advance procurement (2016 incl. ap) and for normal procurement of the residual quantity (2016 rq) are shown separately. Given the critical network situation in winter 2015/2016 and the shutdown of nuclear power plants in France (cf. section 2.2), the prices for secondary reserve energy rose at the beginning and end of the year under review.

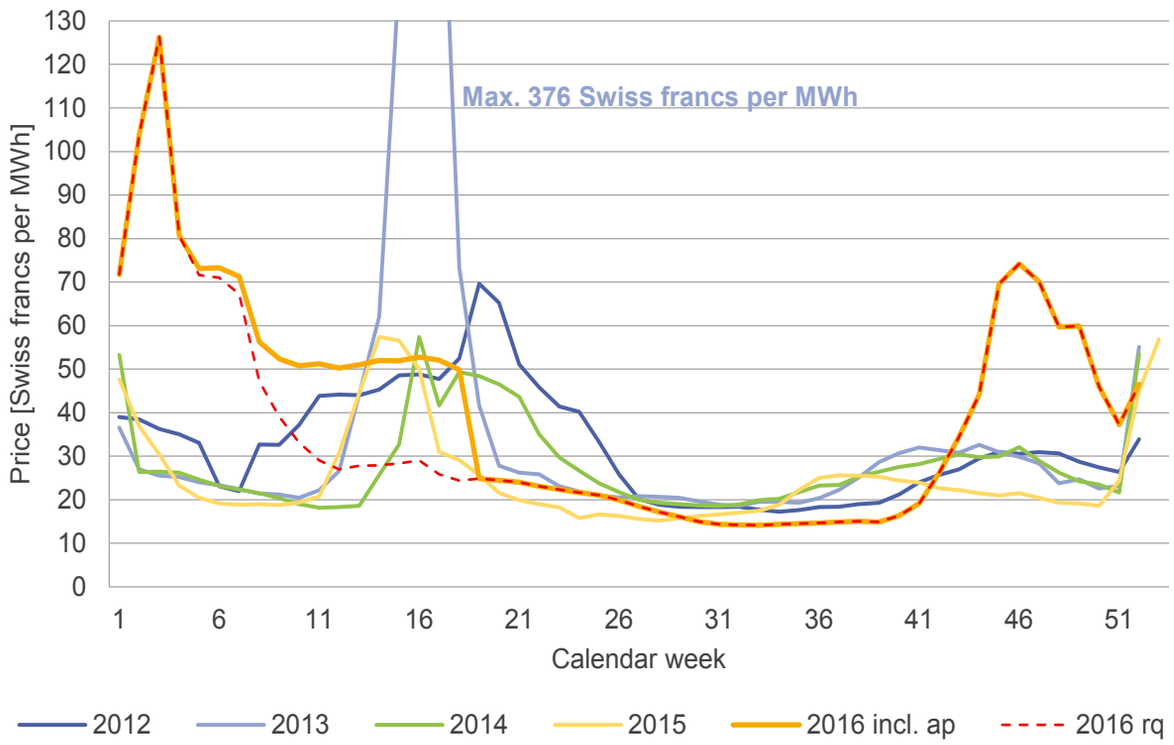


Figure 2: Development of the price of secondary reserve energy from 2012 to 2016, taking account of advance procurement (ap) and regular procurement of the residual quantity (rq).

Thanks to advance procurement, it was possible to mitigate the usual price increase in the spring. The prices for the initial procurement stage (2016 ap S1) remained high, while those for the advance procurement in the second (2016 ap S2) and third (2016 ap S3) stages fell and approximated the price of the regular procurement of the residual quantity (2016 rq) (cf. Figure 3). By contrast, the prices for regular procurement of the residual quantity (2016 rq) were below the long-term spring average (cf. Figure 2).

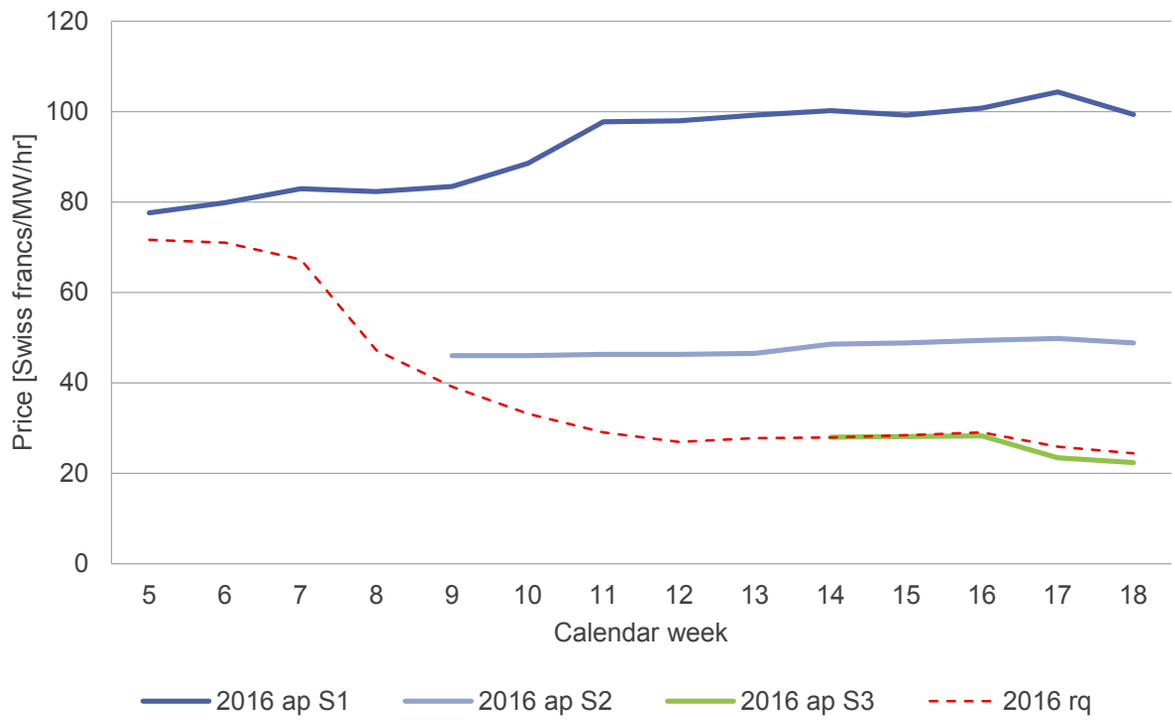


Figure 3: Development of the price of advance procurement of secondary reserve energy in 2016

A comparison over a period of several years indicates a falling long-term price for reserve energy. This is attributable to several factors. For example, power plant operators have taken specific measures aimed at increasing the supply of reserve energy. And instead of regulating the supply via production, it is possible for certain facilities that consume large quantities of electricity (e.g. cold storage depots, heat pumps) to temporarily reduce their consumption in order to contribute towards the balance between production and consumption. Another approach can be found in the development of international cooperation. Working together with neighbouring countries opens up additional savings potentials in the area of procurement of reserve energy.

3 Networks

Switzerland's medium-voltage network (NL 5) is approximately 34,000 kilometres in length. This photo shows the medium-voltage line in Simmental (canton of Bern).

3.1 Facts and figures relating to Switzerland's electricity networks

ElCom carries out an annual inventory of various types of installations in Switzerland's electricity networks. In the course of the past few years, the quantity of installations in Switzerland's electricity networks increased slightly in most categories (cf. Table 4). As expected, the number of overhead lines and mast transformer stations decreased, while the quantity of cables and transformer stations increased.

Type of installation	2011	2012	2013	2014	2015	Unit
Pipe system, high voltage (NL 3), medium voltage (NL5) and low voltage (NL 7)	102,832	104,894	111,626	116,477	119,621	km
Cable, high voltage (NL3)	1,917	1,980	1,976	2,031	1,911	km
Cable, medium voltage (NL 5)	31,370	32,174	32,833	33,544	33,870	km
Cable, low voltage (NL 7)	72,491	73,382	75,127	76,311	77,590	km
Cable, connection to household (NL 7)	46,454	47,957	50,972	52,569	53,931	km
Supply line and cable (NL 1)	6,750	6,750	6,750	6,750	6,750	Line-km
Overhead line, high voltage (NL 3)	6,935	6,918	7,059	7,158	6,904	Line-km
Overhead line, medium voltage(NL 5)	11,888	11,570	11,151	10,914	10,590	Line-km
Overhead line, low voltage (NL 7)	11,117	10,835	10,227	9,719	10,653	Line-km

Type of installation	2011	2012	2013	2014	2015	Unit
Substation, NL 2, NL 3, NL 4 and NL 5	1,192	1,144	1,097	1,314	963	Quantity
Transformer, NL 2	158	154	155	152	146	Quantity
Switching field, NL 2[1]	164	185	163	177	165	Quantity
Transformer, NL 3[2]	96	97	82	81	78	Quantity
Switching field, NL 3[1]	2,268	2,577	2,449	2,545	2,606	Quantity
Transformer, NL 4	1,140	1,147	1,144	1,145	1,143	Quantity
Switching field, NL 4[1]	1,781	1,906	1,952	2,110	2,078	Quantity
Transformer, NL 5[2]	758	585	536	454	327	Quantity
Switching field, NL 5[1]	27,811	27,366	29,468	26,727	28,226	Quantity
Transformer station, NL 6	49,190	51,100	51,862	52,425	53,405	Quantity
Mast transformer station, NL 6	6,150	5,716	5,831	5,685	5,748	Quantity
Cable distribution box, low voltage (NL 7)	158,937	156,839	170,285	171,712	174,897	Quantity
No. of network operators	683	679	671	659	650	

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 residual value of the installations in the distribution network has risen to over 18 billion Swiss francs. Network use revenue (excluding fees and payments to the state and remuneration of feed-in at cost) amounted to 3.4 billion Swiss francs in 2015. In order to avoid redundancies, this figure only takes account of the revenue from end consumers (i.e. does not include revenue from resellers).

Figures 4 and 5 show the distribution of ownership and revenue from network use by size of company. In both cases, the 100 largest network operators are divided into groups of 10, while the remaining 550 operators have been grouped together in a separate category. The 10 biggest network operators (dark blue) account for around 40 percent, the 50 largest (dark blue, light blue, green, yellow and orange) for around 75 percent and the next 50 for around 10 percent of the value of all declared installations (Figure 4). The remaining 550 network operators (in the "Remainder" category) merely account for around one-sixth of the total value of the installations in the distribution network.

The distribution of the revenue generated from network use (grid usage charge, cf. Figure 5) is similar to that of the proportional holdings. In the period under review, distribution of both ownership and revenue remained stable.

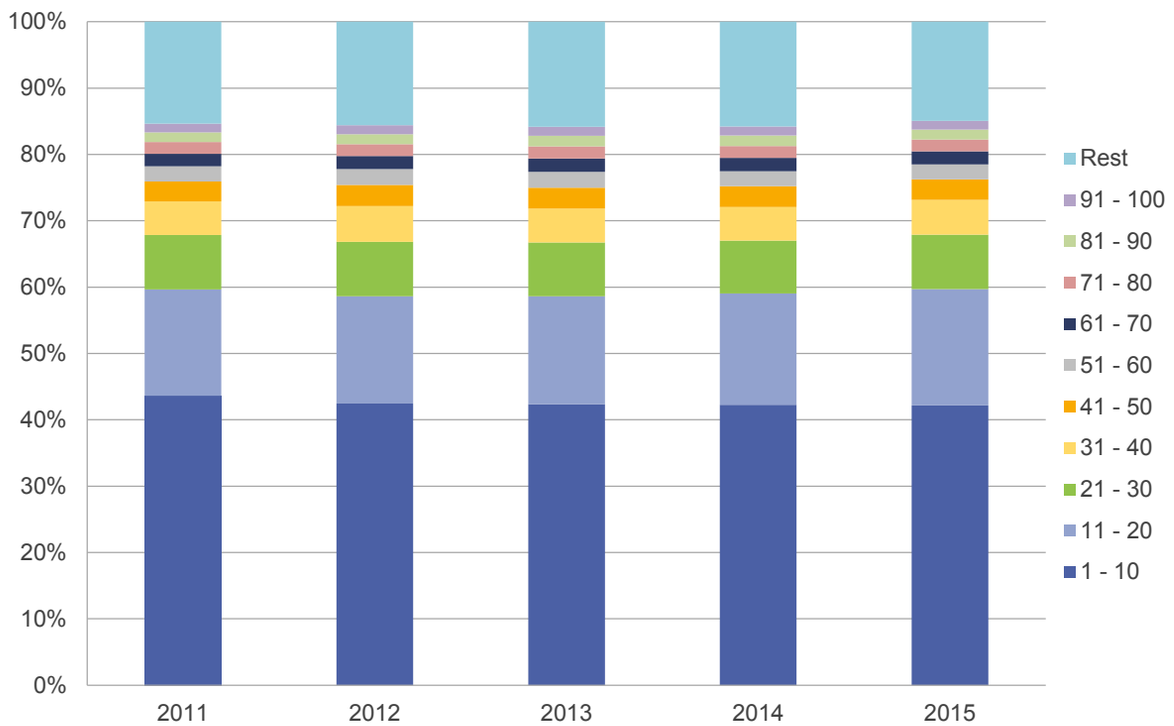


Figure 4: Proportional holdings in the distribution network by company size

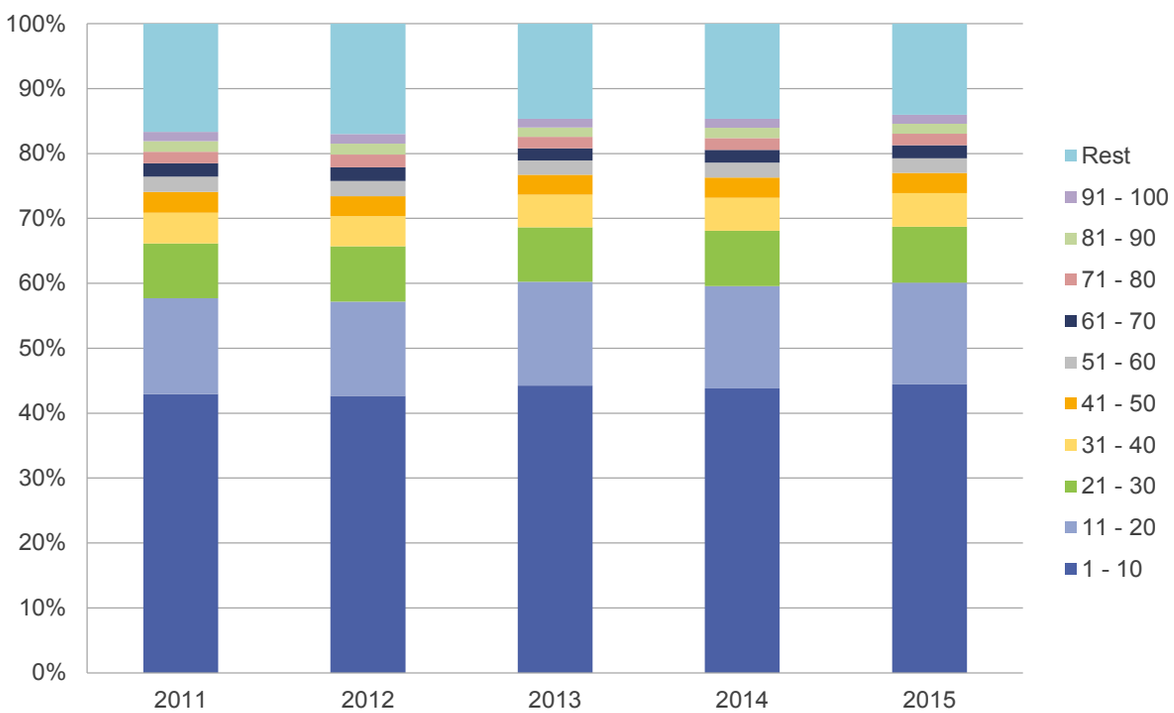


Figure 5: Proportion of network utilisation revenue (distribution network) by company size

Figure 6 shows a breakdown of network costs (including taxes, fees and services), which amounted to a total of 4.55 billion Swiss francs in 2015. With a total of 3.5 billion Swiss francs, or a proportion of almost 80 percent, operating and capital costs account for the largest share. If we compare this amount with the network use revenue of 3.4 billion Swiss francs cited above, this results in a deficit of around 100 million Swiss francs. The remaining amount comprises direct taxes, plus fees and payments to the state (including the fee for remuneration of feed-in at cost and for the protection of bodies of water and fish). In 2015, remuneration of feed-in at cost was increased from 0.6 to 1.1 cents per kWh, which largely explains the increasing proportion of fees and payments to the state.

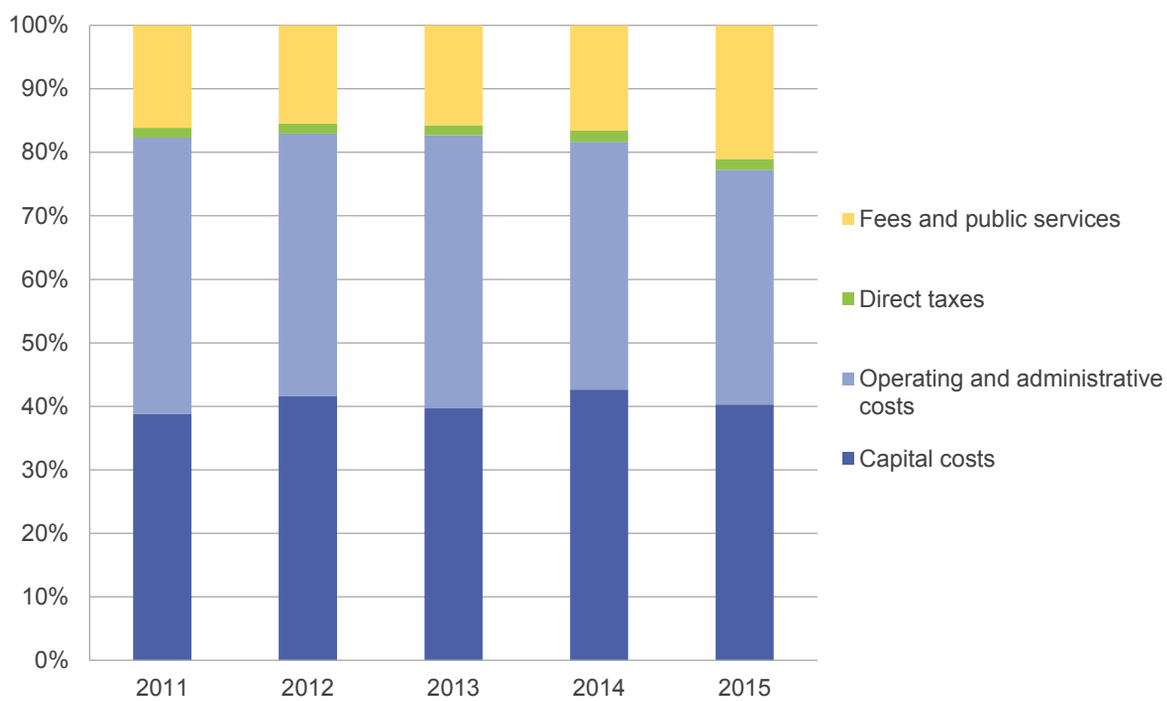


Figure 6: Breakdown of network costs

3.2 Grid expansion and planning

3.2.1 Long-term planning of the transmission network

A variety of decisions relating to sectoral plan and planning approval procedures will have to be taken at the federal level in the next few years, while taking due account of the criteria specified in the Federal Electricity Supply Act. 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.

At the beginning of 2015, Swissgrid completed its "Strategic Grid 2025" report, which it presented to the public in April. With this report, the long-term planning of the transmission network has now been coordinated Swiss-wide, 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 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. However, the degree of transparency with respect to the cross-border financing of infrastructure and the utilisation of auction proceeds needs to be increased. In the view of ElCom, the next technical long-term planning therefore needs to be evaluated together with the long-term financial planning.

The "Strategic Grid 2025" report takes due account of the requirement of 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 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 on the basis of the most objectified possible method, as well as 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 secure safe, productive 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 on this basis to more closely examine a potential "rollout" onto the distribution network with voltage levels of 36 kV and higher. Here, from the point of view of the regulator, ElCom discussed specific relevant issues 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 autumn 2015, ElCom conducted a survey among distribution network operators at network level 3 concerning the issue of long-term planning. The results showed that, when preparing their long-term planning, most network operators orient themselves on the existing and possible future legal provisions. Thus in the view of ElCom there is no need for action with regard to the fundamental method of preparing long-term planning. However, ElCom will address this topic again as soon as the legal framework relating to "intelligent electricity supply networks" (expansion of renewable energy use and the use of decentralised storage technologies) has been 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 Swiss Association of Electricity Producers (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

ElCom's participation in the sectoral plan and planning approval procedures relating to network expansion projects is essentially regulated in the Ordinance on the planning approval procedure for electrical installations. Furthermore, in order to improve coordination within these procedures the aim is to conclude a cooperation agreement between ElCom, the Swiss Federal Office of Energy (SFOE) and the Federal Inspectorate for Heavy Current Installations. In its assessments of expansion projects, ElCom pays particular attention to the aspect of economic viability of submitted applications for approval.

In 2016, within the scope of its official duties ElCom commented on two important transmission network projects, namely the connection of the Nant de Drance power plant and the Bassecourt-Mühleberg capacity increase. At the distribution network level, ElCom mainly commented on projects concerning voltage increases.

3.3 Investments in the grid infrastructure

3.3.1 Investments in the transmission network

Within the 2016 realisation period, the budgeted investments of 177 million Swiss francs were reduced by 28 million to 149 million Swiss francs. This was primarily attributable to delays in public calls for tenders and in licensing procedures, as well as to the commissioned planners and to efforts aimed at optimising the implementation of certain substation projects.

3.3.2 Investments in the distribution network

As an integral part of its monitoring activities, ElCom assesses whether sufficient investments are carried out in order to keep the electricity network in good condition. For the period from 2011 to 2015, the distribution network operators reported annual investments of around 1.4 billion Swiss francs, and write-offs amounting to between 0.8 and 0.9 billion Swiss francs (cf. Figure 7). Since the supply quality is good in an international comparison (cf. section 2.3) and the investments clearly exceed the write-offs, ElCom considers the investments in the distribution network to be sufficient.

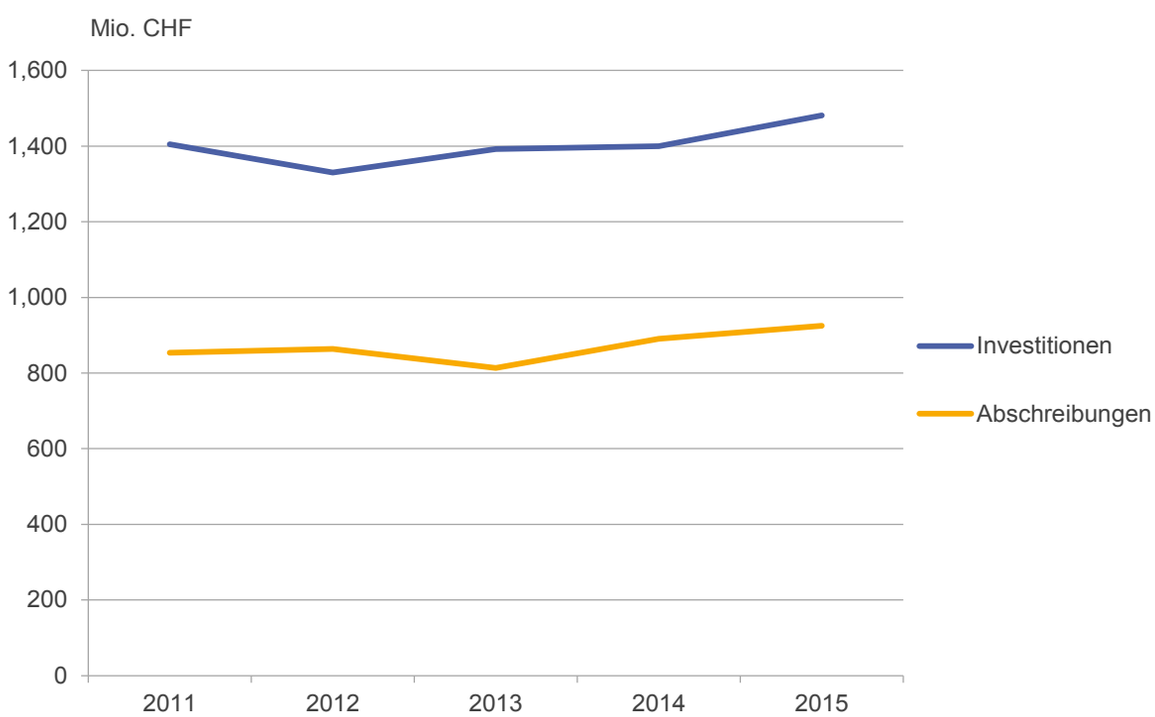


Figure 7: Trend in investments and write-offs in the distribution network

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 155 applications for the remuneration of costs associated with increases in network capacity. In the past six years, ElCom has issued a total of 532 associated rulings (cf. Figure 8).

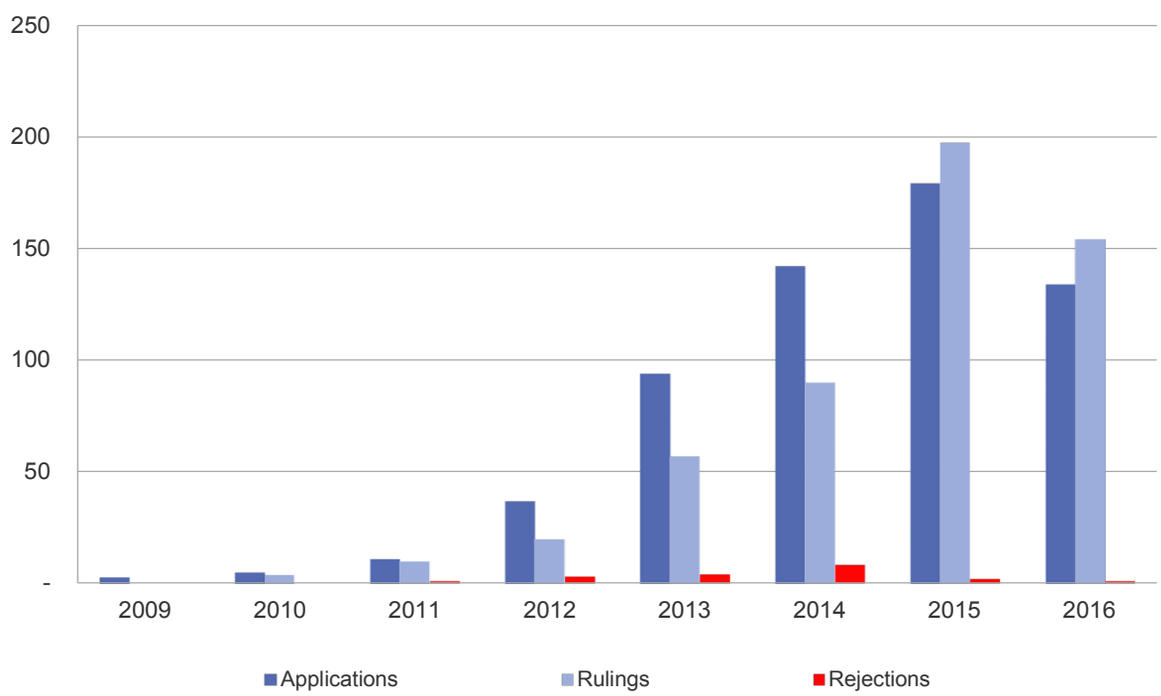


Figure 8: Trend in the number of rulings on network capacity increases

As of the end of 2016, the total costs for network capacity increases reached 57.29 million Swiss francs, with a total power plant output of 228.6 MW. Table 5 presents an overview of the key data relating to network capacity increases in the period from 2009 to 2016.

	Total	Photo-voltaics	Wind	Other sources[1]
No. of rulings	532	506	3	23
Minimum generator output [kW] [2]	9	9	3,000	22
Maximum generator output [kW][2]	74,000	2,038	16,000	74,000
Total generator output [kW]	228,647	80,832	23,000	124,816
Average generator output [kW]	436	162	7,667	5,427
Minimum costs [Swiss francs] [2]	3,500	3,500	1,805,003	19,311
Maximum costs [Swiss francs] [2]	9,262,389	619,657	9,262,389	2,117,200
Total costs [Swiss francs]	57,287,702	37,402,842	13,523,872	6,360,989
Average costs [Swiss francs][3]	109,328	75,106	4,507,957	276,565
Minimum relative costs [Swiss francs per kW][4]	3	3	451	3
Maximum relative costs [Swiss francs per kW][4]	7,418	7,418	819	3,498
Average relative costs [Swiss francs per kW][4]	251	463	588	51

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 2016

3.5 National grid operator

In accordance with Article 33, paragraph 4 of the Federal Electricity Supply Act, the former owners of the transmission network were required to transfer the entire network to national grid operator Swissgrid by the end of 2012. Alongside other shareholders, in 2014 the Alpiq Group publicly announced its intention to terminate its participation in Swissgrid AG and initiate the associated sale of shares. Within the framework of the announced disposal, Alpiq concluded a share sale agreement with Société d'Investissement de Suisse occidentale SA (SIRESO) on 28 May 2015, following which BKW Netzbeteiligung AG claimed a right of first refusal on the shares of Swissgrid AG previously held by Alpiq. On 8 September 2015, SIRESO contacted ElCom in relation to this matter. In a ruling dated 15 October 2015, ElCom rejected the request submitted by SIRESO calling for the imposition of provisional measures, in response to which SIRESO lodged an appeal with the Federal Administrative Court.

In its ruling A-7429/2015 dated 23 May 2016, the Federal Administrative Court upheld SIRESO's appeal concerning the imposition of provisional measures. ElCom was thus entrusted with the task of re-examining the prerequisites for ordering a provisional measure in line with the deliberations. In August 2016, the involved parties notified ElCom

that they had reached a mutually acceptable agreement, and SIRESO subsequently withdrew its petition dated 8 September 2016 calling for a ruling. In a communication dated 20 October 2016, ElCom then formally dismissed the case.

The former transmission network operators were obliged by law to transfer the ownership of the entire network to Swissgrid. The valuation method and the resulting applicable level of compensation of the former owners by Swissgrid were still pending. Upon request, ElCom examined these in 2012 and found that the regulated compensation was appropriate. Several parties then appealed against this finding, and the Federal Administrative Court upheld their appeals, stating that the regulated valuation did not represent full compensation and outlining potential valuation criteria on the basis of which full compensation could be calculated. In line with the principle of subsidiarity, ElCom subsequently asked the involved parties to negotiate on the issue of network valuation.

In the year under review, the parties reached agreement on the valuation method for network compensation and submitted a signed valuation agreement in September 2016. ElCom examined the agreement and found that it complied with the legal provisions as well as with the ruling pronounced by the Federal Administrative Court in 2013. The contractually agreed valuation method is based on both the current acquisition value (the specified value) and the current replacement value. Here the former is weighted 1:1 and the latter is double-weighted. This valuation method gives rise to increased costs for Swissgrid: the amount of full compensation is approximately three billion Swiss francs, which is around 400 million higher than the regulated value of the transmission network. Swissgrid could incorporate this amount into its tariffs, but in order to avoid tariff increases, the auction proceeds received in the period from 2013 to 2016 are to be used.

As in the previous years, further components of the transmission network were transferred to Swissgrid AG at the beginning of 2016. In the year under review, ElCom pronounced five rulings relating to these components in which it stipulated the provisional regulatory valuation, which serves as the basis for the provisional compensation for transferred components.

3.6 Rulings and decisions relating to networks

In the year under review, ElCom again dealt with a number of issues relating to disputes over network connections.

In association with the allocation of network levels, ElCom confirmed in a ruling that, within their own networks, the operators themselves are responsible for defining the conditions for the connection of end consumers and production facilities to the individual network levels. These conditions have to be non-discriminatory and ultimately must be oriented on an efficient solution in both technical and economic terms. ElCom also specified that the network connection point and feed-in point of an energy production facility designate the same point in the network. By specifying the most favourable network connection point in technical and economic terms, the network operator defines the level at which the connection with the supplier is effected. The borderline of responsibility between private electrical installations and the distribution network subsequently has to be defined at this level. This means that the allocation to a network level is not based on the borderline – in fact, the contrary is the case.

In the framework of a provisional measure, ElCom also ruled that a distribution network operator has to accept surplus energy from a photovoltaic facility with own consumption of less than 10 kW without an additional production meter. ElCom explained that a bidirectional total consumption meter has to be installed on the network side.

The Federal Administrative Court largely upheld a ruling by ElCom concerning voltage conversion on an existing network connection. ElCom had concluded that, in a medium-voltage network that in the past had been converted from 12 to 20 kV, the last consumer to be connected to the network at 12 kV did not have an entitlement to the continuation of the previous network connection (i.e. with 12 kV instead of 20). On the contrary, the non-discriminatory application of the guidelines of the network operator regarding network connection would mean that this entity, too, should be supplied with 20 kV. While the Federal Administrative Court found that the content of ElCom's ruling is lawful, it referred the matter back to ElCom for the purpose of specifying a new implementation deadline. The entity concerned has in turn referred the matter to the Federal Supreme Court.

4 The Swiss electricity market

The Star of Laufenburg is regarded as the milestone of an international interconnected network: it was here that the electricity networks of Germany, France and Switzerland were first interconnected.

4.1 Network operators in Switzerland

Between 2011 and 2015, the number of distribution network operators in Switzerland fell by around 5 percent to 650. This trend can primarily be attributed to mergers of various municipalities, as a result of which the respective network operators were also amalgamated. The number of municipalities fell from 2,551 to 2,324 in the same period (source: Federal Statistical Office). This development is also accompanied by an increasing number of end consumers per distribution network operator. As we can see from Figure 9, the typical network operator is relatively small and on average supplies around 1,440 end consumers. Only 77 – i.e. around 1 in 9 – supply more than 1,000 end consumers, with eleven supplying more than 100,000. Overall, Swiss network operators supply more than five million consumers with electricity.

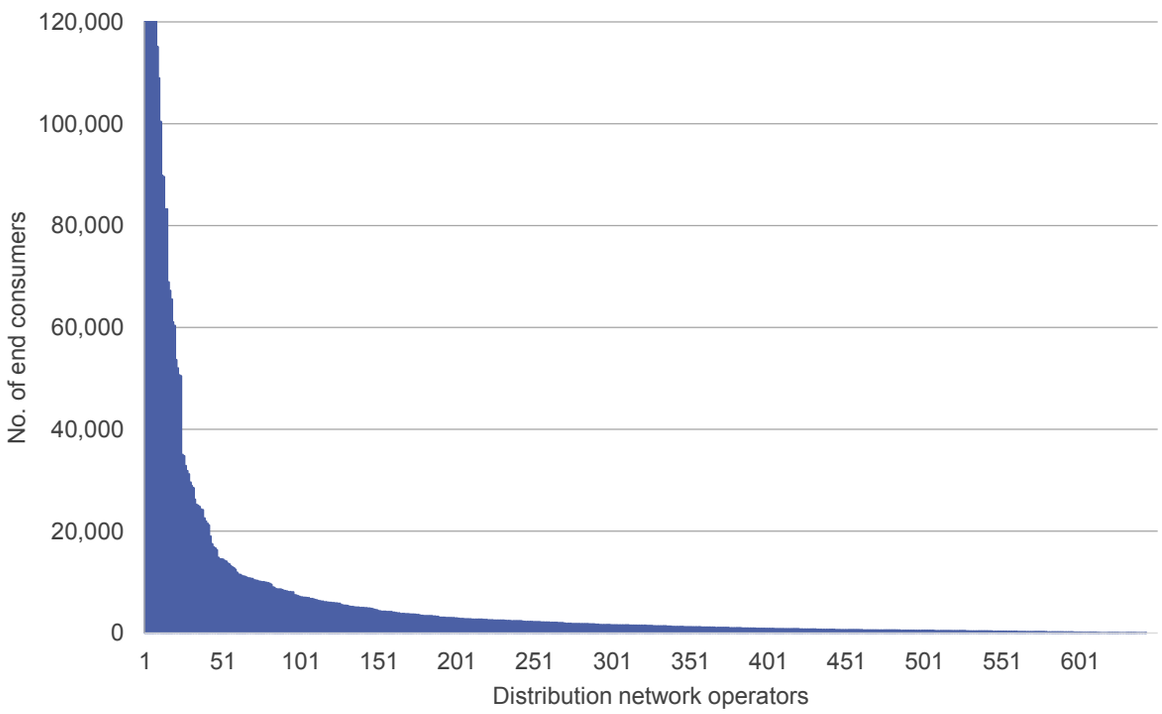


Figure 9: Number of end consumers per distribution network operator.. For the sake of legibility the vertical scale has been cut at 120,000 end consumers, which concerns eight distribution network operators.

4.2 Market access and change of supplier

In the initial stage of liberalisation of the Swiss electricity market, only major consumers with an annual consumption of at least 100 MWh may exercise their right to free market access. At the end of October of each year they can decide whether they wish to change their provider or continue to receive basic supply, but once they have opted for the free market they may not revert to basic supply.

In order to ascertain the number of end consumers in the free market, ElCom conducted a survey among the 80 largest distribution network operators, who account for almost 75 percent of end consumption in Switzerland. Excluding public transport, Switzerland's annual electricity consumption amounts to around 53.6 TWh (average for the period from 2006 to 2015; source, Swiss Federal Office of Energy). In the applied random sample, which was based on the structure depicted in Figure 10, approximately 31,000 end consumers (or less than 1 percent of the sample) currently have access to the free market. This group consumes a total of around 21 TWh.

Figure 10 shows the proportion of major consumers who have made use of their right to access the free market. In the first few years after market liberalisation, little use was made of the right to choose an own supplier: up to the end of 2011, only seven percent had made use of this option (orange curve). This figure then rose sharply over the next few years, so that around two-thirds of the eligible end consumers had chosen to access the free market, where prices have become lower than those for basic supply. This proportion is even higher (close to 80 percent) if we take account of the underlying energy volume (blue curve). This indicates that those consumers who have not made use of the option are relatively small.

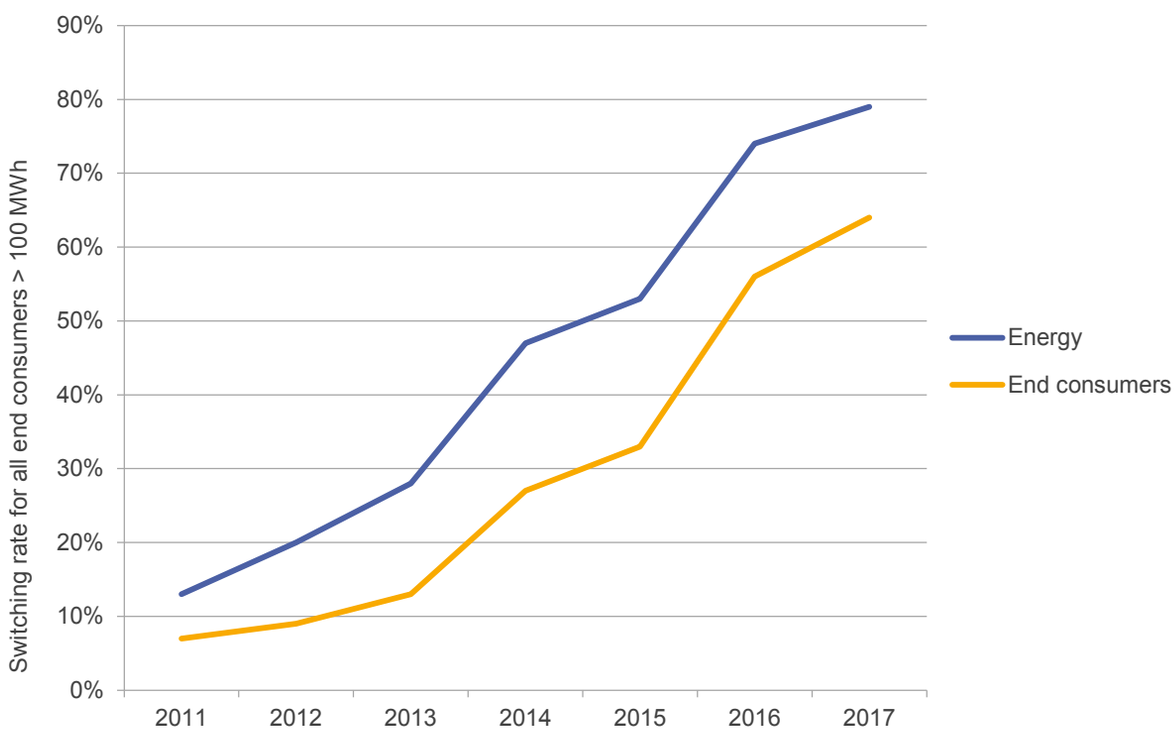


Figure 10: Transfer to the free market

Figure 11 shows the distribution of sold quantities of energy in relation to the size of the network distributor. The largest distributors (dark blue) supply roughly 40 percent of the electricity that is sold in the distribution network to end consumers. If we look at the figures for the biggest 50 network operators (dark blue, light blue, green, yellow and orange), we can see that they account for around 70 percent of the supplied energy. The next 50 biggest operators together supply one-tenth, while the remainder supply one-sixth of the electricity consumed by end users.

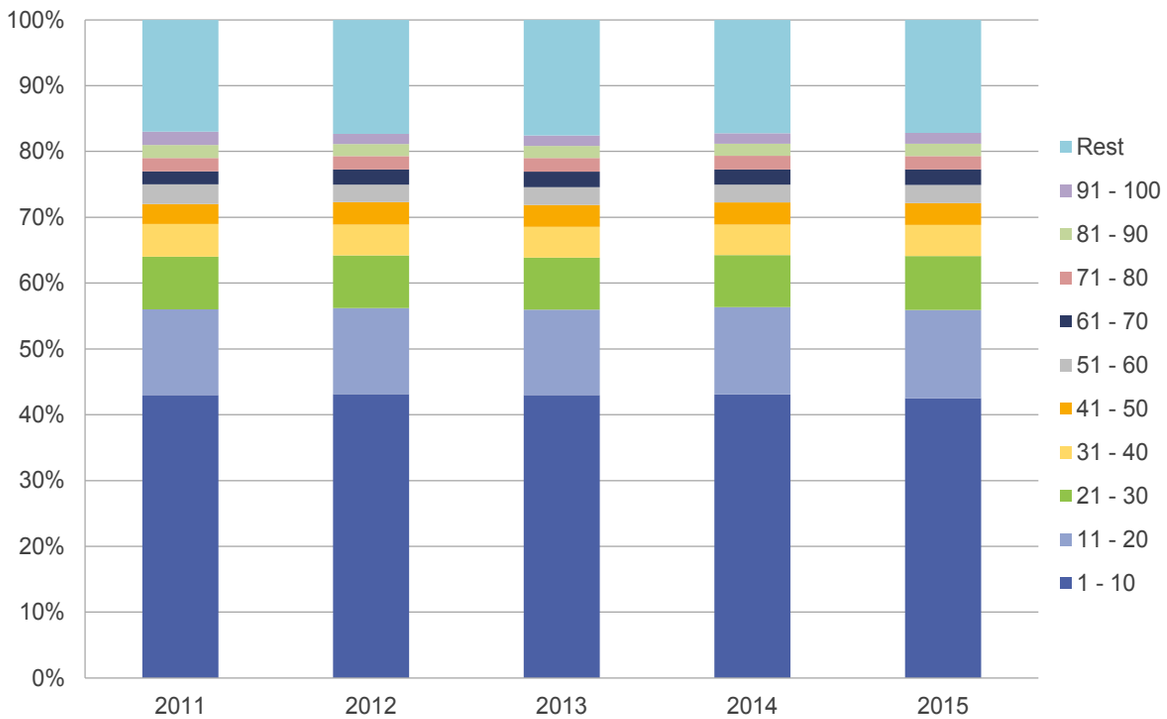


Figure 11: Proportion of energy supplies via the distribution network, by company size

4.3 Transmission network tariffs

In the period from 2013 to 2017, the tariffs for the use of the transmission network and the general system services were subject to considerable fluctuations (cf. Table 6). The reasons for this were the various court rulings and the resulting payments to the owners of the transmission network and to power plants.

	2013	2014	2015	2016	2017
Grid usage					
Working tariff (cents per kWh)]	0.16	0.19	0.22	0.25	0.25
Power tariff (cents per kWh)]	24,600	30,900	36,100	41,000	41,000
Fixed basic tariff per exit point	235,400	285,500	336,300	387,700	387,700
System services tariff (cents per kWh)	0.31	0.64	0.54	0.45	0.40

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

For 2017, the combined tariffs for network use and system services in the transmission network amount to 1.23 cents per kWh. On average, an end consumer in category H4 (which is equivalent to a 5-room apartment without an electric boiler, with an annual consumption of 4,500 kWh) pays 9.86 cents per kWh in 2017 for network use (cf. Figure 12). As in the previous year, the proportion of the transmission network to the overall network costs is therefore around 13 percent.

4.4 Distribution network tariffs

In 2017, the average electricity price for a household with consumer profile H4 is 20.05 cents per kWh, which is slightly lower than in 2016. The electricity price comprises a variety of components that the network operator publishes each year by not later than the end of August for the following year's tariffs. The total tariff comprises remuneration for network use (grid costs), the energy price, remuneration of feed-in at cost (including the fee for the protection of bodies of water and fish), and fees and payments to the state. There are conflicting developments for the calculation of the 2017 tariffs: on the one hand, energy tariffs and network use remuneration for a typical household are falling, and on the other hand this trend is being counteracted to some extent by the increase in feed-in remuneration at cost and fees and payments to the state.

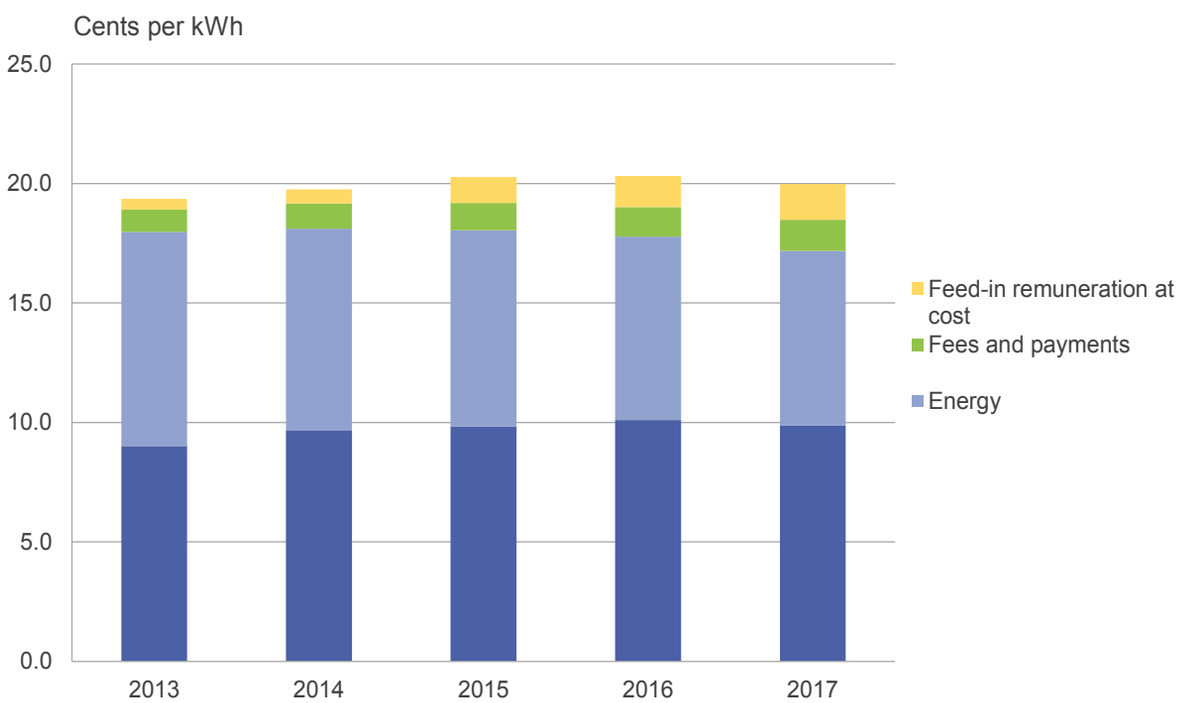


Figure 12: Cost components of the average overall electricity tariff for consumer profile H4 (excluding value-added tax)

Differences in tariffs exist at the cantonal and municipal levels. Detailed information about the tariffs of each municipality is available on the ElCom website (www.elcom.admin.ch), together with an interactive map. Average cantonal tariffs (half the population pays a higher, and the other half a lower, price) are compared in Figures 13 to 16. The further away the cantonal tariffs are from the average Swiss level, the redder (higher tariff) or greener (lower tariff) the colouring.

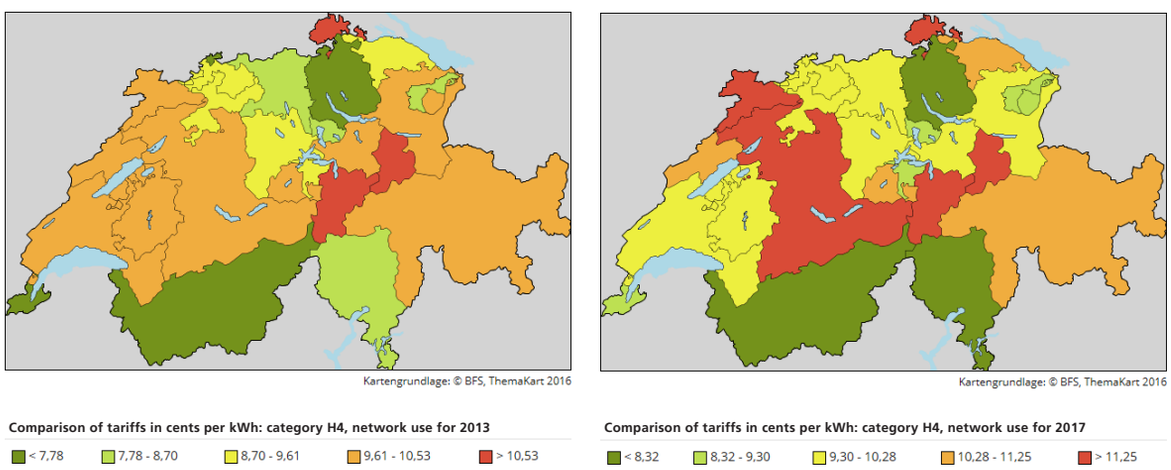


Figure 13: Comparison of average cantonal tariffs for network use for consumer profile H4 in 2013 and 2017

Between 2013 and 2017, the average cantonal network use tariffs for category H4 rose by around 0.6 cents per kWh, while energy tariffs fell by 1.4 cents per kWh. At the same time, as we can see from Figures 13 and 14, the discrepancies between the cantons in terms of both network and energy tariffs widened during this period.

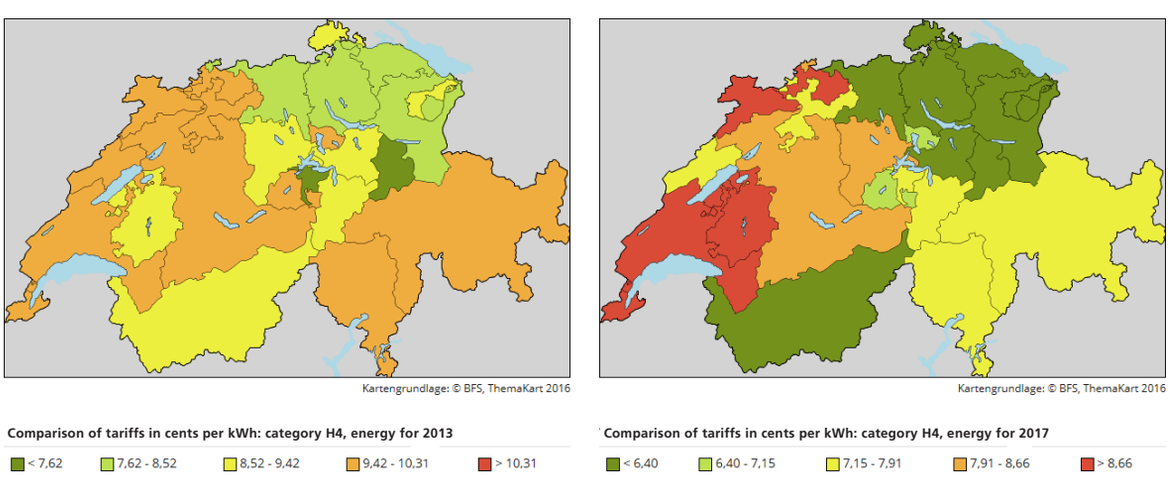


Figure 14: Comparison of average cantonal tariffs for energy for consumer profile H4 in 2013 and 2017

The average cantonal and municipal fees and payments to the state are depicted in Figure 15. These do not include the uniform nationwide fees and payments (remuneration of feed-in at cost and fees for the protection of bodies of water and fish). Unlike energy and network tariffs, these tariff components are not audited by ElCom because they are specified within the political decision-making process. It is also apparent that significant discrepancies between the cantons exist with regard to fees and payments to the state, but the pattern has barely changed in the period concerned. The overall electricity price, i.e. the total of all four components, including remuneration of feed-in at cost (which rose from 0.45 cents per kWh in 2013 to 1.4 cents per kWh in 2017), is depicted in Figure 16.

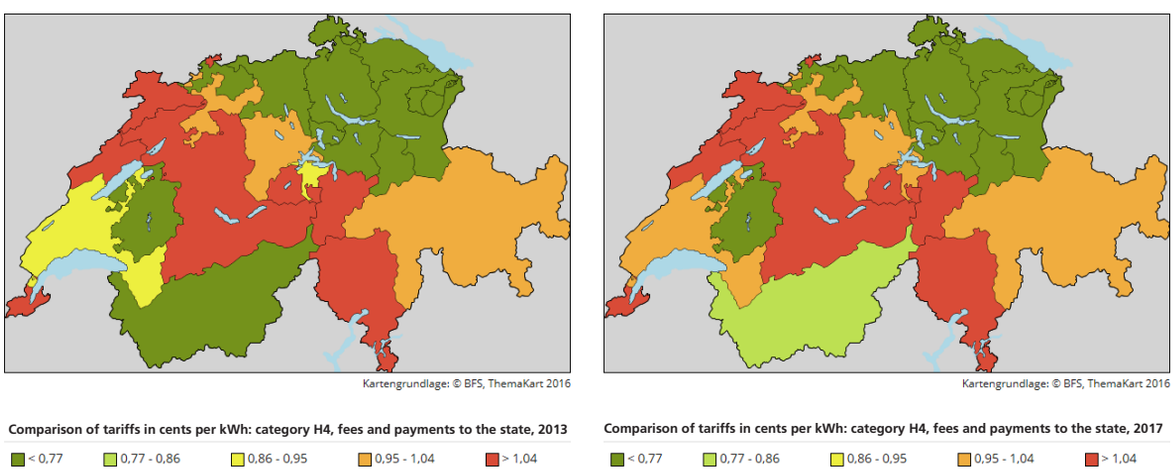


Figure 15: Comparison of average cantonal costs for cantonal and municipal fees and payments to the state, and payments to the state for consumer profile H4, in 2013 and 2017

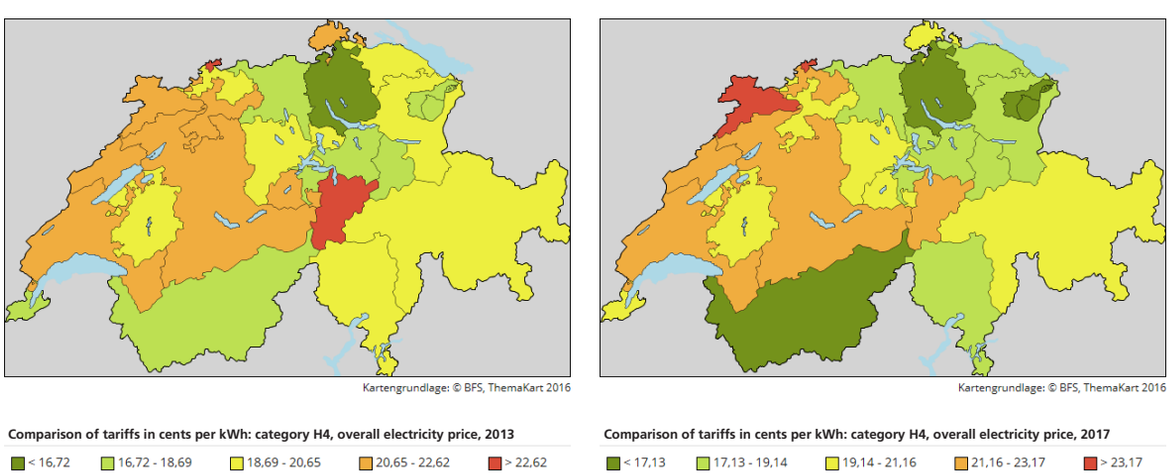


Figure 16: Comparison of average cantonal tariffs for the overall electricity price for consumer profile H4 in 2013 and 2017

4.5 Examination of tariffs

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

- 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 150 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. The 634 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 the request to check any required changes and either implement them or substantiate the original figures.

- If a network operator still had unlawful or implausible figures in its cost accounting even after it had been adjusted, ElCom carried out an audit in the corresponding segments. In the year under review, ElCom particularly reprimanded the inadmissible calculation of coverage differentials from the previous year. This involves the calculation of coverage differentials in one year and the amount carried forward to the following year. Furthermore, ElCom asked a number of network operators to reduce the excessive internal transfer prices for grid losses.

- ElCom also examined the figures submitted by network operators for the tariffs for the following year based on various criteria such as level of tariff, costs and compliance with the "95 Swiss francs" rule. In a total of 79 cases the balance was found to be in order. In its capacity as regulator, ElCom informed these network operators that it would not be opening proceedings against their tariffs next year.

- Finally, in some cases ElCom comprehensively examined the entire spectrum of network and energy costs (the latter only for end consumers with basic supply). Following the ruling by the Federal Administrative Court on the CKW case (cf. section 4.6), in which it had to decide on issues relating to the allocation of energy costs for end consumers with basic supply and the party status of consumers, various suspended proceedings were reinstated towards the end of the summer. ElCom was able to rule on two cases concerning networks and energy, and thus conclude the proceedings. Two other cases concerned network costs and another concerned energy.

In the year under review, these tariff audits focused on the following aspects:

Network evaluation:
Here the same problems existed as in previous years. The calculation of the synthetic valuation of a facility is frequently carried out incorrectly and often inadequately documented. These figures have to be derived in a transparent and comprehensible manner on the basis of the acquisition and production costs of comparable facilities, otherwise the possibility exists that they could exceed the value of a comparable facility and thus infringe against 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.

There also were differences with respect to the costs for the demolition of facilities to be replaced: one network operator added the demolition costs to the acquisition and production costs of the new facility. Instead of adding demolition costs to the costs for the current year, they are written off, and interest is applied, over the useful life of the new facility. Based on the fact that, in accordance with the applicable electricity supply legislation, capital costs have to be calculated on the basis of the acquisition and production costs of the existing facilities, ElCom ruled that the costs for demolition and temporary facilities represent costs for the current year. Demolished and temporary facilities no longer exist once the new facility has been completed. Therefore it is not permissible to incorporate these costs into the acquisition and production costs of the new facility. The application of imputed interest (weighted average cost of capital, WACC) on facilities that no longer exist would give rise to excessive profit for the network operator. An appeal was lodged against this ruling and is still pending.

ElCom has repeatedly been asked how to handle the costs of a facility that has to be replaced prematurely. In response, it published a memo concerning the effect on tariffs of extraordinary write-offs. These are recoverable via the tariff in the year in which the facility was put out of operation if it can no longer be operated, is no longer in use, its system had to be changed or the network costs have fallen as a consequence. However, extraordinary write-offs are not recoverable if the closure of the facility is not necessary and the network costs do not decrease.

In addition, for the first time ElCom commented on, and in principle confirmed, its competency within the scope of a ruling relating to fees and payments to the state.

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 safe, productive 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 in contradiction with Article 7, paragraph 5 of the Federal Electricity Supply Ordinance, for example turnover or the viability of a given segment. In a cost-based regulation, turnover is not permissible because the result is circular: a higher turnover increases the recoverable costs, which give rise to a higher future turnover which in turn increases the recoverable costs.

The specification of the tariff for grid losses was also a disputed issue. In most cases this concerns the question whether, in its capacity as energy supplier, a network operator is permitted to make a profit from the sale of grid losses to its own network that exceeds the interest on the utilised capital. While network operators claim a profit derived in different ways, ElCom accepts as a maximum the interest on the utilised capital in accordance with Article 15 of the Federal Electricity Supply Act in conjunction with Article 13 of the Federal Electricity Supply Ordinance. The amount of recoverable costs and admissible profit has to be independent of the division of the company into organisational units and the resulting internal allocation.

Various network operators justify the high tariffs for grid losses by pointing to their added environmental value. In view of this, ElCom issued a directive (1/2016) on the recoverability of electricity quality for grid losses. It only recognises the additional costs of procuring a high quality electricity to the extent to which they are proportionally contained in the network operator's standard product (without a profit quota). The term "standard product" refers to the product which is allocated to an end consumer with basic supply if the latter purchases electricity from the distribution network operator and does not order a specific product.

In another case, the use of the sales proceeds from an already fully amortised network facility was contested. Here the network operator included the proceeds in the extraordinary revenue outside the network. In this case, ElCom ruled that the proceeds have to be deducted from the network costs.

Energy costs:
In the previous year, ElCom had suspended all energy-related proceedings in view of a ruling by the Federal Administrative Court, but these were reinstated in the summer of the year under review following the ruling by the above Court on the case involving electricity supply company CKW.

ElCom had to intervene on a number of occasions due to excessive profits in the area of energy distribution. In line with its practice relating to the "95 Swiss francs" rule, ElCom reduced these profits in order to ensure that the balance of distribution costs and profits does not exceed 95 Swiss francs per invoice recipient. In its proceedings in the year under review, ElCom applied the average price method in accordance with the practice confirmed by the Federal Supreme Court in order to separate electricity from different sources (own power plants, purchases on the market, etc.).

In addition, for the first time ElCom commented on its competency within the scope of a ruling relating to the examination of green power products. In the past, various network operators had already asserted that, in connection with the examination of tariffs for energy supplies to end consumers with basic supply, ElCom only possessed competency for either grey electricity or the standard product, and thus that the network operator had a free hand in pricing products with added environmental value. However, ElCom pointed out that it is in fact responsible for verifying the appropriateness of tariffs for all energy supplies to end users with basic supply. The tariff for the energy segment has to be specified regardless of ecological quality and on the basis of the production costs (Article 4, paragraph 1, Federal Electricity Supply Ordinance). In previous cases, the network operators had accepted ElCom's view. In the year under review, ElCom pronounced a ruling on this issue for the first time and did not recognise the claim for higher profits for green power products.

In another dispute, ElCom had to examine whether an operator who had contributed towards the cost of the construction of a substation in the past by the previous operator is entitled to a reduced network use tariff. ElCom found that granting a special tariff for an individual connected entity contradicts the principle of uniformity of tariffs and the requirement of simple tariff structures, and is therefore inadmissible. Furthermore, the amount of an individually billed cost contribution is not a criterion for the formation of a special client group. However, the principle of user pays can justify the application of the network use tariff for a higher network level. In the proceedings in question, this was confirmed because the entity in question bore most of the capital costs of the facilities used on a network level of the predecessor. In addition, other entities connected to the same network level had, on average, paid significantly lower individual contributions towards the facilities they used. The question of who bears the operating costs of these facilities also has to be taken into account.

4.6 Judicial practice

In its pilot ruling on 20 July 2016 (2C_681/2015, 2C_682/2015) concerning the CKW case, the Federal Supreme Court stated its position for the first time concerning recoverable energy costs in the area of basic supply. Here the Court fully upheld an appeal lodged by DETEC at the request of ElCom. ElCom splits the costs of the energy portfolio (own production and acquisition) between end consumers with basic supply and free market customers on the basis of the supplied energy quantities. The Federal Supreme Court confirmed that this "average price method" complies with the applicable legislation. The Court also confirmed ElCom's efficiency comparison with regard to the maximum recoverable administration and distribution costs (including profit) of 150 Swiss francs. It found that ElCom was duly entitled to reduce the costs in excess of this specified maximum. In its ruling, the Federal Supreme Court also examined the question whether, and to what extent, end consumers can hold party status in tariff audits. In connection with audits performed by ElCom in its capacity as regulator (Article 22, paragraph 2b, Federal Electricity Supply Act), end consumers are not entitled to party status, but this does not apply in a case in which an end consumer requests ElCom to audit its tariffs. Here, ElCom has to rule on a dispute instead of in its capacity as supervisory authority (Article 22, paragraph 2a, Federal Electricity Supply Act). In such proceedings the end consumer automatically holds party status.

The higher courts rejected the obligation on the part of large-scale power plant operators to bear a portion of the costs for the procurement of system services. As a consequence, all power plant operators were repaid the amounts they had paid to Swissgrid in 2009 and 2010. Some operators also demanded payment of default interest. In 2013, ElCom ordered Swissgrid to pay five percent default interest with effect from the reminder date. In nine rulings pronounced on 23 May 2016 (2C_348/2015 to 2C_356/2015), the Federal Supreme Court upheld Elcom's decisions, confirming that the date of the legal reminder to Swissgrid has to be taken as the date for the commencement of payment of default interest. The Federal Supreme Court also stated that a payment that is made under reserve of a later demand for repayment cannot be regarded as a legally valid reminder.

In the year under review, the Federal Supreme Court pronounced a ruling on network access for the first time. In two rulings in 2014, ElCom had confirmed an entitlement to network access for two construction consortiums organised as ordinary partnerships. The Federal Administrative Court had then upheld the appeals against this ruling, explaining that the construction consortiums did not qualify as end consumers as defined in the applicable electricity supply legislation. The Federal Supreme Court reversed the rulings of the Federal Administrative Court and as final instance upheld ElCom's rulings.

4.7 Sunshine Regulation

The aim behind the "Sunshine Regulation" is to make the quality and efficiency of network operators more visible with the aid of a transparent and standardised comparison process. In August in the year under review, ElCom decided to definitively introduce this form of regulation as 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, will be used for measuring the quality, costs and efficiency of the provision of services by the individual suppliers. This direct comparison of network operators is intended to create incentives to eliminate any identified weaknesses without the need for intervention on the part of the regulator. For comparison purposes, network operators with similar structures are to be grouped together.

ElCom carried out preparatory work relating to the Sunshine Regulation throughout the entire year under review. Here the revision of the Federal Electricity Act was its centre of focus. The goal was to create the necessary legal basis for the publication of the results. At the beginning of the year, ElCom evaluated a short questionnaire on product diversity, the provision of services and the advantages of power plant licences. For the Sunshine Regulation, ElCom essentially uses data that are submitted each year by the network operators within the scope of cost accounts 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.

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. Here, ElCom divided the approximately 650 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 second test round. The results were submitted to the operators from the middle of April, and as in the previous year, they were again only sent to the respective network operators. In the year under review, the new findings relating to product diversity and aspects of the provision of services were reported. Another new move concerned the publication on the Internet of various explanatory documents relating to the second test round. The network operators were again invited to comment on the Sunshine Regulation and its implementation. The evaluation of the feedback formed a valuable basis for its further development. For example, adjustments are to be made to the cost basis, and new indicators are to be introduced (including one concerning compliance with the "95 Swiss francs" rule).

4.8 Issues relating to measurement services

Within the scope of a legal dispute, ElCom examined the question whether competition exists in the area of measurement services. In this context, in a ruling pronounced in October 2015 (233-00056), ElCom rejected a petition from the operator of a photovoltaic system who wanted the services relating to the measurement of feed-in from his production plant to be performed by a third party provider instead of by his network operator. The operator of the photovoltaic system asked ElCom to order the network operator to consent to the petitioned change of provider, based on the relevant legal provisions (Article 8, Federal Electricity Supply Ordinance). In its ruling, ElCom noted that network operators do not have exclusive control of these services and that competition in the area of measurement services would be technically and economically feasible. However, measurement services have always formed an integral part of network operation. The existing electricity supply legislation is not oriented on competition in the area of measurement services and there is no legal basis for enforcing it.

The operator of the photovoltaic system and the addressee of the ruling lodged an appeal against the ruling by ElCom with the Federal Administrative Court. In its ruling dated 8 November 2016 (A-7561/2015), the Federal Administrative Court rejected the appeal calling for the network operator to consent to the petitioned change of measurement services provider. The Court thus supported ElCom's interpretation of the law and pointed out that, if the provision of measurement services were to be liberalised, this would affect people's fundamental rights and obligations and would also have far-reaching financial consequences. Depending on the nature of the liberalisation, the number of affected parties would be high, and in any case it had to be assumed that the involved network operators would oppose such a move. The liberalisation of the provision of measurement services would therefore require a legal basis in the form of federal legislation. Furthermore, this would also require legal provisions to protect the rights and obligations of individuals. In the case in question, the operator of the facility was basing his entitlement to consent for the change of measurement services provider on Article 8, paragraph 2 of the Federal Electricity Supply Ordinance. But given that a provision of an ordinance cannot represent a sufficient legal basis, and because no other applicable legal bases exist, the petition had to be rejected.

An appeal against this ruling by the Federal Administrative Court was lodged with the Federal Supreme Court.

4.9 Feed-in remuneration at cost, non-recurring remuneration, return delivery tariff

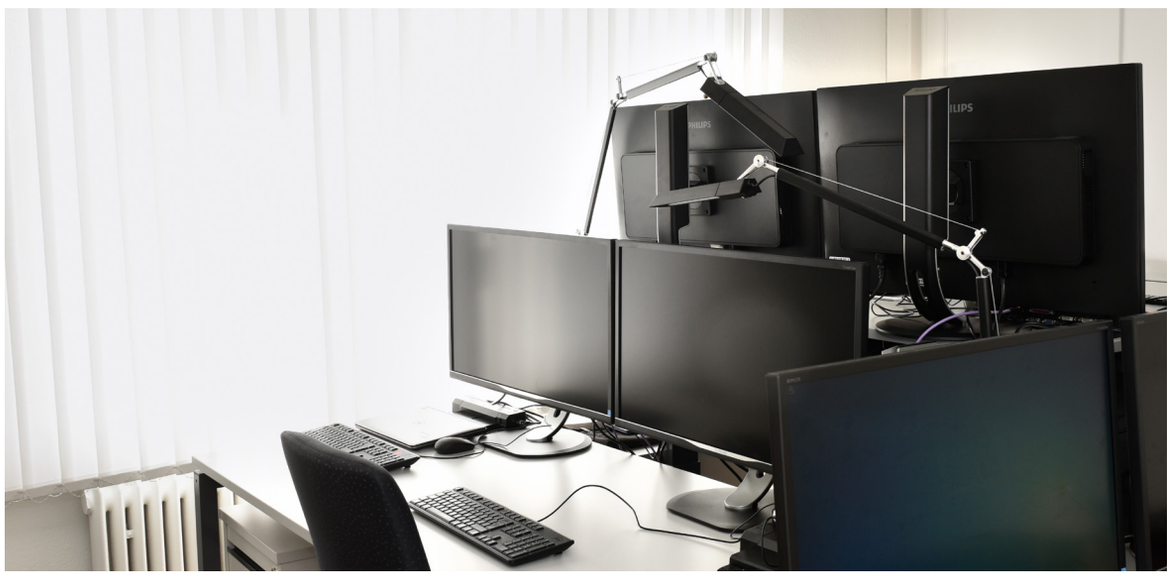
In the year under review, ElCom pronounced a total of 23 rulings relating to feed-in remuneration at cost, non-recurring remuneration and the return delivery tariff. 18 of these cases concerned non-recurring lump-sum compensation of 150 Swiss francs per kWp (kilowatt peak) for costs that arose as the result of the adaptation of a facility originally classified as installed to the requirements placed on integrated facilities. These rulings were pronounced following a ruling by the Federal Administrative Court, which recognised the entitlement to protection of legitimate expectation for project owners who, in connection with the construction of their facility, strictly complied with the second guiding principle in the previous version of the directive of the Swiss Federal Office of Energy on feed-in remuneration at cost for photovoltaic systems, which referred to "pseudo-integrated" facilities.

ElCom also pronounced a fundamental ruling on the return delivery tariff. Here it found that, among the relevant market-oriented purchase prices for remuneration for equivalent energy, it is the network operator's acquisition price for grey power that is obtained with the existing portfolio that is applicable. However, the costs associated with any own production by the network operator do not have to be taken into account. Remuneration differentiated by time of day or year is permissible if the network operator's purchase prices also vary chronologically. If the network operator's exact purchase prices were not known at the time of feed-in, remuneration has to be based on the planned costs, and the difference from the subsequently ascertained purchase prices has to be settled at a later date in an appropriate form.

Two other rulings concerned the disputed classification of photovoltaic facilities, while another concerned the rejection of both feed-in remuneration at cost and non-recurring remuneration for a photovoltaic facility with an output below 10 kWp that was put into operation prior to 31 December 2013 and was only registered on 1 April 2014, and a further ruling concerned the revocation of feed-in remuneration at cost

In addition, ElCom had to decide whether the retroactive application of the market price for 2015 for two small hydropower plants was justified. Both power plants were able to profit from a significant increase or renewal of feed-in remuneration at cost, but due to official stipulations they were unable to attain the necessary annual increase in production. The stipulations involved an increase in the specified volume of residual water and the construction of a fish ramp. ElCom found that, for the specification of the required increase in production for facilities that do not meet the investment criterion, official stipulations may not be taken into account. Thus for the involved hydropower plants the application of the market price was justified.

5 Market supervision



ElCom receives between 40,000 and 50,000 standard transactions every day (excluding OTC reports and fundamental data), which are entered into its market monitoring system.

5.1 Market transparency in wholesale electricity trading

The smooth functioning of markets is based on reliable price signals that reflect supply and demand and are not manipulated. Supply security also benefits from smoothly functioning markets. Comprehensive market supervision therefore provides added value in a variety of ways: for example, it assures a fair, transparent and non-manipulated electricity price for end consumers, and active market monitoring in Switzerland protects against market manipulation and insider trading.

In accordance with Articles 26a to 26c of the Federal Electricity Supply Ordinance governing the provision of data relating to the wholesale electricity market, ElCom is responsible for supervising wholesale electricity trading. The IT tools required for this purpose were already put into place in 2015. These include the infrastructure that enables the involved market participants to deliver the required data and documentation to, and register with, ElCom. ElCom uses the created IT tools for collecting, processing and evaluating the received data, and is thus able to effectively monitor Switzerland's electricity market, and if it detects any irregularities it is able to contact the involved market players without delay.

At the end of 2016, ElCom concluded its IT project with the introduction of an automated market monitoring system called MATCH. With this software it is now able to analyse incoming data automatically and systematically. This means that the Market Monitoring section has now completed its development activities. An initial assessment revealed that the quality of data does not yet comply with the specified requirements.

In ElCom's application of Articles 26a to 26c of the Federal Electricity Supply Ordinance there are clear interdependencies regarding the implementation of REMIT in the EU. As a non-member of the EU, Switzerland does not have access to certain major information

flows, and in view of this it is endeavouring to use the existing networking options as effectively as possible. ElCom has therefore participated at various ACER roundtable sessions so that it can foster exchanges with the latter and the various stakeholders. ElCom is also actively involved in the CEER Market Integrity and Transparency Working Group and the CEER Wholesale Energy Markets Task Force.

ElCom's Market Monitoring section maintains contacts with the various market players and at the beginning of 2016 it organised a workshop on "Reporting under Article 26a of the Federal Electricity Supply Ordinance". On the domestic front, exchanges take place with the Federal Financial Market Supervisory Authority (FINMA) and the Federal Competition Commission (WEKO). And at the international level, ElCom works closely together with the neighbouring energy regulators, energy exchanges, ENTSO-E and data suppliers.

5.2 Market Monitoring section: facts and figures for 2016

62 Swiss market participants who are also active in the EU are currently registered with ElCom. These participants deliver their data to ElCom via eight suppliers who are listed in the Registered Reporting Mechanism (RRM). ElCom also obtains fundamental data relating to Switzerland and its neighbouring countries from the European Network of Transmission System Operators (ENTSO-E) platform.

With effect from 7 April 2016, both standard and non-standardised transactions have been reported to ElCom. These include over the counter (OTC) as well as transport transactions. The volume of transferred data was far higher than anticipated: as of the end of 2016, the registered suppliers delivered a total of 19,670,365 items, which is equivalent to a data volume of around 70 gigabytes. Approximately 30 percent of the 17,424,692 standard transaction data concerned concluded trades, while the remaining 70 percent concerned the associated orders. Here, spot trading accounted for 87.6 percent of the trades, while financial transactions only accounted for 12.4 percent. The large volume of reported transactions indicates that Swiss market participants are very actively involved in the neighbouring wholesale electricity trading centres.

6 International activities

There are 30 storage and run-of-river hydropower plants along Switzerland's borders: shown here, Eglisau-Glattfelden hydropower plant.

6.1 Congestion management

The Swiss transmission network is connected to the networks of its neighbouring countries via numerous interconnection points: there are 14 transmission lines between Germany and Switzerland, four across the border with Austria, ten between Italy and Switzerland and nine across the border with France. These lines are managed by Swissgrid in close cooperation with the transmission network operators in the four neighbouring countries.

The capacity of these cross-border transmission lines is a major variable for ensuring network stability: the cross-border capacities have to be limited, and in order for electricity traders to effect cross-border supplies they have to explicitly acquire capacity via auctions. The management of cross-border transmission lines is referred to as "congestion management", and the legal basis in Switzerland for auctioning these capacities is Article 17, paragraph 1 of the Federal Electricity Supply Act.

In the course of the implementation of the single European electricity market, cross-border capacities in Europe are meanwhile no longer awarded in explicit auctions, but instead implicitly via coupled markets. As of the end of 2016, all central European countries, plus Spain, Portugal and Italy in the south and the UK, Norway, Sweden, Finland, Estonia, Lapland and Lithuania in the north, were integrated into coupled markets. Following the entry into force of the EU capacity allocation and congestion management regulations in mid-August 2015, Switzerland was excluded from market coupling. This means that capacity allocation at Switzerland's borders is still based on the explicit auction principle.

A close eye therefore needs to be kept on the impacts of Switzerland's exclusion from market coupling on network stability and thus on supply security. The award of cross-border capacities in the form of explicit auctions is continuing to give rise to major inefficiencies regarding the utilisation of the existing infrastructure. The European Agency for the Cooperation of Energy Regulators (ACER) estimated the value of these opportunity costs at Switzerland's borders at around 105 million euros for 2015. Generally speaking, since 2015 Swissgrid has succeeded in increasing the utilisable import capacity from Germany and Austria by optimising the operation of the transmission network (cf. section 3.3.1). In this way, Swiss energy suppliers have been able to obtain additional capacity for procuring energy from the lower-priced German wholesale market.

However, Switzerland's electricity supply legislation also provides for exemptions from the market-based allocation (i.e. auctioning) of capacities. In accordance with Article 17, paragraph 2 of the Federal Electricity Supply Act, supplies based on international purchase and supply agreements that were concluded prior to 31 October 2002 are exempt from auctions and thus entitled to take precedence, as are supplies to end consumers with basic supply and from renewable energy sources (Article 17, paragraph 2 in conjunction with Article 13, paragraph 3, Federal Electricity Supply Act).

In 2014, an energy supplier requested priority for suppliers to end consumers with basic supply. In accordance with a ruling by ElCom, in connection with the allocation of capacities, deliveries to end consumers with basic supply only take precedence if the network operator is unable to fulfil its delivery obligation without the need for imports (Article 17, paragraph 2, Federal Electricity Supply Act in conjunction with Article 20, paragraph 2, Federal Electricity Supply Ordinance), which was not the case in the proceedings in question. The Federal Administrative Court upheld ElCom's ruling, and the matter is currently pending at the Federal Supreme Court.

A parliamentary initiative (Palv 15.430) was launched that calls for an end to priorities for deliveries to end consumers with basic supply and from renewable energy in accordance with Article 17, paragraph 2 of the Federal Electricity Supply Act. As before, energy supplies from hydropower plants at the borders, and cross-border transmission for the purpose of securing the respective sovereign quotas, continue to take precedence (cf. section 6.2). ElCom supported the formulation of the initiative, prepared the explanatory report and also answered various questions at the meetings of the Commission for the Environment, Spatial Planning and Energy of the Council of States. Following the approval by the Federal Council, the Council of States also voted in favour of the matter during its 2016 winter session, and the Commission for the Environment, Spatial Planning and Energy of the National Council tabled it for debate in January 2017.

6.2 Border power plants

There are 30 hydropower plants along Switzerland's borders that produce electricity from bodies of water along borders with neighbouring countries. These take the form of large (pump) storage plants (e.g. Emosson, Hinterrhein), as well as run-of-river power plants along the Rhine and small hydropower plants such as La Goule on the Doubs. With regard to the utilisation of cross-border transmission network capacity, these power plants represent a special case in that the distribution of electricity is often regulated by long-standing treaties between Switzerland and the respective neighbouring country. In some cases, the produced electricity may only be distributed via the congested cross-border transmission network, while in other cases the power plant is connected to the distribution network on both sides of the border so that the distribution of the produced electricity between the two countries concerned can take place independently of the transmission network.

For some power plants, exemptions from auction procedures (priorities) have been granted in the congested cross-border transmission network, regardless of the conditions in the grid. In 2015, based on the technical and legal framework conditions ElCom examined the legality of these priorities in the cross-border transmission network and pronounced five associated rulings. One of these rulings on cross-border electricity supply from border power plants has meanwhile become legally binding, while the other four were referred to the Federal Administrative Court by the involved operators. In 2016, the Federal Administrative Court referred two of the rulings back to ElCom. These were subsequently contested and referred to the Federal Supreme Court. Rulings by the latter were still pending as of the end of the year.

In addition to the five previous applications, another border power plant submitted an application in 2016 to be granted priority for cross-border energy supplies. As of the end of 2016, ElCom was still clarifying the situation and had not yet ruled on this matter.

6.3 Merchant lines

Merchant lines are cross-border transmission lines that are exempt from the obligation to grant network access to third parties. Here the transmission capacity is managed by the network operators. However, the utilisation of the capacity is reserved for the investors, who can choose whether to use it themselves or receive remuneration from the national grid operator for capacity they do not use themselves. This exemption is limited to a specific timeframe, 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. For both lines, ElCom had to rule on the extent of the capacity that is exempt from non-discriminatory access by third parties. One of these cases was concluded in the year under review, while in the other a decision by the Federal Administrative Court is still pending.

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 (tariffs) or for the maintenance and expansion of the transmission network (Article 17, paragraph 5, Federal Electricity Supply Act). Swissgrid may apply to ElCom for permission to use the proceeds in the desired manner, and ElCom ultimately decides on how they are to be used (Article 22, paragraph 5c, Federal Electricity Supply Act). In the period from 2009 to 2012, around 40 million Swiss francs 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. Because in the previous years investments in the transmission network were not carried out to the originally planned extent, and in view of the costs associated with court rulings, Swissgrid applied to ElCom for the proceeds from 2014, 2015 and 2016, and in addition from 2013, to be used exclusively for reducing the network tariffs.

In its ruling dated 20 October 2016 (transmission network transaction / applicable value / new ruling on valuation method) (cf. section 3.4), ElCom decided on how the proceeds from 2013 are to be used, namely – as requested by Swissgrid – for reducing the network tariffs.

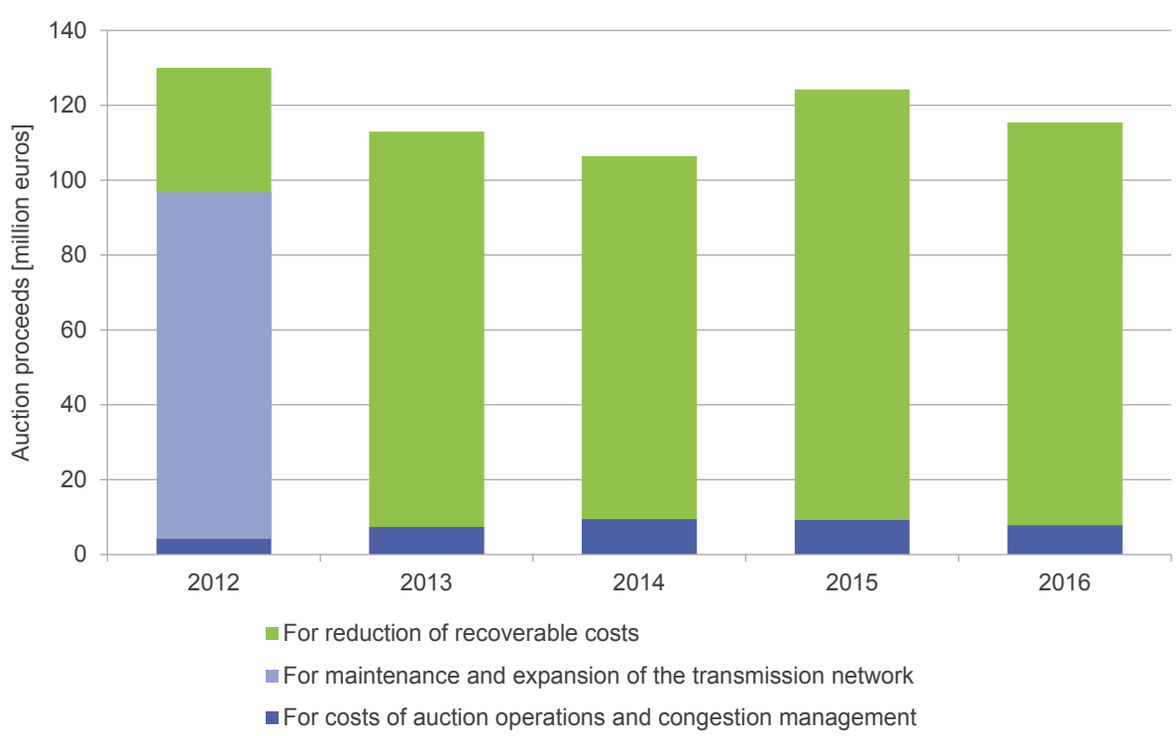


Figure 17: Use of the auction proceeds, 2012 to 2016

6.5 International platforms for reserve energy

A balance always has to be maintained between electricity supply and demand. However, short-term fluctuations occur every day, for example due to inaccuracies in forecasting demand, the failure of production facilities or the generation of unexpectedly high quantities of electricity from wind power plants. These have to be balanced, and this is where reserve energy comes in. In Switzerland, Swissgrid maintains the necessary balance in a three-step process (primary, secondary and tertiary reserve energy). This initially occurs on the domestic market, with priority for renewable energy. But Swissgrid also procures energy on the international markets: here the main objective is to maintain Switzerland's supply security, which can be supported through cross-border cooperation because more suppliers from a variety of regions are able to contribute towards the stability of Switzerland's electricity network. Furthermore, positive price effects can be obtained in this way. ElCom monitors these international projects in its capacity as regulator.

The purpose of the PRL project is to secure the procurement of primary reserve energy together with Switzerland's northern neighbours. The international consultation procedure, which provides all relevant parties with an opportunity to represent their own interests, was prepared in 2016. At the same time, preparations were made for France's inclusion in the project, a move that is expected to secure procurement on a broader basis.

The aim of the TERRE project is to secure the international procurement of tertiary energy among a group of southwest European partners. Here the initial international consultation was carried out and attracted a great deal of interest, especially among Swiss suppliers. The main objective is to develop joint products for the market in order to cushion critical supply situations over as broad an area as possible.

6.6 International bodies

In its annual market monitoring report on the internal electricity and gas markets, ACER again noted, as it has done in previous years, that the efficiency of the utilisation of the electricity grid system in the EU is increasing. Due to its non-integration into the market, Switzerland continues to suffer a high social loss (cf. section 6.1), whereas this has been eliminated in practically all other countries. For the EU, efficiency losses due to unscheduled load flows are developing into a major problem. They are holding up the creation of the planned energy union, which was tabled again at the end of November 2016 together with a proposal for a comprehensive revision of the relevant legislation. The EU Parliament and European Council will be debating this issue in 2017/2018, and implementation is not expected before 2020/2021. ElCom participated in the survey for the report. ElCom also participated in other activities of ACER in which it is able to exert an influence. However, its influence is limited to the ACER Electricity Working Group and the subgroups in which ElCom has the status of observer. Switzerland's further integration depends on the outcome of the bilateral negotiations with the EU. ElCom's involvement in the Council of European Energy Regulators (CEER), in which it holds observer status, was relatively modest in the year under review. However, it participated in the preparation of a report on the independence and powers of the regulatory authorities, which supplements previous reports by the OECD.

7 Outlook

In 2017, too, ElCom's main focus will be on supply security, particularly over the medium and long term. The rapidly changing framework conditions within Switzerland, but also throughout Europe, mean there will be a need to adapt the existing market structure. With several European countries planning to discontinue the use of nuclear energy, the need for exchanges of energy in Europe will intensify in the future. For Switzerland, in terms of long-term supply security – system adequacy – the import risk will become greater. In order to reduce this risk it will be necessary to create new incentives for expanding domestic production. Alternatively, adapted political background conditions could serve to guarantee supply security over the long term. The expansion of the network will be crucial: here, the expansion of the capacities of the transformers in Mühleberg and the Bassecourt-Mühleberg lines will be especially important. In the short term, ElCom's objective is to at least maintain Switzerland's supply security at its currently high level. In the context of supply security, another priority for ElCom in 2017 will be to analyse the next steps to be taken following the referendum on the proposed new energy policy, "Energy Strategy 2050", and to subsequently identify any need for action.

The test phase for the Sunshine Regulation was concluded in 2016, and this instrument is to be introduced as a regulatory tool in 2017. Initially, very little will change for distribution network operators: as before, tests will be carried out on the basis of the evaluations of the five dimensions (quality of supply, network costs, tariffs, quality of services, compliance). The findings will then be submitted in anonymous form to the network operators, but will not be released publicly. The question whether and when they will be published will be decided within the scope of the revision of the Federal Electricity Supply Act.

In the context of the implementation of the CKW ruling (average price method), ElCom will await the definitive parliamentary reactions in 2017, which will determine the extent to which consequences may arise for those few network operators who have not applied the average price method to date.

The MATCH system for monitoring wholesale electricity trading in Switzerland will enter its operational phase in 2017. Within the scope of this system, since 2016 ElCom has been receiving between 40,000 and 45,000 transactions a day, excluding OTC transactions and fundamental data.

Within the framework of the strategic objectives of the Federal Administration in the area of real estate management to accommodate its organisational units in as many of its own buildings as possible, the ElCom Technical Secretariat will be moving into new premises in Christoffelgasse in December 2017.

There will be a change in personnel at Elcom in 2017 – details will be announced at the appropriate time.

8 About ElCom

ElCom, from left to right: Anne d'Arcy, Christian Brunner, Brigitta Kratz (Vice President), Matthias Finger, Laurianne Altwegg, Antonio Taormina (Vice President), Carlo Schmid-Sutter (President)

ElCom is responsible for monitoring the Swiss electricity market and securing compliance with the Federal Electricity Supply Act. As an independent state supervisory authority, it is playing an active role in the transition from a monopolistic electricity supply system to a competition-based electricity market. ElCom is also responsible for monitoring electricity tariffs for end consumers with basic supply, as well as for ensuring that the network infrastructure is duly maintained and where necessary expanded so that Switzerland's supply security can continue to be assured in the future.

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

- Examining 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.
- Supervision of electricity tariffs for fixed end consumers (basic supply, households and other end consumers with an annual consumption below 100 MWh) and all end consumers who choose not to gain access to the network.
- Ruling on disputes associated with free access to the electricity network: with effect from 1 January 2009, large-scale consumers (i.e. those with an annual consumption of at least 100 MWh) have been able to freely choose their electricity supplier.
- Ruling on disputes relating to remuneration at cost for feed-in to the grid, which was introduced on 1 January 2009 for producers of electricity from renewable energy sources.
- Monitoring electricity supply security and the status of the electricity networks.
- Defining the procedures for the allocation of network capacity in the event of congestion in cross-border transmission lines and coordinating its activities with European electricity regulators.
- Comprehensive supervision of the national grid operator (Swissgrid) now that the ownership of the transmission network has been transferred to the latter (separation process).
- Supervision of 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.

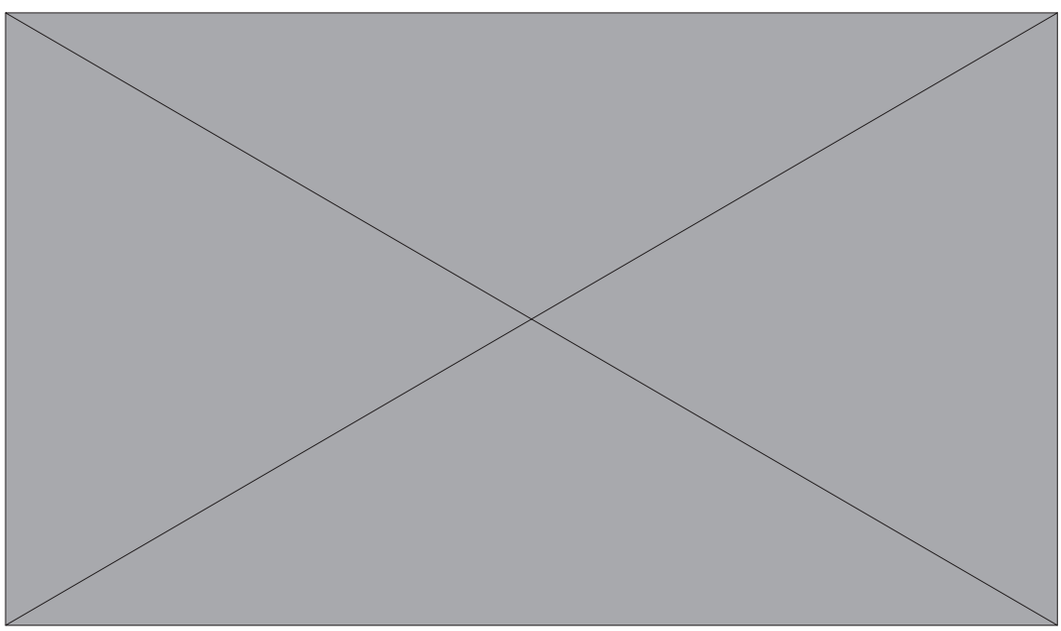


Figure 18: Structure of ElCom

8.1.1 Commission

The seven Commission members are independent of the electricity industry, and they all act on a part-time basis. 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 Supply Security", "Legal Affairs", "International Relations" and "Market Monitoring".

In the year under review, the composition of the Commission was as follows:

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 and lecturer in energy law at the Zurich University of Applied Sciences
- Antonio Taormina (since 2014): 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)
- Anne d'Arcy (since 2007): Professor of Corporate Governance and Management Control, Vienna University of Economics and Business
- Matthias Finger (since 2007): PhD (political science), Professor of Management of Network Industries at the Swiss Federal Institute of Technology, Lausanne
- Christian Brunner (since 2014): degree in electrical engineering, Federal Institute of Technology, Zurich, former director of Alpiq Networks Business Unit

Committees

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

Prices and Tariffs

- Anne d'Arcy (chair)
- Laurianne Altwegg
- Christian Brunner
- Carlo Schmid-Sutter

Legal Affairs

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

Networks and Supply Security

- Christian Brunner (chair)
- Matthias Finger
- Brigitta Kratz
- Carlo Schmid-Sutter

International Relations

- Antonio Taormina (chair)
- Matthias Finger
- Brigitta Kratz
- Christian Brunner

Market Monitoring

- Matthias Finger (chair)
- Christian Brunner
- Carlo Schmid-Sutter
- Antonio Taormina

Resignations and new appointments

There were no resignations or new appointments in the year under review.

Representation of gender and language regions

ElCom comprises three women and four men, i.e. its representation of women is equivalent to 43 percent. The official target of the federal government is 30 percent – on average, 39 percent of the members of Switzerland's extra-parliamentary commissions are women.

In terms of representation of language regions, the composition of ElCom is currently as follows: German-speaking region, four people; French-speaking region, two people; Italian-speaking region, one person. The proportions are therefore 57, 29 and 14 percent respectively. The official target of the federal government is to achieve an overall representation of French, Italian and Romansh speaking personnel of 40 percent.

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 the electricity networks: level 1, approx. 6,750 km; level 3, approx. 9,000 km; level 5, approx. 44,000 km; level 7, approx. 142,000 km (overhead lines and cable, including building connections)
Transformers: level 2, 146; level 4, 1,143; level 6, approx. 59,000 (including mast transformers)

Total network use revenue: 3.4 billion Swiss francs
Annual investments: 1.5 billion Swiss francs
Annual electricity consumption: 58 TWh
Production: 66 TWh
Electricity imports: 42 TWh
Electricity exports: 43 TWh

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 Commission 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 Technical Secretariat and provides the Commission with administrative support.

As of 31 December 2016, the Technical Secretariat employed 43 personnel on a full-time or part-time basis, including 3 trainees. Its total workforce corresponds to 38.5 full time equivalents, and comprises 14 women and 29 men. The average age of all employees was 40. Breakdown by national language:

- Italian, 2 employees
- French, 7 employees
- German, 34 employees

Head of the Technical Secretariat (43 employees)

Renato Tami
attorney-at-law and notary public

Networks and Europe (8 employees)

Michael Bhend,
engineer (Federal Institute of Technology, Zurich)

Pricing and Tariffs (12 employees)

Stefan Burri,
PhD in political science

Market Monitoring (5 employees)

Cornelia Kawann,
degree in engineering, MBA

Legal Affairs (10 employees)

Nicole Zeller,
attorney-at-law

Commission Secretariat (7 employees)

Barbara Wyss,
PhD in economics

8.2 Finance

In the year under review, ElCom had a budget of 12.2 million Swiss francs at its disposal. Its effective expenditure amounted to 10.4 million Swiss francs, which covered its entire personnel and operating costs, including the additional expenditure associated with the development of its market monitoring activities.

On the income side, ElCom received a total of 5.3 million Swiss francs, 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

2016 ElCom Forum

The seventh ElCom Forum was held on 18 November in Winterthur. It focused on the question, "Is Switzerland's electricity supply secure?" Leading experts gave speeches in which they presented their views, and participated in a lively roundtable session attended by more than 300 specialists. Everyone appeared to share the view that Switzerland is facing significant challenges relating to supply security, especially in the medium to long term.

The 2017 ElCom Forum will be held on Friday 17 November in Lausanne.

Information events for network operators

In the year under review, ElCom held 10 information events at various locations in Switzerland. The main topics were the "Sunshine Regulation", network costs and ongoing legal issues. In addition, the Swiss Federal Office of Energy (SFOE) gave a presentation on significant developments in the area of Swiss energy policy. A total of around 700 people attended these events, which were offered on a non-profit basis. They provided a welcome opportunity for the participants, as well as the involved ElCom and SFOE personnel, for exchanging professional views and experiences. In addition to the information events, in the year under review a special course on cost account reporting was organised for network operators, which provided them with an opportunity to ask detailed questions on a broad variety of issues.

Market monitoring workshop

As in the previous year, a workshop focusing on market monitoring at ElCom was held in Bern in January 2016. The main topic here was the EU directive on integrity and transparency in the energy wholesale market (REMIT).

9 Appendix

9.1 Facts and figures

A total of 406 new cases were received in 2016, almost half of which concerned applications for increasing network capacity. In the year under review, 197 of these cases were brought to a conclusion, i.e. 49 percent were settled in the year in which they were received. A total of 426 cases were brought to a conclusion in 2016, which once again represents a completion rate of more than 100 percent.

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 between a few hours and one or two days. Occasionally an enquiry may lead to proceedings. A total of 241 general enquiries were received in 2016, and all but two of them were dealt with in full (99 percent).

Complaints, etc.	Brought forward from previous years	Received in 2016	Dealt with in 2016	Carried forward to 2017
Specific matters relating to tariffs	74	71	107	38
Feed-in remuneration at cost	69	63	102	30
Increases in network capacity	95	166	179	82
Other cases	214	106	268	52
Total	**452**	**406**	**656**	**202**
Basic enquiries	n. a.	241	239	2
Total (including general enquiries)	**452**	**647**	**895**	**204**

Table 7: ElCom activities: statistics for 2016

9.2 Appeal statistics

A total of 194 rulings were pronounced in 2016, a large proportion of which concerned applications for increasing network capacity. A total of 848 rulings were pronounced in the period from 2008 to 2016, 723 of which were not contested and were thus declared legally binding. The remainder were referred to the Federal Administrative Court or the Federal Supreme Court.

	No appeal	Appeals to the Federal Administrative Court	Appeals to the Federal Supreme Court
848 pronounced rulings between 2008 and 2016	723	93	32

Table 8: Rulings pronounced between 2008 and 2016

9.3 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 attended a total of 14 full-day and 32 half-day meetings within Switzerland, in a variety of compositions. Once a year, ElCom organises a retreat during which its members seek contact with the local network operators.

9.4 Publications (in national languages only)

Directives

19.11.2016	Anrechenbarkeit der Stromqualität für Wirkverluste
17.11.2016	Pflicht der Netzbetreiber zur Erfassung und Einreichung der Daten über die Versorgungsqualität im Jahr 2017
22.12.2016	Abrechnungsmethodik für SDL und EnG-Zuschläge

Notifications

17.2.2016	Revision FMG Vernehmlassung Elektrizitätskommission
28.4.2016	Mitteilung Tarifwirksamkeit von ausserordentlichen Abschreibungen
19.9.2016	Mitteilung Rückliefervergütung gemäss Art. 7 Abs.2 Energiegesetz
22.12.2016	Zuordnung der Kosten des Energieportfolios eines Verteilnetzbetreibers auf die Endverbraucher in der Grundversorgung

Reports and studies

9.6.2016	Bericht zur Stromversorgungssicherheit der Schweiz 2016
9.6.2016	Sonderbericht zur Versorgungssituation Winter 2015/2016
16.8.2016	Bericht zur Stromversorgungsqualität 2015

9.5 Abbreviations and glossary

ACER	EU Agency for the Cooperation of Energy Regulators
Balance energy	Electricity that is billed in order to balance the difference between the effective quantity purchased or supplied to a balance group and the quantity purchased or supplied in accordance with the timetable.
Balance group	Formal grouping of participants in the electricity market for the purpose of forming a common measurement and billing unit within control zone Switzerland for the purposes of the national network operator.
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.
CEER	Council of European Energy Regulators
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. redispatch, reductions).
Control zone	Zone in which the national grid operator is responsible for network control. This zone is physically defined through measurement stations.
Day-ahead trading	Trading of energy on the day prior to its effective delivery or purchase.
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.
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
EU	European Union
FONES	Federal Office for National Economic Supply
Intraday trading	In intraday trading, short-term transactions are carried out after closure of day-ahead trading in order, for example, to be able to respond to deviations of the load from the forecast level or to failures of power plant blocks and thus to reduce the deviation from the timetable.
MATCH	Market Transparency Switzerland: system for monitoring wholesale electricity trading in Switzerland
N-1 safety concept	This concept ensures that, in the event of any failure of a network element, the remaining elements are not subjected to an inadmissible load. The calculation of n-1 loads is carried out in advance in the form of a simulation.
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.
NL	Network level
NL 1 to NL 7	Network levels 1 to 7
NTC	Net transfer capacity
OECD	Organisation for Economic Cooperation and Development
OTC	Over the counter: off-market trading between financial market participants
Palv	Parliamentary initiative
PLEF	Pentalateral Energy Forum

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
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
UREK	Parliamentary Commissions for Environment, Spatial Planning and Energy
VSE	Association of Swiss Electricity Supply Companies

WACC	Weighted average cost of capital: network use remuneration is a major component of an electricity tariff. It comprises operating costs and capital costs. For the capital that is already invested in existing electricity networks or invested in new electricity networks, the investor is entitled to receive interest. This is specified in an imputed interest rate, referred to as the weighted average cost of capital.

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