Report on the activities of ElCom 2021

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1 Foreword by the President

Werner Luginbühl
President of ElCom

The year 2021 may be described as the year in which the wider Swiss public became aware that a secure supply of electricity in future can no longer be taken for granted. In addition to the well-known, medium-term challenges following the decommissioning of Switzerland's nuclear power plants, fresh uncertainty has arisen over future import potential after the Federal Council's European policy decision. Over the second half of the year, the Russian export strategy created additional instability and turbulent conditions on the European gas and electricity markets.

As well as various activities, such as answering questions from the public about self-consumption, unbundling requirements and storage systems, ElCom also conducted various proceedings. These include proceedings on an individual tariff evaluation, other tariff evaluations, the average price method and the level of feed-in remuneration for renewable energies. ElCom also carried out several projects such as intensifying activities to address the situation of large shortfalls in coverage and the set-up of new IT infrastructure for the submission of data by network operators.

Personnel
On 1 November 2021, Dr Urs Meister took over the management of ElCom's Technical Secretariat. He has been dealing in-depth with legal/regulatory and market developments in the electricity and gas sectors for many years and, in the Commission's view, possesses the ideal attributes for this management role.

Urs Meister succeeds Renato Tami, who had led the Technical Secretariat since ElCom's foundation. Renato Tami oversaw a long period of consistent development and consolidation at ElCom. He has played a major role in ensuring that ElCom enjoys broad acceptance and a good reputation in the industry and amongst consumers today. His efforts merit a high degree of recognition and gratitude.

Security of supply
The situation in terms of security of supply in winter 2020–21 was favourable, but became more challenging in autumn/winter 2021. Electricity prices climbed continually over the course of the year as a result of rising gas prices. The availability of the French nuclear power plants was at a below-average level. As a result, record prices were recorded on the European markets over the Christmas period.

Due to these sharp price increases, a market participant approached the Swiss Confederation via ElCom in the Christmas week of 2021 with a request for temporary liquidity support. The issue was caused by high security payments that various European energy companies had to make to cover the difference between the

transaction price and current market value due to the tight situation on the energy markets.

ElCom carried out extensive evaluations before and after the Christmas period on system relevance, interconnection with third parties and the continuation of critical functions in the event of bankruptcy etc.

The request for liquidity support was rejected on 3 January 2022 owing to an improved situation on key markets post-Christmas.

In view of these events, the Confederation is evaluating short-term measures within the scope of the applicable law to ensure a rapid response in the event of a reoccurrence of the situation, and is assessing whether new rules or provisions are required in this area long-term to prevent such situations from arising in future.

Possible measures could, for example, aim to reduce the system relevance of specific companies. This includes ensuring the continued operation of potentially system-critical functions in the event of bankruptcy or composition proceedings.

Under the leadership of ElCom, the Confederation's authorities carefully monitored the development of the electricity supply situation in Switzerland in dialogue with the industry. No direct threat to security of supply for the remaining winter period was identified at the end of 2021. The availability of power plants in Switzerland, Germany and Italy appears sufficient and Switzerland has adequate import capacity.

Over the medium term, little has changed in terms of action required. Energy forecasts indicate that import requirements will double or even rise three-fold at times (>15TWh) during the winter half-year by 2050. Imports of over 10TWh push system operation to the limit, which is not an option considering the relevance of power supply in all areas of life. As the situation currently stands, there is no sufficient guarantee that enough electricity can be imported either.

ElCom outlined these concerns in a report in spring 2021, which it presented to the two expert commissions of Parliament's Environment, Spatial Planning and Energy Committee during hearings.

Border Study, negotiations on framework agreement abandoned, and request in accordance with Article 9

The Border Study – which was commissioned by ElCom, the Swiss Federal Office of Energy (SFOE) and the Verband Schweizerischer Elektrizitätsunternehmen (Association of Swiss Electricity Companies) – was completed in April 2021. This study assessed additional supply risks in the event of failure to reach an electricity agreement with the EU. The Border Study's model simulations for 2025 indicate that Switzerland could face supply shortages in a stress scenario as early as 2025, with significantly reduced import capacity.

On 26 May 2021, the Federal Council broke off negotiations with the EU on an institutional agreement. This significantly increased the likelihood of this stress scenario arising. From this point it became clear that Switzerland could also face a short-term security-of-supply problem, in addition to medium and long-term challenges.

With a serious threat to security of supply emerging, ElCom submitted proposals for measures to the Federal Council in accordance with Article 22 para. 4 Electricity Supply Act (ESA).

On 10 June 2022, ElCom informed the Federal Council about the foreseeable development

of import risks and proposed undertaking preparatory work on the implementation of specific measures in accordance with Article 9 ESA. Measures in three areas were proposed:

- Bringing forward the creation of the hydro reserve based on existing hydropower plants
- Rapid achievement of the efficiency potential
- Preparation for the establishment of peak-load gas-fired power plant reserves

Based on these proposals, a week later the Federal Council tasked ElCom with drawing up a 'peak-load gas-fired power plants' concept to ensure grid security, which had to be submitted to the Federal Department of the Environment, Transport, Energy and Communications (DETEC) and the Federal Council by the end of November 2021.

'Peak-load gas-fired power plants' concept

The 'peak-load gas-fired power plants' concept was produced based on the fundamental assumption that such power plants would only be used to ensure supply stability in extraordinary emergency situations. These reserves are effectively emergency power generators, which means they can only be used rarely. The concept primarily addresses a supply risk specific to Switzerland. It did not focus on protection against geopolitical risks, such as a Europe-wide gas shortage.

With regard to the size of the reserve, the probabilistic calculations for 2025 were explored in greater depth based on the existing Border Study. This revealed that a shortage of electricity lasting several weeks could occur in extreme cases, with the shortfall in power-plant output varying greatly.

A combined use of reserve gas-fired power plants and the hydropower reserve represents the most efficient solution. While the hydropower reserve only provides limited energy due to the restricted storage volume, it can cover high power peaks short-term through distribution to various plants. The combination with a gas-fired power plant reserve can significantly extend and optimise the 'lifespan' of the hydropower reserve – without requiring a disproportionately large hydropower reserve. Conversely, the gas-fired power plant output can be minimised.

The investment required for two gas-turbine power plants with a total output of 1000MW is around CHF 700 million. The total annual fixed costs for the provision of these power plants stands at around CHF 65 million. Ap-

plied to the amount of energy consumed annually in Switzerland, this results in a surcharge of around 0.1 cents per kilowatt hour.

The provision of an energy reserve from the existing storage power plants in combination with additional energy from gas-fired power plants of up to 1000MW will significantly improve the resilience of power supply in good time in ElCom's view, particularly in view of the risks identified that may emerge by 2025. This significantly reduces the likelihood of having to take much more drastic management measures under the National Economic Supply Act.

I hope this Activity Report provides an interesting insight into ElCom's wide-ranging activities and responsibilities.

Werner Luginbühl
President of ElCom

2 Interview with the Director

Dr Urs Meister took over the management of ElCom's Technical Secretariat in November 2021. His appointment was made during a turbulent period.

Mr Meister, security of power supply was an issue that attracted great public interest in 2021. But ElCom has only started issuing warnings about possible shortfalls in supply this year. What has happened?
ElCom had actually highlighted the uncertainty related to growing import requirements and supply risks during the winter months in previous years. Fresh uncertainty arose last year after negotiations with the EU over an institutional agreement were abandoned. This made it clear that there would be no electricity agreement over the coming years and a worst case scenario can no longer be ruled out. Failure to reach an agreement raises the prospect of severe restrictions on cross-border electricity trading. Model simulations have shown that Switzerland may face supply shortages from 2025 in stress scenarios.

The Federal Council has tasked ElCom with drawing up a 'peak load gas-fired power plants' concept. ElCom is essentially technology-neutral – so why did it recommend this type of technology?
ElCom generally supports a technology and competition-neutral framework. The Federal Council mandate arose due to special circumstances. The developments outlined above have added to the urgency of increasing the number of power plants. Power plants which can be constructed quickly and be ready for operation by the mid-2020s are required. Such rapid expansion is unrealistic for both renewable energies and hydropower. These power plants are also only intended to provide a reserve. From a financial perspective, controllable technologies with relatively low investment costs come into consideration. Gas turbine power plants meet these requirements.

What about the negotiations with the EU? What's the situation there? What does Switzerland need to ensure secure power supply in future?
There is currently still a deadlock over a comprehensive electricity agreement between Switzerland and the EU. Discussions are taking place at a technical level though between the transmission system operators. This mainly concerns determining cross-border grid capacity, minimising unscheduled and therefore destabilising flows of electricity over the Swiss grid, and integration into international balancing capacity markets. Reaching a technical agreement would undoubtedly help improve security of supply, but it wouldn't eliminate the need for additional domestic production capacity. Finally, there's also growing uncertainty over the production and export capacity of our neighbouring countries.

Electricity prices hit record highs at the end of the year, not just in the EU, but in Switzerland too. How did this situation arise and what does it mean for us?
The extremely high electricity prices currently being seen in wholesale trading are primarily attributable to the sharp rise in gas prices. Whether and to what extent domestic electricity producers can benefit depends on their hedging strategies and the future price trend. Conversely, electricity consumers on

the market face much higher costs – once again depending on their procurement and hedging strategies. This development will also eventually affect basic supply customers later on as many distribution network operators procure the majority of their electricity on the market. The price rises may also be reflected in the 2023 tariffs depending on the power providers' procurement strategy. But it's still too early to comment specifically on the price trend at the moment.

One energy company also made an appeal for support to the Confederation at the end of the year after facing financial difficulty owing to the rise in electricity prices. Could security of supply be jeopardised if one of the major electricity companies ran into serious trouble?

The insolvency of a company in the energy sector does not necessarily jeopardise security of supply. A company's 'systemic relevance' does not just depend on its size, but also on its actual business model and the company's role in the electricity market – such as in terms of the use and marketing of power plants. Finally, the specific market context is another factor. In a tense situation with prices already extremely high and low liquidity on the markets, the problems facing some companies may prove more critical to the stability of the entire system than in a more favourable market situation. Whether new regulations are needed and if so, which ones, now needs to be explored. The Confederation has already initiated work in this area. ElCom and other authorities in the federal administration are working closely together and are also in discussion with the industry.

A personal question to finish off with: what are your hopes for 2022 as the new Director of ElCom?

First of all, I would like to see the situation on the energy markets ease as a result of the end of the Ukraine conflict. As far as ElCom is concerned, I hope the politicians continue to embrace its analyses and recommendations and take them seriously. This does not just concern security of supply, but also the other issues ElCom deals with. ElCom provides well-founded and credible expertise thanks to a wealth of practical experience and its independence.

Urs Meister
Director of ElCom

« Switzerland may face supply shortages from 2025 »

Personally, I really hope the most challenging phase of the coronavirus pandemic is now over and that I am once again able to engage in more direct contact and discussion with both employees and the representatives of other institutions.

3 Security of supply

Hydropower plays a key role in Swiss electricity supply. Pictured here is Lac d'Emosson in the canton of Valais.

3.1 Introduction

In accordance with Article 22, para. 3 and 4 ESA, ElCom is responsible for monitoring security of supply. If there are indications of a significant threat to domestic supply in the medium or long term, Article 9 of the above Act stipulates that ElCom must propose suitable measures to the Federal Council. These may take the form of efficient electricity use, the procurement of electricity or upgrading and expanding the electricity networks. Security of supply is assured if the required quantity of energy is available at the applicable quality standard and at reasonable tariffs across the entire electricity network at all times.

Financial analyses of winter production were carried out to assess Switzerland's future security of supply and were published in a policy paper, while ElCom's Adequacy Study 2030 focused on probabilistic simulations of the supply situation in ten years' time. A comprehensive report on Switzerland's security of electricity supply was also produced in 2020. ElCom's interpretation of the results of these studies is that a significant expansion of domestic winter production capacity is required to ensure security of supply during winter.

3.2 Security of supply reports

ElCom also produced a series of technical reports on the development of Swiss security of supply in 2021. These reports are briefly outlined below.

3.2.1 Security of supply in winter: analysis of import risks

This report indicates that import requirements are expected to double or even increase three-fold (>15TWh) at times during the winter half-year by 2050, according to Energy Perspectives 2050+. Import requirements during the winter half-year of over 10TWh for two decades equates to a structural bottleneck in ElCom's view. For vital infrastructure like power supply, which must be balanced in real time, this means system operation with significant risks. Structural import requirements are critically important in view of neighbouring states being less willing to export as well as EU-wide optimisation of the markets. Imports of over 10TWh push system operation to the limit, which is not an option in view of the relevance of power supply in all areas of life and weakens the position of the Swiss electricity industry (high-performance transmission grid, flexible power plants).

3.2.2 Security of supply in Switzerland in 2025 – 'Analysis of cooperation on electricity between Switzerland and the EU'

Together with the Swiss Federal Office of Energy (SFOE), ElCom commissioned an 'Analysis of cooperation on electricity between Switzerland and the EU'. This analyses the impact of various scenarios of cooperation with the EU.

In one of these scenarios, there is insufficient energy available in Switzerland in the stress scenario defined. The low import capacity and energy shortage during winter mean that the levels in the storage power plants quickly decreases. The situation becomes critical at the end of March. On average it would then no longer be possible to meet domestic power demand on several days and there is an average shortage of several dozen gigawatt hours of energy per year. Under more acute assumptions (additional production outages), there could even be week-long interruptions to supply.

On 26 May 2021, the Federal Council broke off negotiations over an institutional agreement with the EU. In light of this development, the electricity agreement is not expected to be concluded, or at least not within a reasonable timeframe. This adds to the significance of the results of the 'Analysis of cooperation on electricity between Switzerland and the EU' study. These results also formed the basis of the additional work agreed by the Federal Council in mid-June on short-term and medium-term security of supply, the 'peak-load gas-fired power plants' concept and the assessment of the potential of efficiency improvements by 2025.

3.2.3 Monitoring of security of supply and ElCom proposal to the Federal Council in accordance with Article 22 para. 4 ESA

In accordance with Article 22 para. 3 ESA, the Federal Electricity Commission (ElCom) is tasked with monitoring the development of the electricity markets in terms of secure and affordable supply. If a significant threat to domestic security of supply emerges over the medium or long-term, ElCom must present proposals for measures to the Federal Council in accordance with Article 9 ESA (Art. 22 para. 4 ESA).

ElCom informed the Federal Council about the foreseeable development of import risks and identified a possible need for action, especially with regard to the critical situation in 2025. In view of current European developments, growing import requirements and increasing import risks (cf. section 3.2.2), ElCom submitted a proposal to the Federal Council in June 2021 indicating the need to undertake preparations for the implementation of specific (both production and consumption-related) measures in accordance with Article 9 ESA.

Based on these proposals, in June the Federal Council assigned ElCom the task – together with Swissgrid – of drawing up possible grid-related measures to ensure short and medium-term security of supply and grid stability (cf. section 3.2.4) which had to be submitted to DETEC by August 2021.

The Federal Council also tasked ElCom with drawing up a 'peak-load gas power plants' concept to ensure grid security (cf. section 3.2.5) which had to be submitted to the department and to the Federal Council by November 2021. The department also carried out an assessment of the potential for efficiency improvements by 2025 and submitted it to the Federal Council together with ElCom's concept.

3.2.4 Grid-related measures to ensure short and medium-term security of supply and grid stability; Report for DETEC/Federal Council

With its decision on the dispatch on the consolidation bill of 18 June 2021, the Federal Council requested ElCom – in collaboration with Swissgrid – to draw up possible grid-related measures to ensure short and medium-term security of supply and grid stability for submission to DETEC by the end of August 2021.

As part of this task, the following six sets of measures were identified, which will be fleshed out in greater detail with a view to addressing potential problems that may arise by 2025:

1. International contracts under private law on interconnected operations (SAFA)
2. Early replacement of coupling transformers
3. Optimisation of maintenance work
4. Increase in voltage on the transmission grid
5. Coordination of transmission grid with network level 3
6. Updating of the operating concept

The evaluation of the measures shows that the key measures with short-term impact have already been taken or are in the process of being implemented. These measures need to be accelerated and implemented before 2025 as far as possible. ElCom will assess the additionally identified and above-listed measures in greater depth together with Swissgrid and other industry actors.

ElCom therefore recommends continuing the preparatory work on measures in accordance with Article 9 ESA (efficiency, gas-fired reserve power plants, hydropower reserve). ElCom submitted the relevant analysis and proposals to DETEC at the end of November.

3.2.5 Peak-load gas-fired power plants' concept

On 18 June 2021, the Federal Council adopted the dispatch on the Federal Act on a Secure Electricity Supply from Renewable Energy Sources (consolidation bill on the amendment of the Energy and Electricity Supply Act). It also called upon ElCom to draw up a 'peak-load gas-fired power plants' concept and to submit it to DETEC by November 2021. The concept must also provide details about the output required, potential locations, costing, financing, gas storage and ways of ensuring carbon neutrality. The concept is also based on the premise that such peak-load gas-fired power plants would only be used to ensure grid supply security in extraordinary emergency situations. It primarily focuses on a domestic shortage of electricity and a supply risk specifically in Switzerland; peak-load gas-fired power plants provide an additional security element in this respect. The Federal Council is set to decide on how to proceed in 2022.

3.3 Security of supply – review and outlook

In order to fulfil its monitoring mandate, ElCom uses comprehensive monitoring methods to observe medium to long-term supply security. The key results of these monitoring activities for the year under review are presented in the following sections.

3.3.1 Review of winter 2020–21

Winter 2020–21 was the first full winter after the decommissioning of the Mühleberg nuclear power plant. Whereas in December 2020 the remaining nuclear power plants were not always all fully available, this was the case for the rest of the winter period from the start of 2021. The level of the Swiss reservoirs was normal at the beginning of 2021. There was good availability on the transmission grid and the import and export capacities were also at the normal level.

However, the situation in France was tense. Owing to delayed maintenance work due to COVID-19, an extremely high number of nuclear power plant units were not in operation in France, especially in February 2021. This meant high levels of export to France and a rapid emptying of the Swiss reservoirs was anticipated. The situation eased in France after generally mild temperatures, particularly from mid-February 2021. Storage levels dipped to a long-term low but not until mid-April 2021, i.e. after the most critical period. In retrospect, the situation in winter 2020–21 was comfortable.

3.2.2 Other incidents during the course of the year

There were two incidents of separation on the power grid in continental Europe during the year under review.

- On 8 January, the grid was separated into two parts for around an hour due to a cascade of overloads in south-eastern Europe.
- The Iberian peninsula was also separated for around an hour on 24 July. The cascade of connection shutdowns was caused by a forest fire here.

Neither incident had any further impact on the Swiss grid.

There were no interruptions to power supply due to outages on the meshed transmission grid during the year under review. However, the headquarters of Swissgrid was affected by a brief interruption on the regional distribution grid. The emergency power supply system worked as planned, which meant the Swissgrid control centre remained operational at all times.

Voltage stability is proving increasingly challenging, especially during weak-load periods. The capacity for compensating for reactive power was exhausted at times during maintenance work at nuclear power plants. Lines had to be shut down in some cases to maintain voltage in the correct range.

3.3.3 Situation in winter 2021–22

Electricity prices rose continuously during the course of 2021 due to increases in the price of gas and other commodities. The below-average availability of the French nuclear power plants also impacted on prices – the four biggest units were deactivated in mid-December 2021 for safety reasons. Record prices were recorded on the French market in particular over the Christmas period as a result of these various developments. The Swiss market, as well as those of other neighbouring countries, were nevertheless also affected. The tense market and supply situation meant ElCom monitored supply developments more closely with the involvement of other federal authorities and Swissgrid.

Although the market situation eased again in early 2022, prices rose once more after the Russian attack on Ukraine. Uncertainty over Russian gas supplies to Europe had the greatest impact on prices. This uncertainty has since continued to overshadow the gas and electricity markets in Europe.

Switzerland's security of electricity supply was continually ensured during winter 2021–22, despite the high prices on the market and the below-average availability of the French nuclear power stations. Strong import possibilities were a contributing factor. Import capacities were high based on good availability of the transmission grid. Sufficient production capacity was also available in Europe – particularly in Germany and Italy – which, in combination with import capacities, had a positive impact on the Swiss supply situation at the end of the winter. The availability of the Swiss nuclear power plants was also high, while the level of the reservoirs was in the normal range.

The development of the geopolitical situation in relation to the conflict in Ukraine was and remains an unpredictable factor. If this were to result in a shortage of gas throughout Europe, this would also impact on electricity generation possibilities, particularly in Germany and Italy, and consequently also on Switzerland's import capacities next winter.

The review of winter 2021–22 once again highlights that strong import capacity is of paramount importance to Swiss security of supply. These import capacities will not always be guaranteed in future, whether due to a lack of generation capacities in neighbouring countries or as a result of politically restricted import capacities in relation to the EU's 70 per cent rule.

3.4 Unscheduled flows

In an interconnected network, the actual (physical) flow of electricity never corresponds exactly to the traded and scheduled flows. The deviation between the physical and trading flows passes through the transmission grid as unscheduled flows. Up to 30 per cent of the volumes traded from Germany to France currently flow physically through Switzerland.

The introduction of flow-based market coupling in the Central Western Europe region, excluding Switzerland, saw trading capacities from Germany to France increase significantly, in turn causing some congestion on the Swiss grid, particularly during winter.

The extensive efforts over many years of Swissgrid and ElCom are showing signs of progress. A contract was agreed with the EU's 'Italy North' capacity calculation region, which ensures Switzerland's southern border enjoys equal treatment with Italy's other northern borders. This contract was signed by Swissgrid and the transmission grid operator of 'Italy North' after being approved by ElCom and the regulatory authorities of the other participating countries. This contract must be renewed annually and capacity is calculated using the NTC method.

Swissgrid and ElCom also continued their efforts aimed at achieving a similar solution on Switzerland's northern borders with the 'Core' capacity calculation region. An agreement is proving challenging here and remains uncertain. Flow-based market coupling – from which Switzerland is excluded without an electricity agreement – applies in 'Core'. The aim is to ensure balanced, mutual inclusion in the capacity calculations so that unscheduled flows of this nature only cause congestion in exceptional circumstances. Switzerland should also be included in future if methods related to the capacity calculation are used, such as redispatch and countertrading. Such an agreement is also required to enable Switzerland's neighbouring countries to include the flows with Switzerland in their 70 per cent target from the EU's perspective.

The EU also plans to extend flow-based market coupling to Italy over the long-term. This makes balanced mutual inclusion in the capacity calculations all the more important. An agreement with 'Core' would lay a good foundation in this respect.

Another problem of unscheduled flows that jeopardise system security is presented by the platforms for trading balancing power, which are becoming operational one by one. Switzerland is currently participating on these platforms but whether that will remain the case in future is uncertain. Without Switzerland's participation, such unscheduled flows could occur in real time almost without any prior warning.

3.5 Cyber security

Electricity networks are increasingly controlled and monitored using smart information and communications technology. These systems offer the network operator more control options and enable more efficient system operation as well as the opportunity to provide new services. Greater use of IT networks also increases the risk of hackers gaining access to the power grid and compromising the availability[1], integrity[2] or confidentiality[3] of data or damaging technical systems. Such an incident could lead to considerable financial loss and above all reputational damage for the network operator concerned. According to the scenarios set out by the Federal Office for Civil Protection (FOCP), a widespread power outage could cause significant damage in extreme cases. This means cyber security is a key issue in ensuring supply security.

According to Article 22 para. 3 ESA, ElCom is responsible for monitoring the electricity markets with a view to ensuring secure and affordable supply in all parts of Switzerland. This implicitly also includes IT risks, which means ElCom also pays the due level of attention to the status of network operators' cyber security.

Cyber security is becoming more significant due to the increasing use of IT networks. The efficient, risk-based implementation of various industry documents is not just welcomed by ElCom, but also required. These include the Association of Swiss Electricity Companies (VSE) industry documents 'ICT Continuity', Handbuch Grundschutz für Operational Technology in der Stromversorgung (Handbook on Basic Protection for Operational Technology in Electricity Supply), and Richtlinien für die Datensicherheit von intelligenten Messsystemen (Guidelines for the Data Security of Smart Measurement Systems) in accordance with FOCP's CIP guidelines. The Swiss Federal Office of Energy (SFOE) began revising the provisions on cyber security in the ESA during the year under review. A binding minimum standard is a key aspect. ElCom has held intensive discussions with the SFOE and the relevant stakeholders about this issue. These talks improved the mutual understanding of future regulation on cyber security and also helped to define ElCom's new supervisory concept more clearly. Risk-based supervision of the future focuses on improving physical cyber security. This will be achieved through supervisory meetings, the request for documents, targeted surveys and in-depth evaluations, as well as by providing specific information and raising awareness about relevant topics. ElCom's supervisory activities also provide an insight into the level of cyber security and supplement existing situational reports. When implementing the new regulations and supervision, compatibility with the EU's new Network Code on Cybersecurity must be ensured.

In the year under review, ElCom was also involved in the definition of the reporting obligation for cyber security incidents as part of the revision of the Information Protection Act and the cyber security audit of Swissgrid by the Swiss Federal Audit Office (SFAO).

1 Availability means that the systems and data to be protected are available and can be used upon request by an authorised unit.

2 Integrity means that the data processed is correct and complete, but also that the systems function properly.

3 Confidentiality refers to the protection of the systems and data against unauthorised access by persons or processes.

3.6 Quality of supply

3.6.1 Network availability

The quality of supply is defined to some extent 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, System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). SAIDI quantifies the average duration of interruptions per end consumer, while SAIFI indicates the average frequency of interruptions per end consumer. Figures concerning all unscheduled interruptions lasting longer than three minutes and that occur as the result of natural phenomena, human error, operational problems or external influences are factored into the calculations for both indices.

For the purpose of monitoring network availability, ElCom evaluates the interruptions to supply of the 94 largest Swiss network operators. These 94 network operators account for 88 per cent of the country's energy turnover via their networks. In 2020, the 94 biggest Swiss network operators recorded 5,176 unscheduled interruptions (see table 1). This meant the number of unscheduled interruptions fell compared with the previous year. However, the number of interruptions on its own is not sufficient to draw reliable conclusions about network availability. It is only when this figure is combined with the duration of interruptions and the number of end consumers affected that a meaningful indication of network availability can be provided.

	2017	2018	2019	2020	2021[1]	Unit
Interruptions	4 814	6 495	5 780	5 176		Number
SAIDI	10	14	8	12		Minutes per end consumer
SAIFI	0.21	0.27	0.17	0.21		Interruptions per end consumer

1 The figures on supply quality for 2021 will be published in June 2022 and will be available on ElCom's website.

Table 1: Development of supply quality in Switzerland from 2016 to 2020 (unscheduled interruptions only)

In 2020, the average duration of unscheduled interruptions per end consumer stood at twelve minutes. This meant this indicator rose by four minutes nationwide compared with the previous year. The average frequency of unscheduled interruptions per end consumer in 2020 was 0.21, which was higher than in the previous year. Network availability remains extremely good in Switzerland. The high quality of supply in Switzerland is also confirmed by international comparisons. According to the 'CEER Benchmarking Report 6.1 on the Quality of Electricity and Gas Supply', Switzerland is among those countries with the highest quality of electricity supply in Europe.

3.6.2 Import capacity

In addition to network availability, the available import capacity is also a key factor in ensuring Switzerland's electricity supply security. The Swiss electricity sector can also use import and export capacity to execute transactions on the European market and exploit its competitiveness. ElCom therefore monitors the development of available cross-border net transfer capacity (NTC) consisting of import NTC and export NTC.

NTC indicates the level of cross-border transfer capacity that can be used by traders for commercial exchanges – for both imports and exports – with neighbouring states without violating the safety standards. Swissgrid determines the hourly values for the four Swiss borders together with transmission grid operators in neighbouring countries. The proportion of the import and export capacity of the Principality of Liechtenstein, which belongs to the Swiss control zone, is included in the calculation of the import and export capacity from Austria.

Table 2 provides an overview of the average development of the available import capacity, on one hand for all borders together and the northern border, and on the other for each individual border between Switzerland and its neighbouring countries. Evaluated on an hourly basis, the NTC can be more volatile than reflected by average import and export figures shown for the year.

IMPORT NTC (MW)	2017	2018	2019	2020	2021
Total	**6,987**	**6,756**	**6,657**	**6,982**	**6,562**
Northern border (AT, DE, FR)	5,265	5,034	4,936	5,260	4,841
France	3,007	2,772	2,678	2,944	2,923
Germany	1,501	1,396	1,343	1,264	1,347
Austria	757	866	915	1,052	571
Italy	1,722	1,722	1,721	1,722	1,721

Table 2: Available import capacity (NTC) for Switzerland, 2016 to 2021 (average of hourly NTC for the year)

Import capacity fell in 2021 due to declining import capacity from Austria attributable to protracted maintenance work in the Pradella region.

3.6.3 Export capacity

Due to high transit flows through Switzerland from north to south, the capacity available for export to Italy and France is of particular importance to the network and supply security of Switzerland and its neighbouring countries (see table 3). The volume of this export capacity to Italy also has a major influence over the utilisation of Switzerland's import capacity on its northern borders with France, Germany and Austria.

EXPORT NTC (MW)	2017	2018	2019	2020	2021
Total	**9,129**	**8,769**	**7,933**	**8,658**	**8,289**
Northern border (AT, DE, FR)	6,207	6,115	5,415	5,928	5,497
France	1,180	1,184	1,163	1,136	1,209
Germany	4,000	3,888	3,491	3,708	3,629
Austria	1,027	1,043	761	1,084	659
Italy	2,922	2,654	2,518	2,730	2,792

Table 3: Trend in Switzerland's export capacity (NTC) 2016 to 2021 (average of hourly NTC for the year)

Like import capacity, export capacity also declined in 2021 due to a fall in export capacity to Austria (the same reason as for imports). On average, the increases and decreases on both of Switzerland's other northern borders and on its southern border (Italy) remained limited.

3.6.4 Retrofitting decentralised energy generation plants

Many of the photovoltaic systems (PV systems) installed in the Swiss control zone and in the entire interconnected European grid are configured so that they switch off completely if the frequency reaches 50.2Hz. This means the grid abruptly loses a relevant amount of energy generation which can jeopardise the system. In order to contain this problem, steps must be taken throughout Europe (including in the Swiss control zone) to ensure that no further systems are connected to the grid unless they comply with the applicable protection settings.

ElCom therefore issued Directive 1/2018 on 6 March 2018 which is published on its web-

site. A retrofit programme was also initiated in a letter sent to distribution grid operators on 15 June 2018, which addresses the issue of existing PV systems shutting down in response to over-frequency. This was initially limited to PV systems with a connected capacity of ≥ 100kVA (Retrofit 1) because this enabled a major impact to be achieved quickly and relatively inexpensively.

The target set by ElCom of a maximum connected capacity of 200MVA from non-compliant PV systems could not be achieved through the Retrofit 1 programme. ElCom therefore decided at the end of 2019 to extend the retrofit programme to all PV systems with connected capacity of over 30KVA (Retrofit 2). The Retrofit 2 programme was launched in January 2020 and obliges grid operators to ensure the compliance of the PV systems concerned in their network area by the end of 2022 at the latest. Over 40 per cent of distribution grid operators had completed Retrofit 2 by the end of 2021.

3.7 System services

Sufficient electricity production capacities must be available to guarantee supply security, while adequately sized transmission and distribution grids are required for the supply of energy to end customers. Since electricity cannot be stored in the network, the quantity of energy fed into the grid always has to be equal to the quantity that is taken out of it. Despite the high-quality production and consumption forecasts provided by energy suppliers, precise forward planning is not feasible. This means that even minor deviations from the targeted quantities have to be balanced out on an ongoing basis.

Generally, this balancing process involves bringing the production of electricity into line with the current level of consumption. This constant balancing of production and consumption requires power plants whose production can be efficiently controlled. The balancing power provided by these power plants is purchased in a market-based procedure, and the costs incurred are passed on to end customers via the system services tariff, which is used for charging for other services required for safe operation of the grid, including balance management, self-contained start and independent operation capability, voltage stability and compensation of active power losses. However, balancing power is the biggest element of system services in financial terms. The costs for balancing capacity stood at around CHF 179 million in the year under review. This represents a sharp increase on recent years. One reason for this is that Swissgrid must have more balancing capacity available due to the implementation of the System Operation Guideline (SOGL). Another factor is the sharp uptick in electricity prices since mid-2021. This also made balancing capacity more expensive. Figure 1 shows the price trend for balancing power over the past five years.

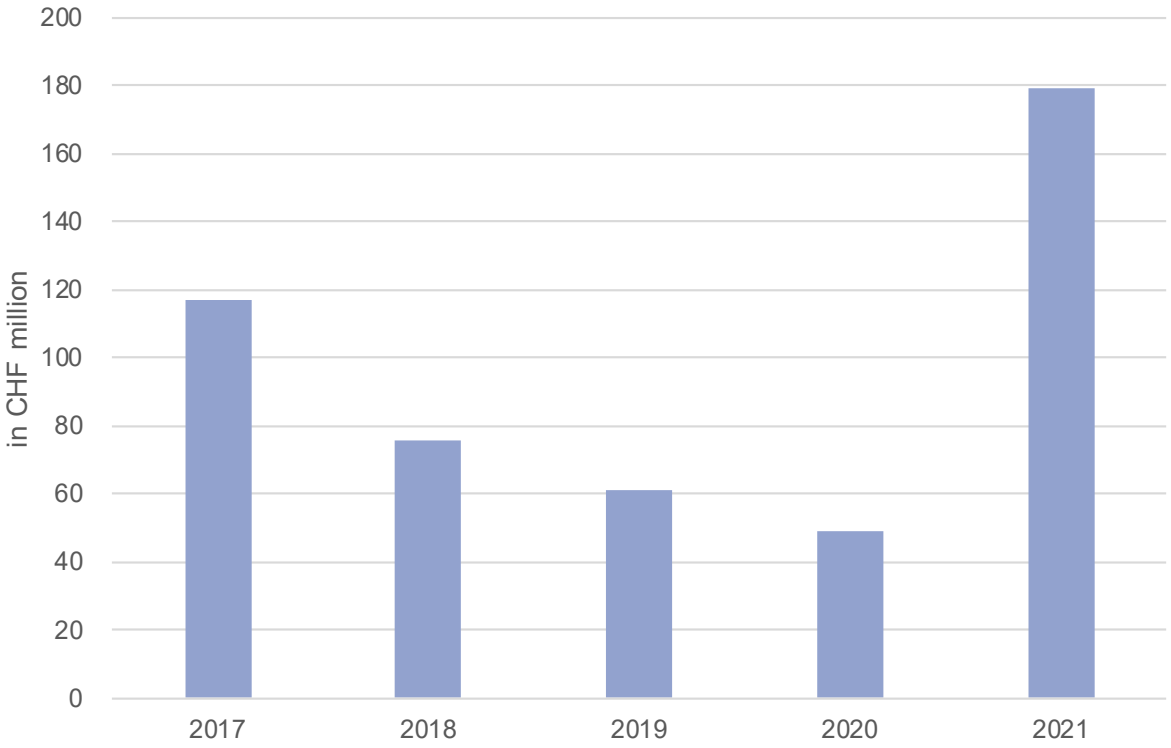


Figure 1: Balancing power price trend from 2017 to 2021.

Since 2016, Swissgrid has been procuring a proportion of the balancing power for the spring in advance. This assures the availability of water reserves, while also improving planning security for the operators of storage power plants. Advance procurement is important for risk management and for the players involved to gain a better understanding of their specific roles. The costs of advance procurement amounted to around CHF 6 million in the year under review. This means they are down on the around CHF 12 million in 2020.

Swissgrid regularly develops balancing products to improve liquidity. The procurement of secondary balancing capacity was adjusted in 2019. Secondary balancing capacity had been purchased as a symmetrical product until mid-2018, which meant the provider had to offer the same amount of positive and negative secondary balancing power. The switch to an asymmetrical product now allows providers to only offer positive or only negative secondary balancing power. This also enables Swissgrid to carry out more targeted procurement of the quantities needed. The procurement of primary balancing capacity was also adjusted in 2020 and is now purchased daily in six four-hour blocks. As indicated above, Swisssgrid had to increase the amount of balancing capacity in the year under review to comply with the provisions of the EU's System Operation Guideline (SOGL). To further improve liquidity, balancing products are also purchased on a smaller scale via international platforms, namely primary balancing capacity (FCR) and since October 2020, also tertiary balancing energy (replacement reserve).

4 Networks

A well developed and maintained power grid is essential to ensuring Swiss security of supply. The electricity grids in the Linth valley in eastern Switzerland are shown here.

4.1 Facts and figures about the Swiss electricity grids

The Swiss electricity grid is run by around 620 network operators and covers a total length of over 207,934 kilometres, which is around five times the circumference of the Earth. Of this, the local distribution grids (network level 7) account for 71 per cent, while Swissgrid's national transmission grid (network level 1) accounts for just over three per cent with around 6,700 kilometres. The remaining kilometres are made up by the medium-voltage levels (network levels 3 and 5). As part of regular cost accounting reporting, ElCom surveys the Swiss electricity grids according to various equipment classes each year. In recent years, there has been a slight increase in the quantity of installations at the plants in most categories. As expected, the number of overhead lines and mast transformer stations has fallen, while the number of cables and transformer stations have increased as a result of progress in cabling work. The electricity grid was expanded by two per cent during the period from 2016 to 2020. In 2020, there were just under 5.7 million measurement points and just over 5.5 million invoice recipients. According to the Federal Statistical Office (FSO), Switzerland has over 0.6 million companies (2019) and 8.6 million inhabitants (2020). Population growth between 2016 and 2020 stood at just under three per cent.

Type of installation	2016	2017	2018	2019	2020	Unit
Pipe system, high voltage (NL 3), medium voltage (NL 5) and low voltage (NL 7)	119,277	120,509	122,616	124,941	130,205	km
Cable, high voltage (NL 3)	1,924	1,992	1,906	2,053	1,968	km
Cable, medium voltage (NL 5)	34,044	34,675	35,307	36,433	36,428	km
Cable, low voltage (NL 7)	78,011	79,269	80,029	82,179	81,264	km
Cable, connection to household (NL 7)	54,240	55,011	57,091	58,891	59,108	km
Supply line and cable (NL 1)	6,629	6,590	6,652	6,717	6,717	Line-km
Overhead line, high voltage (NL 3)	6,738	6,791	6,777	6,788	6,658	Line-km
Overhead line, medium voltage (NL 5)	10,061	9,784	9,458	9,346	8,818	Line-km
Overhead line, low voltage (NL 7)	11,621	8,150	7,663	7,899	6,972	Line-km
Substation, NL 2, NL 3, NL 4 and NL 5	893	1,056	819	825	823	Quantity
Transformer, NL 2	148	151	145	147	149	Quantity
Switching field, NL 2[1]	159	164	167	163	168	Quantity
Transformer, NL 3[2]	79	77	76	76	87	Quantity
Switching field, NL 3[1]	2,577	2,600	2,586	2,680	2,431	Quantity
Transformer, NL 4	1,142	1,150	1,143	1,153	1,143	Quantity
Switching field, NL 4[1]	2,011	2,078	2,163	2,929	2,246	Quantity
Transformer NL5[2]	75	72	73	74	77	Quantity
Switching field, NL 5[1]	30,836	29,934	30,685	39,486	39,411	Quantity
Transformer station, NL 6	53,024	53,144	53,730	54,850	54,142	Quantity
Mast transformer station, NL 6	5,402	5,457	5,265	5,487	4,993	Quantity
Cable distribution box, low voltage (NL 7)	174,377	174,917	177,430	182,325	191,488	Quantity
Measurement points (all consumers)	5,512,743	5,573,672	5,635,760	5,779,344	5,715,085	Quantity
No. of network operators	643	636	630	632	623	

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) Despite the fact that transformation generally takes place on the even network levels, transformation also happens on odd levels in certain cases – such as to balance out different voltage series within the same network levels (e.g. at NL 3, between 110 and 50kV).

Table 4: Installations on the Swiss electricity grids

The total value of the Swiss electricity grid stands at just under CHF 21.5 billion. The distribution grid accounts for around 90 per cent of this figure. The remaining value of the installations on the distribution grid rose by around 0.2 billion compared to the previous year, while the revenue paid by end consumers for use of the distribution grid (excluding duties and payments to the state and charges for the promotion of renewable energy) remained at the same level as in the previous year at CHF 3.3 billion.

The following figures concerning the distribution grid show the distribution of ownership and grid usage revenues by company size in terms of the total residual value of their installations. In both figures the 100 biggest network operators are ranked according to their size in groups of ten (1 to 10, 11 to 20 etc.) while the other 520 network operators make up the residual group. This indicates that the ten biggest companies (dark blue) hold just under 43 per cent of all declared assets (Figure 2). This is around the same as the next 90 biggest companies combined (group 11 to 20 to group 91 to 100). The approximately 520 small grid operators ('remainder' – shown in light blue) have a share of just 15 per cent in total. This is around the same as five years ago.

A similar distribution can be seen in network use remuneration (Figure 3). The ten biggest network operators (in dark blue) account for around 44 per cent of all revenues – this figure has also remained constant over the past five years. The share of total revenues accounted for by the around 520 small network operators ('remainder' in light blue) fell slightly, standing at 14 per cent.

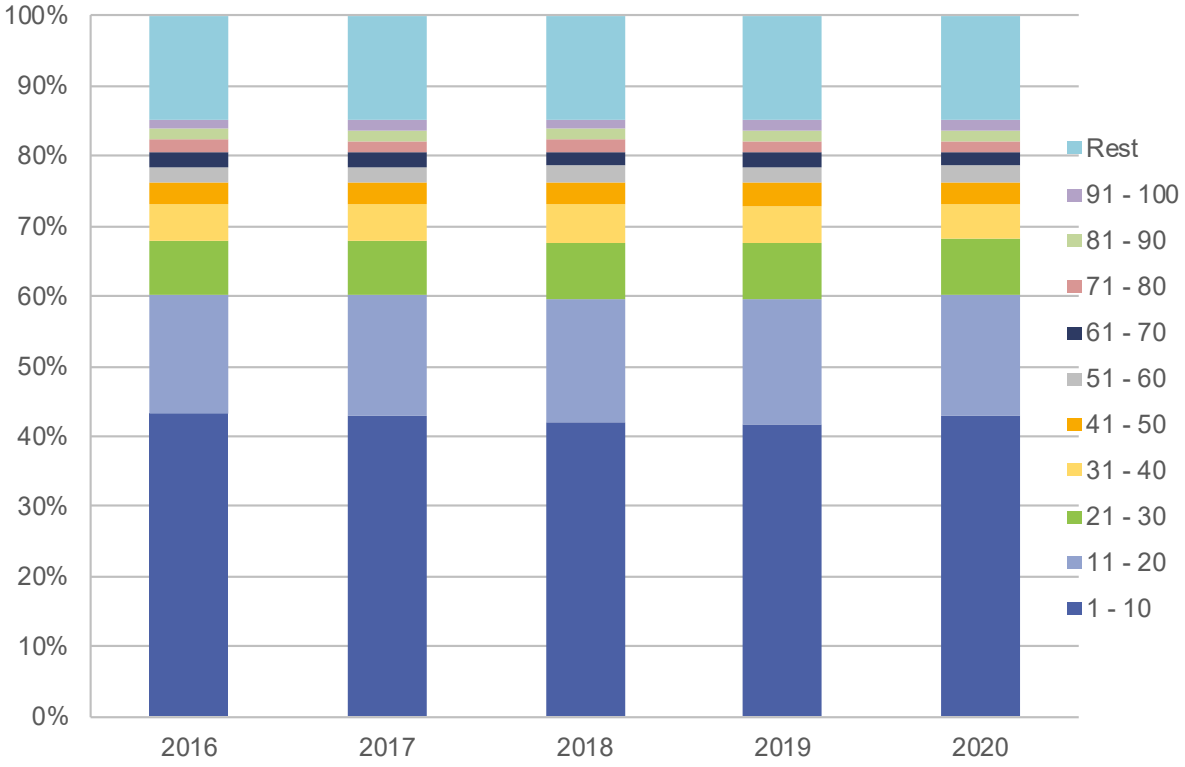


Figure 2: Proportional holdings in the distribution grid by company size

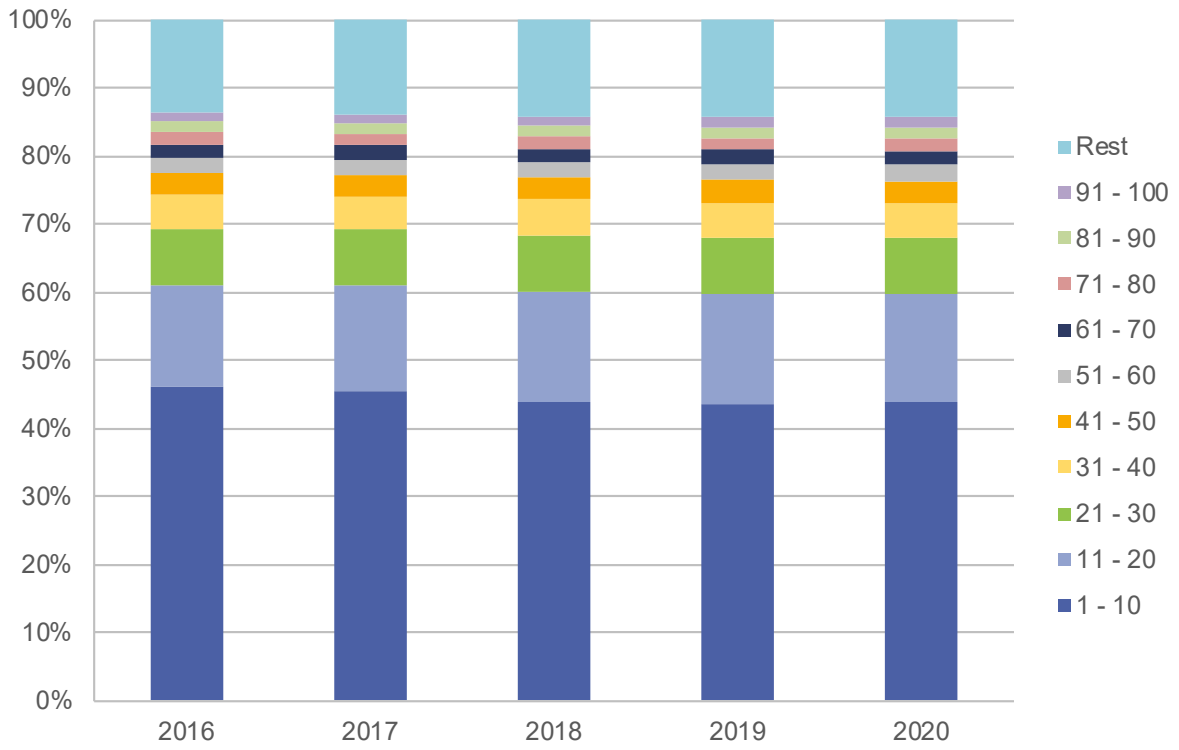


Figure 3: Proportion of network utilisation revenue (distribution network) by company size

The distribution grid operators declared total network costs (including fees and charges as well as surcharges on the transmission grid) of just over CHF 5.1 billion for 2020. These are based on the operating and capital costs of a secure, high-performance and efficient grid in accordance with electricity supply legislation. In addition to this amount, there are tax expenses as well as duties and payments to the state. Surcharges on the transmission grid must also be added on. However, this amount does not include the availability costs incurred by the individual grid operators as these are entered as revenues for the respective provision, which means the position is neutral overall. The biggest components of the grid costs on the distribution grid are the operating and capital costs, making up a share of 68 per cent, which equates to over CHF 3.4 billion (Figure 4).

The share of duties and payments has risen by eight percentage points over the last five years to just under 31 per cent. This position includes duties and payments requested by cantons and communes, on one hand, and the national statutory duties to promote renewable energy on the other. The increase in this cost position during the prior period is primarily due to the gradual rise in the national statutory duties for the promotion of renewable energy from 2014 to 2018.

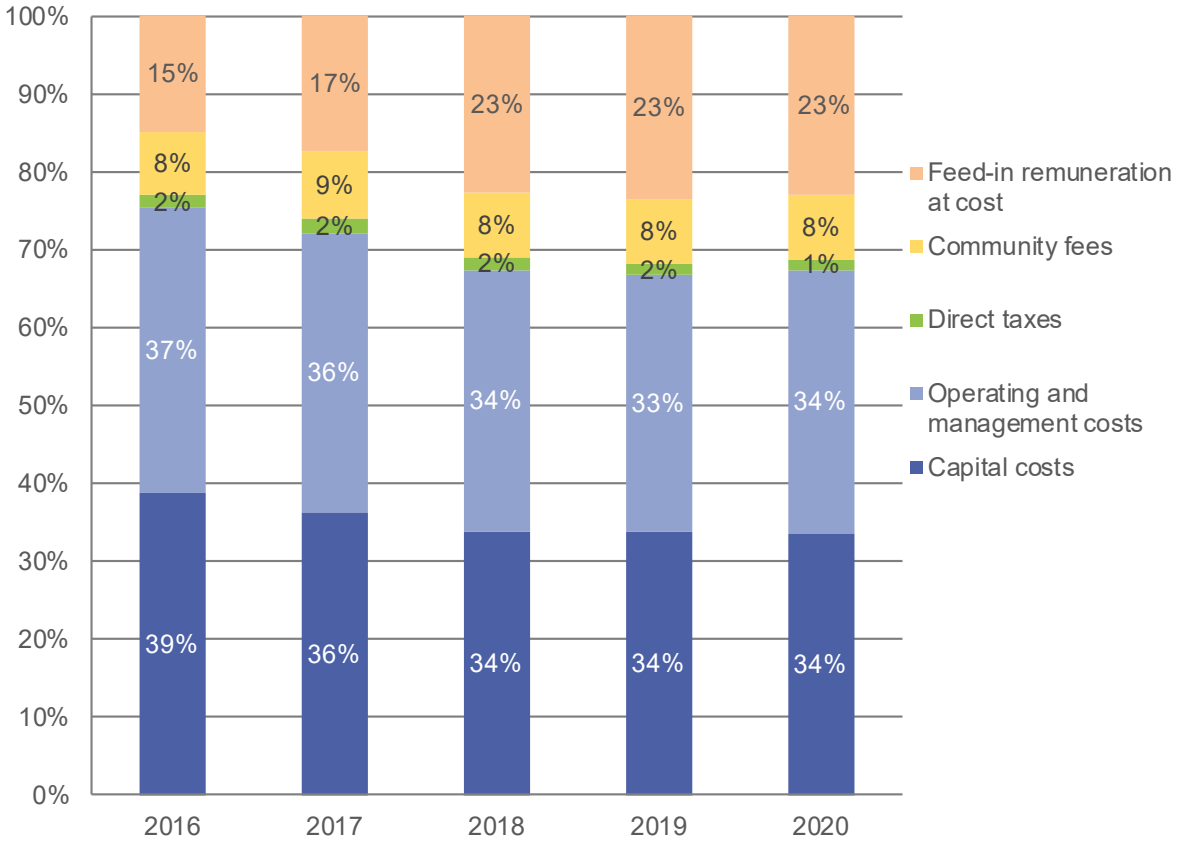


Figure 4 Breakdown of distribution grid costs

In its 2020 Annual Report, Swissgrid reported network use costs of CHF 507 million and system services costs of CHF 155 million. If the distribution grid costs of just over CHF 5.1 billion are added to these cumulative costs of just under CHF 0.7 billion, the overall costs for the Swiss electricity grid come in at just under CHF 5.8 billion. Figure 5 shows the breakdown to the individual network levels (NL). The local distribution grid (NE7) accounts for over half of the costs at around CHF 2.9 billion. Another fifth of the costs are incurred on NL 5. The cost shares of the transformation levels (NE2, NE4, NE6) – the linking element between the various connection levels – are relatively low overall. The high-voltage grid (NE1 incl. SDL) operated by Swissgrid makes up a share of 12 per cent of the total costs for the Swiss electricity grid.

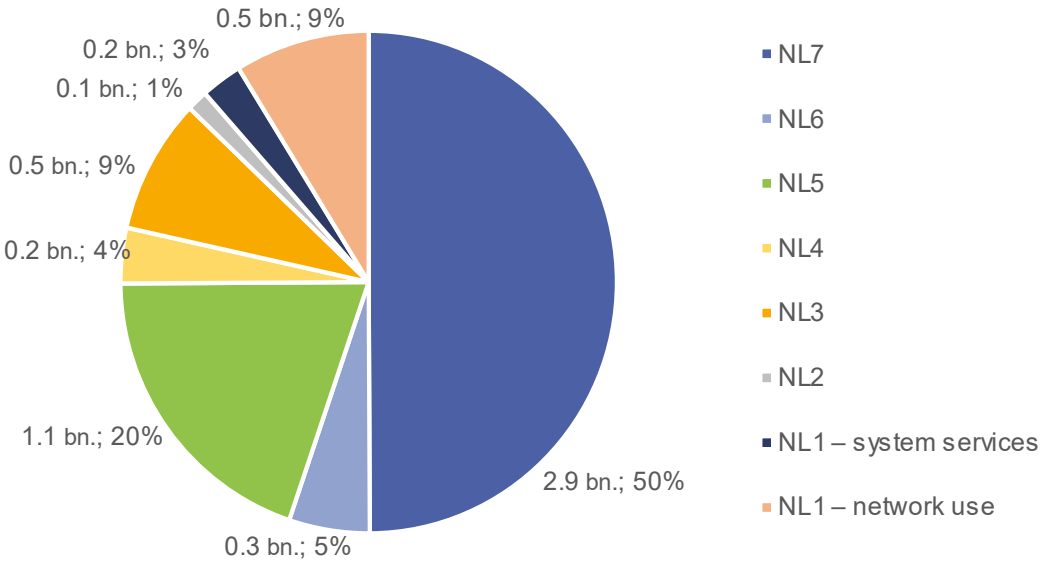


Figure 5: Costs in CHF billion and breakdown of the cost shares of the Swiss electricity grid (including fees and charges as well as surcharges on the transmission grid) by transmission grid (NL 1) and distribution grid (NL 2 to NL –7) in 2020.

4.2 Grid expansion and planning

4.2.1 Multi-year planning of the transmission grid

In accordance with Article 9a ESA, the SFOE produces a set of scenarios as a basis for the planning of the transmission and distribution grids. The federal government's energy policy objectives, macroeconomic data and the international environment must be taken into account. When producing these scenarios, the SFOE consults appropriately with the cantons, the national grid operator, the other network operators and other stakeholders. Article 5a ESO states that the scenarios must be reviewed every four years and updated where necessary. On 24 November 2021, the SFOE began the consultation procedure on the 2030/2040 scenarios for electricity grid planning.

Article 9d ESA, which entered into force on 1 June 2021, stipulates that the national grid operator must present its multi-year plan to ElCom for inspection within nine months of the approval of the last set of scenarios by the Federal Council. The content of the multi-year planning is set out in Article 6a ESO, which also entered into force on 1 June 2021.

As no set of scenarios exists yet, Swissgrid's multi-year planning is based on the Strategic Grid Report 2025 completed in early 2015. This report contains Switzerland-wide coordinated planning of the transmission grid, and this essentially meets the requirements specified in Article 8 para. 2 and Article 20 para. 2a ESA. From ElCom's perspective, the Strategic Grid Report 2025 not only represents a significant milestone in the planning of the entire Swiss transmission grid, but it can also contribute towards improving cross-border coordination in the areas of financing and grid use. The level of investment for the expansion and maintenance of the grid appears to be plausible. The preservation of the value of the transmission grid can be assured on the basis of the defined planning.

The Strategic Grid Report 2025 takes due account of the requirement for balanced investments as specified in Article 22 para. 3 ESA. However, the uncertainty in terms of efficiency is probably considerably greater than suggested by the extensive, exact calculations regarding the indicated net benefits. For further discussion within the scope of multi-year planning and the evaluation options in the sectoral plan and planning approval procedures, the uncertainties need to be quantified using sensitivity analyses. This will increase the meaningfulness of the cost/benefit analysis. With regard to cross-border financing (CBCA), discussions concerning the methodology need to be stepped up between Swissgrid and ElCom, as well as within all relevant bodies. Based on the report by Swissgrid, it is now possible to assess the previously difficult-to-evaluate criterion of efficiency using a method that is as objective as possible and based on transparent assumptions. While this is a welcome development, the uncertainties over the 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.

4.2.2 Multi-year planning of the distribution grids

Under Article 9b ESA, every grid operator must determine grid planning principles. It is worth noting that the grid is generally only to be expanded if the provision of a secure, high-performance and efficient grid cannot be achieved throughout the entire planning horizon by means of optimisation or upgrading. In accordance with paragraph 3 of Article 9b ESA, ElCom may define minimum requirements in this respect. Under paragraph 4, the Federal Council may require the grid operators to publish these principles.

Article 9c ESA establishes the obligation for grid operators to collaborate for the purposes of expansion planning. This also includes the obligation to provide one another with any information required for this purpose at no charge. The grid operators must sufficiently involve the cantons concerned and other parties affected in the planning process.

Article 9d ESA entered into force on 1 June 2021. This states that grid operators must draw up a ten-year development plan (multi-year plan) for their grids with a nominal voltage of over 36kV based on the scenarios and in line with the additional requirements for their grid area. The planned projects are set out in the multi-year plan. This must demonstrate how effective and appropriate they are from a financial and technical perspective. The grid development measures planned over the ten-year period must also be outlined. Under Article 6d para. 2 ESO, which also entered into force on 1 June 2021, the multi-year plans for the distribution grids with a nominal voltage of over 36kV must be produced within nine months of approval of the last scenarios by the Federal Council.

4.2.3 Participation in the sectoral plan and planning approval procedures

In the procedures for the Electricity Transmission Lines sectoral plan and the planning approval procedure, ElCom checks compliance with the criteria set out in the ESA ("a secure, high-performance and efficient network"). DETEC decides on any differences of opinion between ElCom, the SFOE and ESTI (cf. agreement of 21 March 2018 [status as of 5 May 2020];[1]. At the request of ElCom, Swissgrid drew up the 'module guidelines'. This aid helps with the planning of line construction projects on the transmission grid

for the systematic cost calculation of the electricity transmission lines variants.

In 2021, ElCom participated in the support group for the following Electricity Transmission Lines sectoral plan (SÜL) procedures as part of its statutory duties: All' Acqua – Magadino, Vallemaggia (SÜL 109), Innertkirchen – Ulrichen (SÜL 203), Innertkirchen lead-in cable (SÜL 202.1), Marmorera – Tinzen (SÜL 701.1), Airolo – Göschenen (SÜL renunciation request). The premature expiry of some easements of a Swissgrid line in the communal district of Balzers in Lichtenstein presents an unusual challenge. ElCom also issued several opinions on projects as part of planning approval procedures.

1 Available at www.elcom.admin.ch > Documentation > Information

4.3 Investments in the grid infrastructure

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

4.3.1 Investments in the transmission grid

The actual amount invested in the transmission grid in 2020 stood at CHF 151.6 million. During the period 2016 to 2020, the average annual level of investment in the transmission grid stood at CHF 145 million.

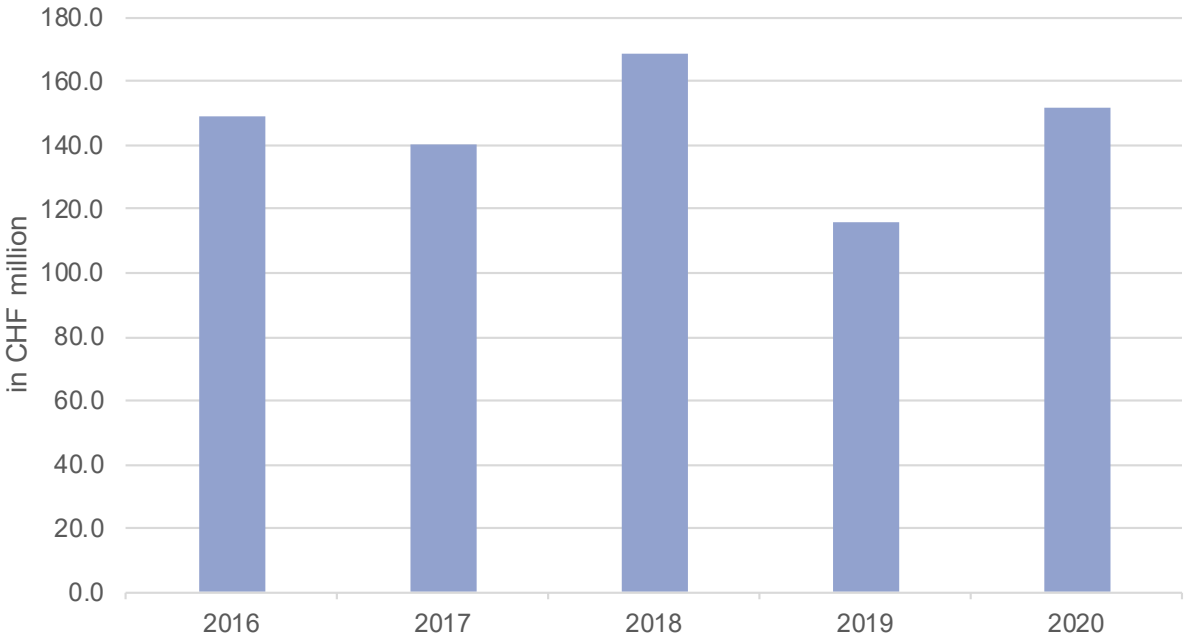


Figure 6: investments in the transmission grid

4.3.2 Investment in the distribution grid

Between 2016 and 2020, the distribution network operators invested around CHF 1.4 billion annually (Figure 7). During this period, write-offs increased from CHF 920 million to over CHF 940 million. As a result, the investment surplus fell from around CHF 465 million to just under CHF 437 million. Since the reliability of Switzerland's electricity networks is very high – also by international comparison (cf. section 3.6) – ElCom still considers the investments in the distribution grid to be sufficient.

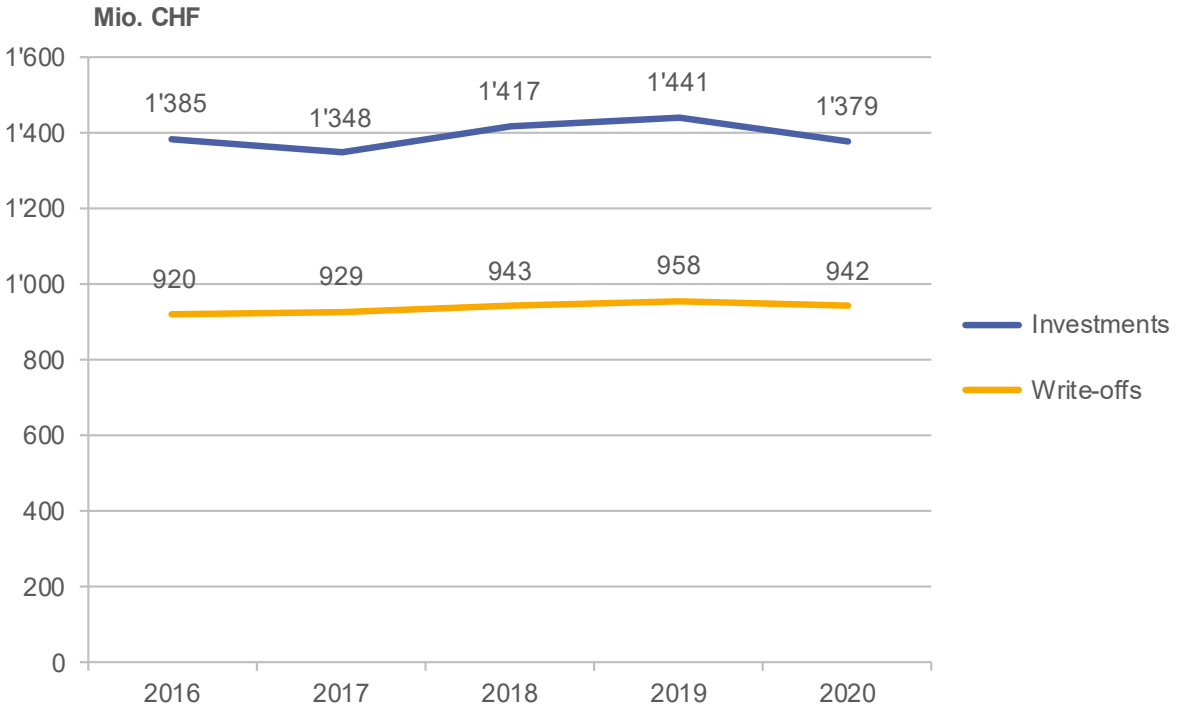


Figure 7: Trend in investments and write-offs in the distribution grid

4.3.3 WACC imputed interest rate for the grid

In 2021, ElCom supported a SFOE working group reviewing the current weighted average cost of capital (WACC) calculation method in accordance with Annex 1 ESO. ElCom had the opportunity to issue an opinion in this context. During this process ElCom pointed out several times that the WACC produced by the existing method was too high in the context of the current low-interest environment and that the technical lower limits of the risk-free interest rate required correction.

In Switzerland, the cost-plus system is used as a basis for calculating the recoverable grid use remuneration. The recoverable actual costs for the grid operation plus an appropriate profit constitute the basis for the tariffs. The operating and capital costs of a secure,

high-performance and efficient grid are recoverable. The recoverable capital costs also include the imputed interest on the assets required for the operation of the grids in accordance with Article 15 para. 3 let. b ESA. Interest is based on WACC, a widely recognised method in regulation. The basis is the average equity and debt capital costs, which in simple terms include risk-free interest with a surcharge. In the current WACC calculation method set out in Annex 1 ESO, the risk-free debt and equity capital rates are frozen at 0.5 and 2.5 per cent (floor).

The WACC for the grid aims to cover the grid's debt capital costs. It also ensures risk-oriented return on the capital deployed through the equity yield rate. The main risks of grid operation are reduced to almost zero. This is achieved through the cost-plus system and the option for grid operators to make additional charges for all budget deviations above the coverage differentials via the tariffs (cf. ElCom Directive 2-2019 on coverage differentials).

In ElCom's view, the WACC should be defined in such a way that – taking account of the specific, reduced risk in the cost-plus system – investments in power grids compared to other asset classes are not less attractive than other investment opportunities. However, incentivising investment in the grid (and in production) through the WACC should be avoided for transparency reasons. This would be equivalent to a subsidy – and would have to be disclosed transparently. Future challenges, such as decentralised production and the trend towards greater de-solidarisation of grid costs requires new, future-oriented models to ensure sustainable financing of the grid in ElCom's view.

As a regulatory authority, ElCom is responsible for monitoring the Electricity Supply Act and therefore also compliance with Article 6 ESA according to which the tariffs for fixed end consumers and any end consumers who relinquish access to the grid must be appropriate. This is why it supports a WACC calculation method that takes account of the risks in grid operations and the current situation on the capital markets. This means the interest ensures both a risk-appropriate return on the capital deployed for grid operations as well as appropriate tariffs.

4.4 Increases in network capacity

Additional network capacity may be required in order to connect producers of electricity from renewable energy to the distribution grid. Swissgrid refunds the costs involved by incorporating them into its calculation of the system services tariff. This form of remuneration requires approval from ElCom, which relies on a directive that serves as a guideline for grid operators when submitting applications. This directive also defines the criteria for the assessment of such applications. In the year under review, ElCom evaluated 25 applications for the remuneration of costs associated with increases in network capacity.

In 2020, ElCom ruled that entitlement to remuneration for grid improvement costs expires after a five-year period. A decision was challenged at the Federal Administrative Court in which the duration of the expiry period was contested. The Federal Administrative Court supported ElCom's decision in judgment

A-2593/2020 of 5 May 2021 and declared that the remuneration payment for increases in network capacity qualifies as remuneration in accordance with Article 3 para. 2 let. a of the Subsidies Act (SubA). Claims for financial support and compensation expire after five years (Art. 32 para. 1 SubA). The entitlement to remuneration of costs for increasing network capacity expired five years after acknowledgement of these costs in the specific case. ElCom has issued a total of 996 decisions over the past 13 years (cf. Figure 8, Table 5).

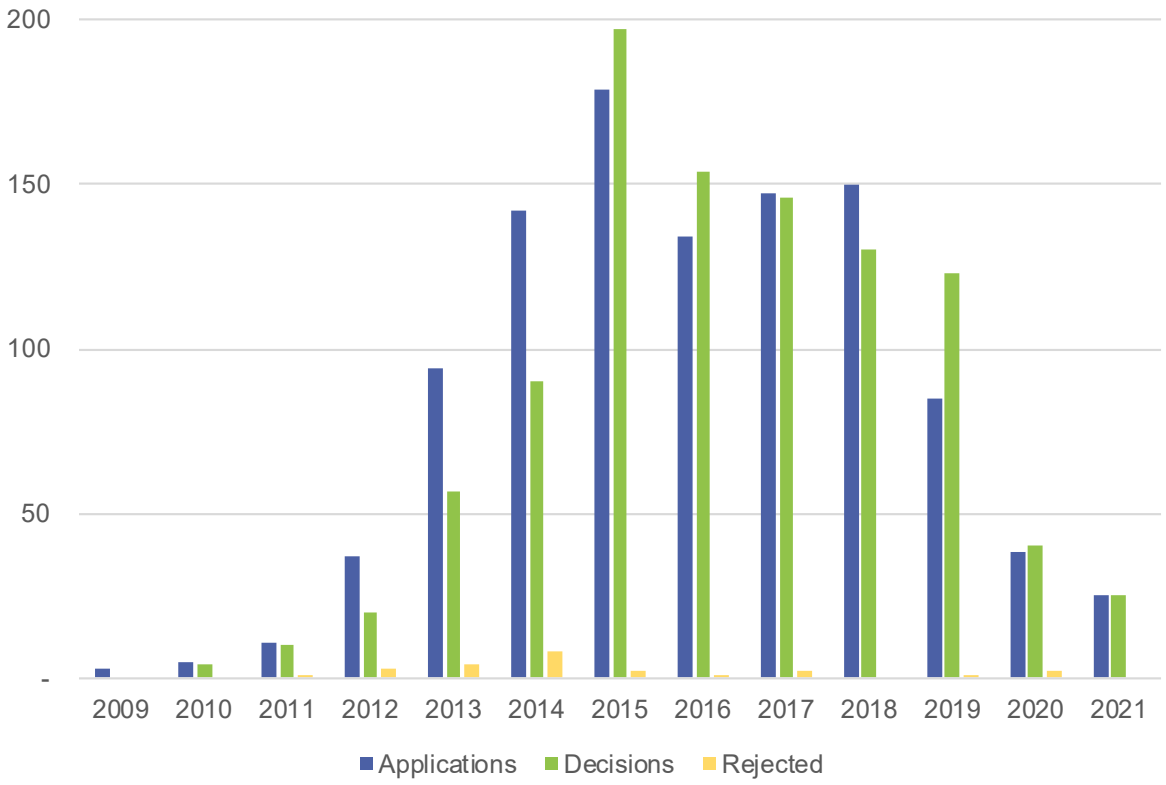


Figure 8: Trend in the number of applications, decisions and rejections for network capacity increases

Total costs for network capacity increases stood at around CHF 116.7 million at the end of 2021 and the related power plant output amounted to 368.1MW in total. Table 5 provides an overview of the key figures on decisions on remuneration applications for necessary network capacity increases for the period 2009 to 2021.

	Total	PV	Hydropower	Wind	Other[1]
No. of decisions	996	937	34	4	21
Minimum generator output [kW][2]	4	4	29	1,500	22
Maximum generator output [kW][2]	74,000	8,303	14,726	16,000	74,000
Total generator output [kW]	368,106	158,069	65,588	30,000	114,449
Minimum costs [CHF][2]	3,500	3,500	12,277	1,151,165	18,069
Maximum costs [CHF][2]	9,262,389	746,912	2,990,952	9,262,389	2,117,200
Total costs [CHF]	116,670,841	71,006,334	20,069,704	19,853,343	5,741,460
Average costs [CHF][3]	117,022	75,861	590,285	3,308,891	273,403
Minimum relative costs [CHF/kW][4]	3	3	5	451	3
Maximum relative costs [CHF/kW][4]	9,719	9,719	4,148	1,116	2,877
Average relative costs [CHF/kW][4]	317	449	306	662	50

1) e.g. Biomass and different plant types
2) Per application / ruling
3) Corresponds to the average value of approved costs of network capacity increases per decision
4) Relative costs = ratio of costs to installed capacity

Table 5: Figures relating to decisions on network capacity increases issued between 2009 and 2021

4.5 National grid operator

During the first half-year, ElCom determined the coverage differentials of the former owners of the transmission grids in the tariff years 2011 and 2012, as well as the regulatory residual values as at the end of 2012 in 19 decisions. In another decision, ElCom decided on the coverage differentials for the tariff years 2011 and 2012 of Swissgrid. Based on the regulatory residual values, Swissgrid and the companies concerned then calculated the definitive compulsory purchase compensation to be paid by Swissgrid for the transmission grid, most of which had already been transferred to Swissgrid in early 2013. The compulsory purchase value of the transmission grid is around CHF 3 billion and the regulatory value around CHF 2.5 billion. During the year under review, ElCom also assessed whether Swissgrid had correctly implemented ElCom's requirements in accordance with the 2019 system audit ruling.

5 The Swiss electricity market

Switzerland has the ideal conditions for generating hydropower thanks to its topography and high average rainfall. The Hagneck run-of-river power plant is pictured here.

5.1 Structure of network operators in Switzerland

The number of network operators in Switzerland fell by just under four per cent to 623 between 2015 and 2020. There has been a clear trend towards fewer network operators for some time now, which is attributable in part to network takeovers and mergers between communes. According to the official Swiss commune register, the number of communes decreased from 2,324 to 2,148, or by eight per cent, during the period 2015 to 2020. Switzerland's population increased by over three per cent during the same period. This resulted in an increase in the number of end consumers per network operator. A typical distribution grid operator nevertheless remains small (Figure 9), supplying a median value of just under 1,500 end consumers. Only 80 grid operators supply over 10,000 consumers and 12 of them over 100,000 end consumers. In total, Swiss grid operators supply more than 5.5 million customers with electricity.

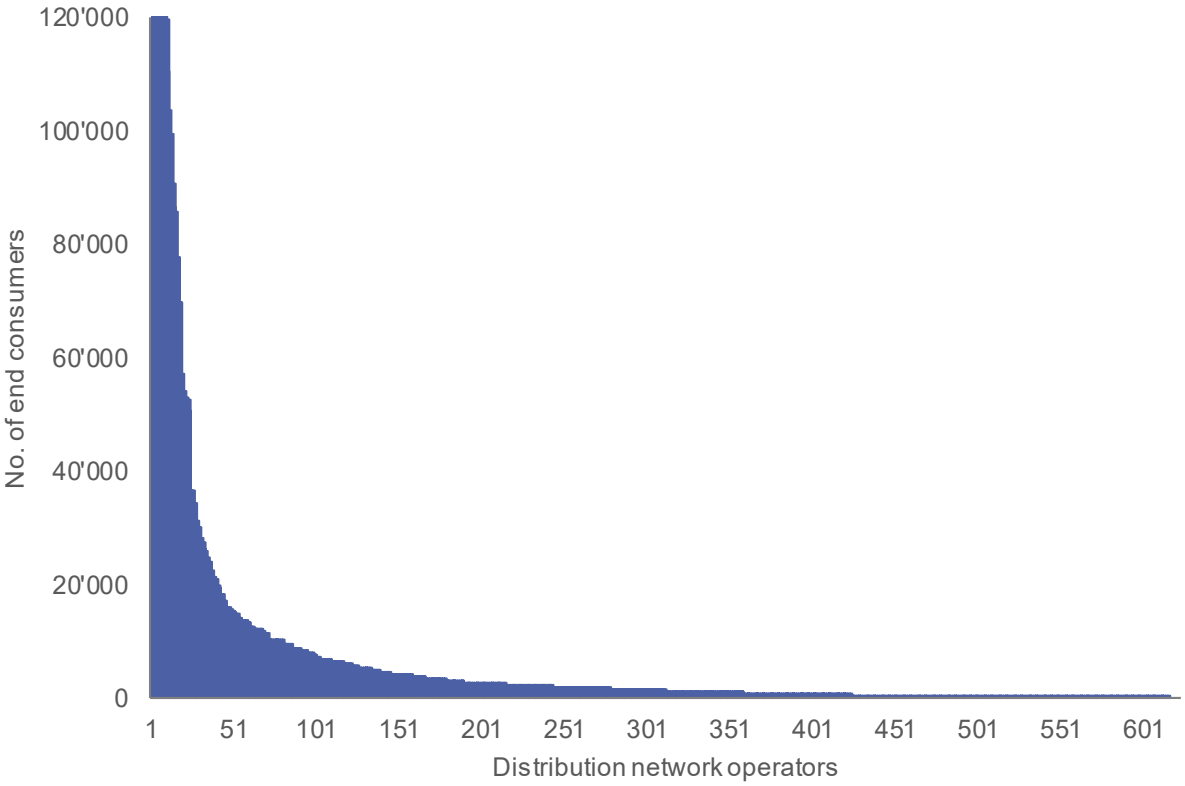


Figure 9: Number of end consumers per distribution grid operator. To improve readability, the vertical scale has been cut off at 120,000 end consumers; the data cut-off relates to nine distribution grid operators.

5.2 Market access and switching rate

In the first stage of opening up the Swiss electricity market, only large consumers with an annual consumption of over 100MWh are entitled to free market access, i.e. the right to freely select their own electricity provider. They have until the end of October of each year to decide whether they wish to switch from basic supply in the following year. Once in the free market, a major consumer can no longer return to regulated basic supply.

ElCom regularly conducts a survey of the largest distribution grid operators to determine the number of potential and effective end consumers on the free market. This currently includes each of the 76 network operators with offtake of over 100'000MWh. In total, these network operators together supply 3.8 million or just under 70 per cent of end consumers in Switzerland. Of the 34,539 end consumers entitled to free market access (0.6 per cent of all end consumers), 23,394 had exercised their right (68 per cent) by 2021. Consumers in the supply areas of these grid operators account for a total of 40.4TWh (around 75 per cent) of end

consumption in Switzerland[1]. Of this 40.4TWh, just under half of the energy (18.3TWh) goes to end consumers entitled to free market access. Those consumers who have chosen market access consume 15.3TWh, or 83 per cent, of the available energy.

The right to freely choose an electricity supplier was exercised on a relatively small scale during the first few years after the market was liberalised (Figure 10). Due to falling market prices, the number of end consumers who exercised their rights increased sharply in the years that followed. In 2021, the share of end consumers on the free market fell slightly. This decrease is due to the fact that the number of consumers entitled to free market access has grown faster than the number of consumers who have actually opted for free market access. The latest figures indicate that two-thirds of all consumers entitled to market access have exercised this right to date (orange curve). They consume four-fifths of the energy used by customers entitled to free market access (blue curve). This means that the number of consumers who have not yet exercised their right to switch to market access is relatively low.

1 End consumption, excluding public transport and lighting, stood at 53.3TWh on average during the period 2011 to 2020 (source: Swiss Federal Office of Energy).

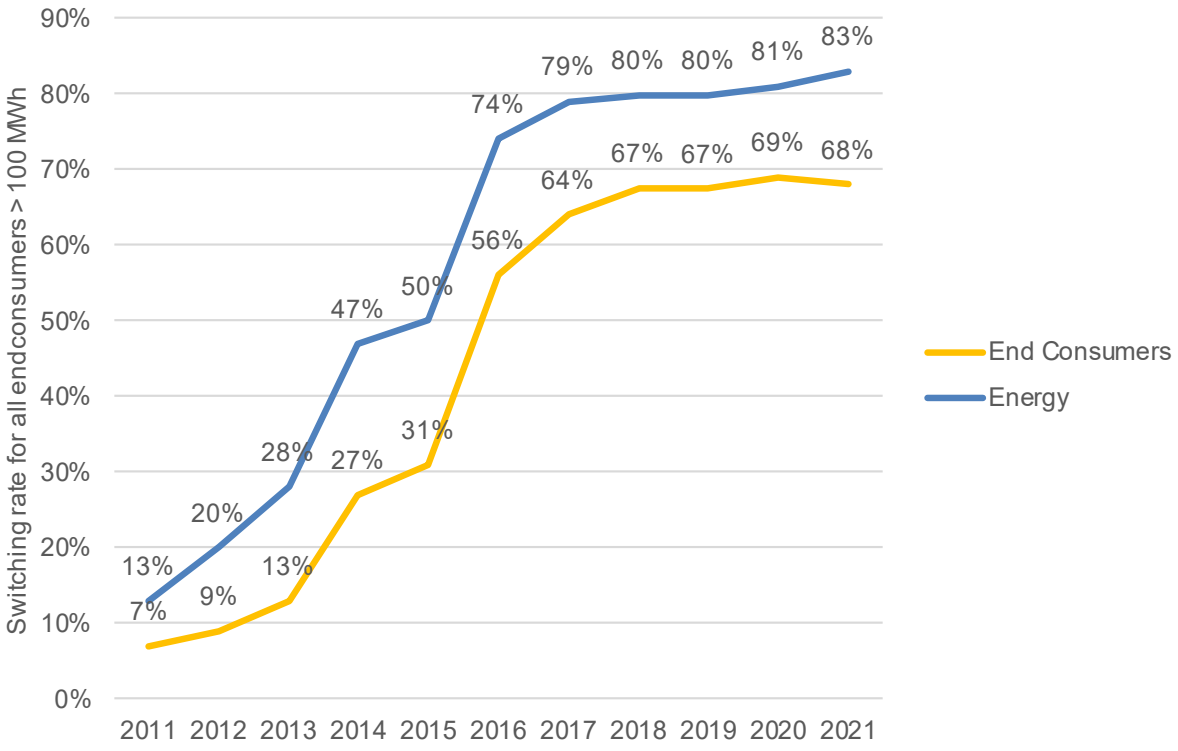


Figure 10: Switching to the free market

The following figure 11 shows the distribution of the quantity of energy sold as a function of the size of the grid operator – in the same way as in Fig. 2, the distribution is based on size in groups of ten for the 100 biggest companies (1 to 10, 11 to 20, 91 to 100) and for the around 520 remaining small grid operators ('remainder'). The largest ten grid operators (dark blue) supply 43 per cent of the energy sold to end consumers on the distribution grid. If extended to the 50 biggest grid operators, the share rises to over 70 per cent of energy supplied. The next 50 largest grid operators together supply one tenth, while the remaining grid operators supply one sixth of the energy used by end consumers.

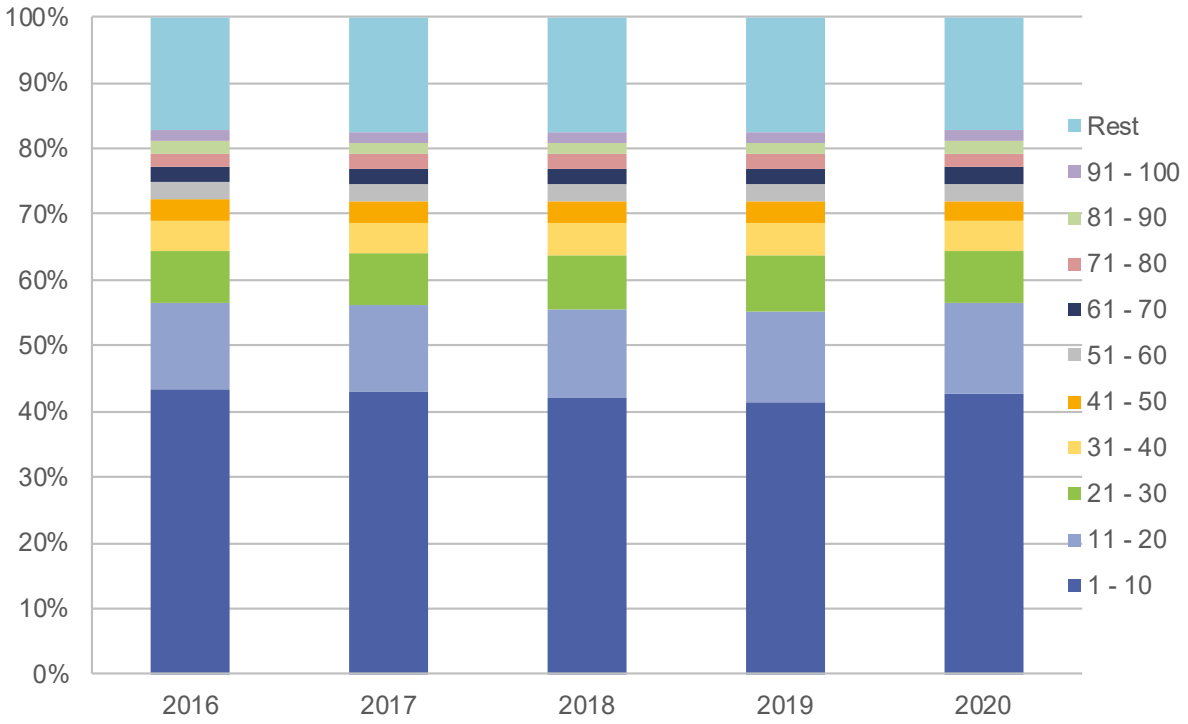


Figure 11: Percentage share of energy supplied via the distribution grid by company size.

5.3 Transmission grid tariffs

As the overview in table 6 shows, the tariffs for the transmission grid fluctuate. The general system services are identical in the 2022 and 2021 tariffs. The grid usage tariffs, which are governed by Article 15 para. 3 ESO (30 per cent working tariff, 60 per cent power tariff, 10 per cent basic tariff) rose year-on-year. In contrast, the tariff for active power losses was reduced from 0.15 to 0.14 cent/kWh (cf. section 3.7 System services).

	2018	2019	2020	2021	2022
Network use					
Working tariff [cents per kWh]	0.23	0.19	0.18	0.20	0.25
Power tariff [Swiss francs per MW]	38,200	31,100	28,800	33,600	43,920
Fixed basic tariff per exit point	365,300	288,000	269,400	319,800	413,040
General system services tariff [cents per kWh]	0.32	0.24	0.16	0.16	0.16
Individual AS tariff					
Active power losses [cents per kWh]	0.08	0.14	0.25	0.15	0.14

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

In order to compare the tariffs of the various grid operators, ElCom converts the tariff components (working, power and basic tariffs) into cents per kWh. If the individual tariff components of the transmission grid are combined in cents per kilowatt hour, this results in a figure of 0.92 cents per kWh for 2021 and 1.06 cents per kWh for 2022. On average, a typical household with annual consumption of 4,500kWh (category H4: Five-room apartment with electric cooker and tumble dryer, but without an electric boiler), pays network use remuneration of 9.7 cents per kWh for the transport and distribution of energy (cf. Figure 12 in the next section). Projected over one year, this corresponds to an electricity bill of CHF 972 for a consumption of 4,500kWh. This means the share of 1.06 cent/kWh or CHF 50 per year for the transmission grid of the tariffed grid costs of this household for the 2022 tariffs once again stands at over 10 per cent.

5.4 Distribution grid tariffs

General tariff structure

In 2022, ElCom once again answered many queries concerning amendments to the Electricity Supply Act of 23 March 2007 and the Electricity Supply Ordinance of 14 March 2008, which entered into force on 1 June 2019. Some of them have been published in the amended notification entitled Fragen und Antworten zur Energiestrategie 2050 (Questions and Answers on the Energy Strategy 2050). The increase of smart meters on the Swiss distribution grid means new tariff models are also increasingly being introduced, which are provided, for example, as optional tariffs to the basic tariff in the network tariffs. Dynamic tariffs, which take account of the grid load behaviour of end consumers more effectively and enable costs to be saved through differentiated load management and differentiated consumption, will become possible. This kind of dynamic tariff can be provided subject to certain conditions under the current legal provisions. ElCom issued the notification Fragen und Antworten zu neuartigen und dynamischen Netznutzungs- und Energieliefertarifen (Questions and Answers on New and Dynamic Network Usage and Energy Supply Tariffs)[1] in 2019 which sets out the legal framework in section 3.3.

In 2022, the median electricity price for a household with consumer profile H4 was 21.6 cents/kWh (cf. Figure 12).

The electricity price is made up of four elements: the network use remuneration, the energy price, the fees paid to the state and the federal charges for the promotion of domestic renewable energy. The grid operators must publish the first three components by the end of August at the latest before the respective tariff year. This means the average price of electricity in 2022 is up slightly on the previous year: grid tariffs rose by 0.1 cent/kWh and the energy tariffs by 0.2 cent/kWh. Charges for renewable energies did not change, while the fees paid to the state rose by 0.1 cent/kWh on average (5.7% compared to the previous year). Grid operators have declared both the least expensive and their standard products since the 2018 tariff year. The latter is charged to end consumers if they do not actively select another electricity product. This only generally concerns energy. As a result, the distribution grid tariffs can only be compared with previous years to a limited extent from 2018 onwards.

1 Available at www.elcom.admin.ch > Documentation > Information.

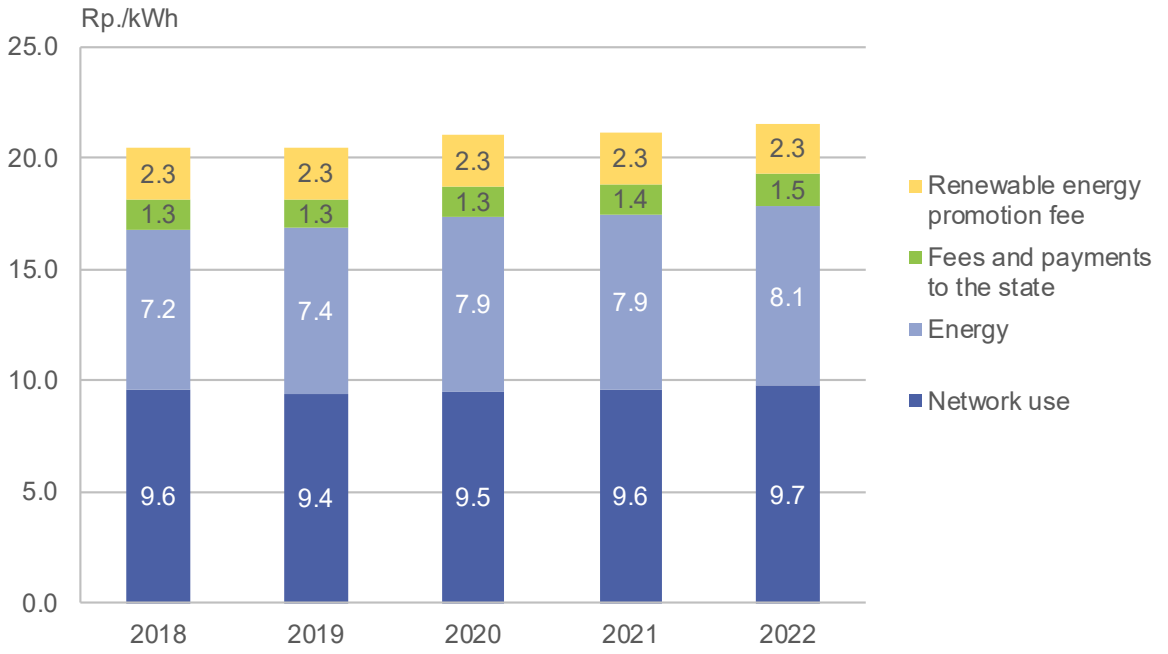


Figure 12: Cost components of the average overall electricity tariff for consumer profile H4 (excluding VAT).

The tariffs in figure 12 refer to national medians. Significant differences in tariffs nevertheless often exist at cantonal and communal level. Detailed information about the tariffs of each commune and an interactive map can be found on ElCom's website (www.elcom.admin.ch) by clicking on the link to the overview of electricity tariffs ('Electricity Price – Overview').

The tariff components on ElCom's electricity price website are weighted by residents for technical reasons, and not by bill recipients as in the calculation of costs in the bar charts above. This means there are slight differences between the two calculation methods.

The median communal tariffs for 2022 are shown in Figure 13 to Figure 16 below. The

method used for presenting these tariffs has been changed since the 2018 Activity Report and year-on-year comparisons are no longer provided. The further the communal median value lies from the Swiss one, the redder (higher tariff) or greener (lower tariff) the communal area appears. The colour variations show the development of the communal tariffs in relation to the comparable national level. Figure 2, for example, shows that grid tariffs in Basel-Stadt were relatively high (orange) and relatively low in Geneva (light green).

The maps below show the situation for the average tariffs of Swiss communes in 2022. 'Network' and 'energy' are the only tariff components that can be directly influenced by grid operators and are checked by ElCom. The median network use remuneration for 2022 is 9.85 cents/kWh and the median energy tariff stands at 7.94 cents/kWh.

Network use

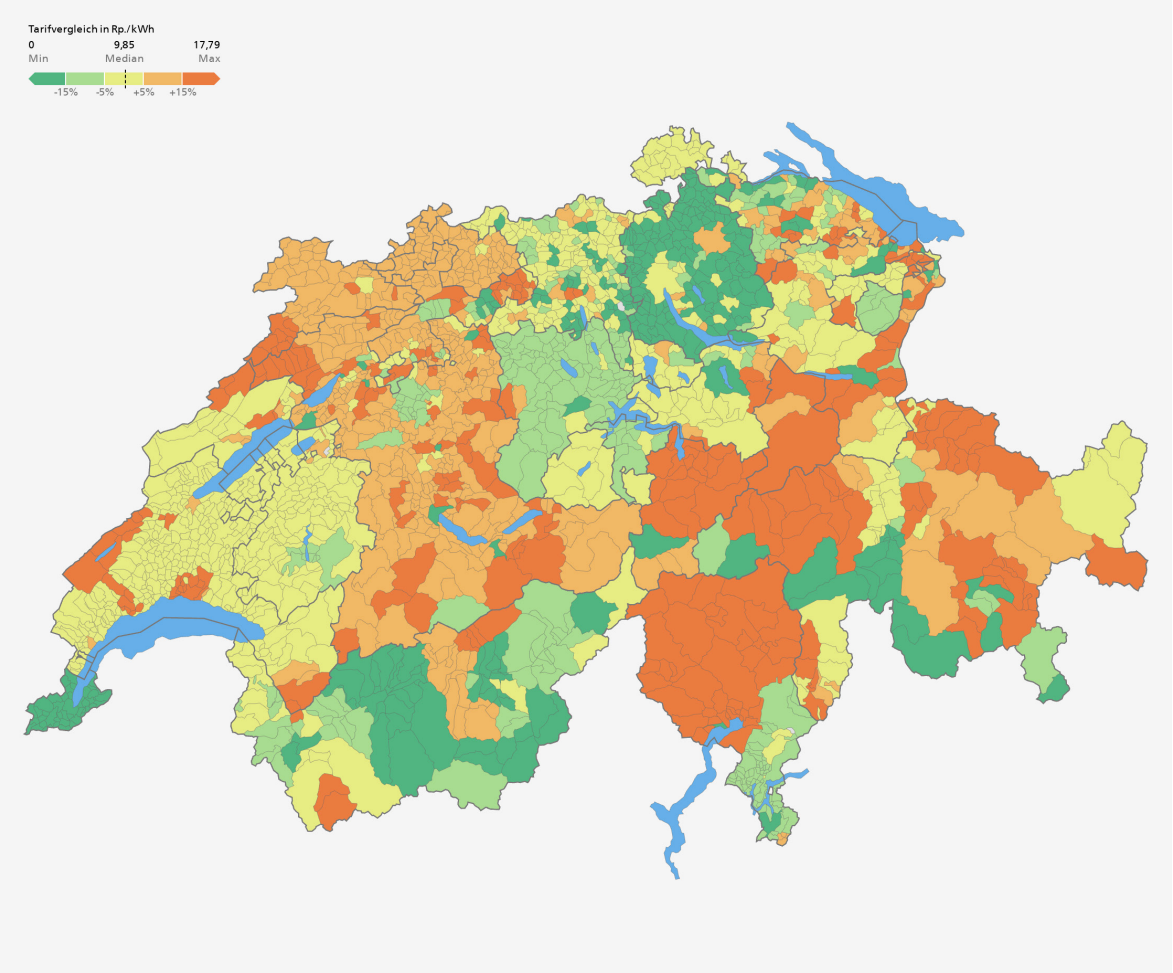


Figure 13: Average communal tariffs (median) for grid use for consumption profile H4 in 2022

Energy

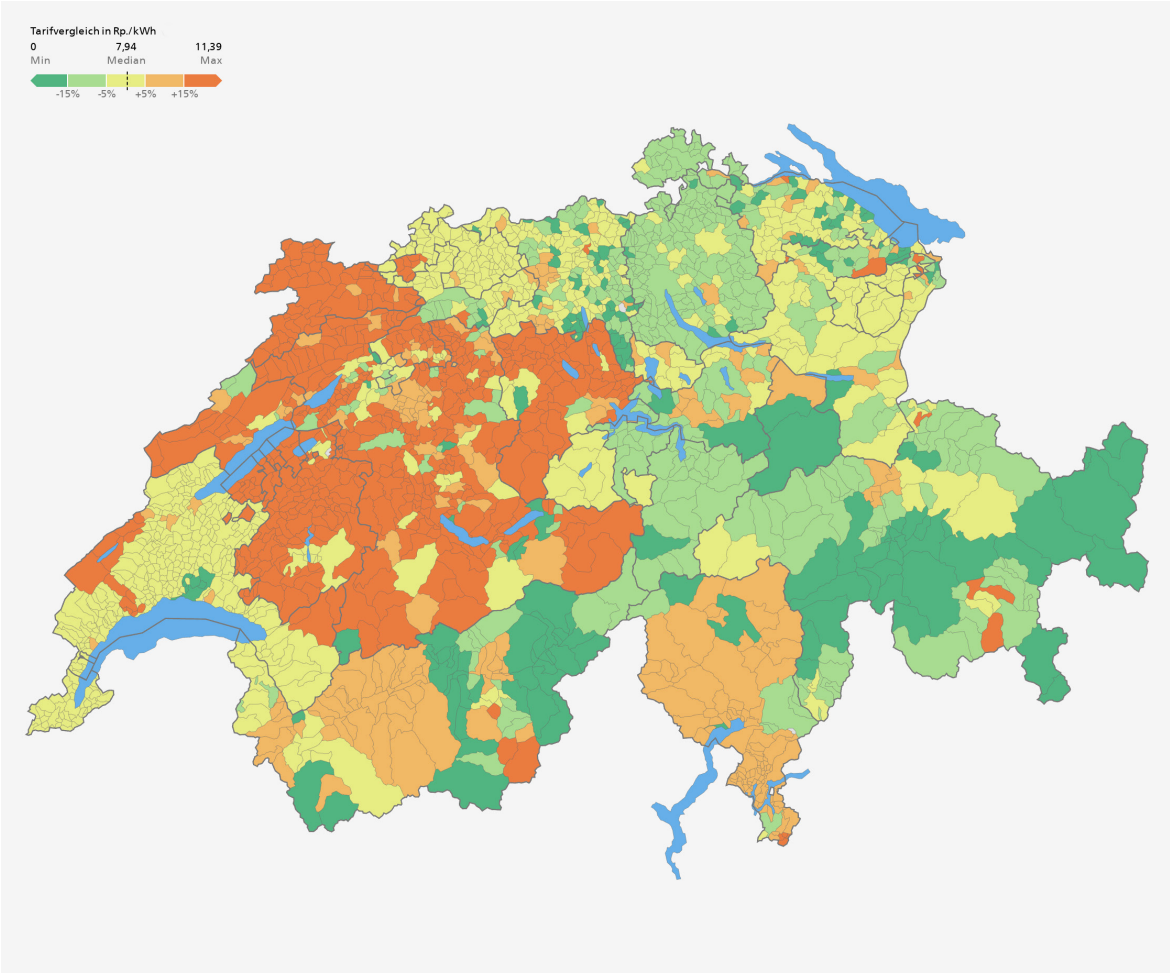


Figure 14: Average municipal tariffs (median) for energy for consumption profile H4 in 2022

Fees and payments to the state

Figure 15 shows the median cantonal and municipal fees and payments to the state. It does not show the uniform Switzerland-wide federal charges for the promotion of renewable energy[1]. Fees and payments to the state are not controlled by ElCom, but are determined in local political decision-making processes. The median fees and charges for 2022 are 0.9 cents/kWh. It is noticeable that there are often high and low, but rarely medium amounts (shown in yellow).

1 As the network surcharge is uniform throughout Switzerland, it is not shown here. However, the total is shown in Figure 16.

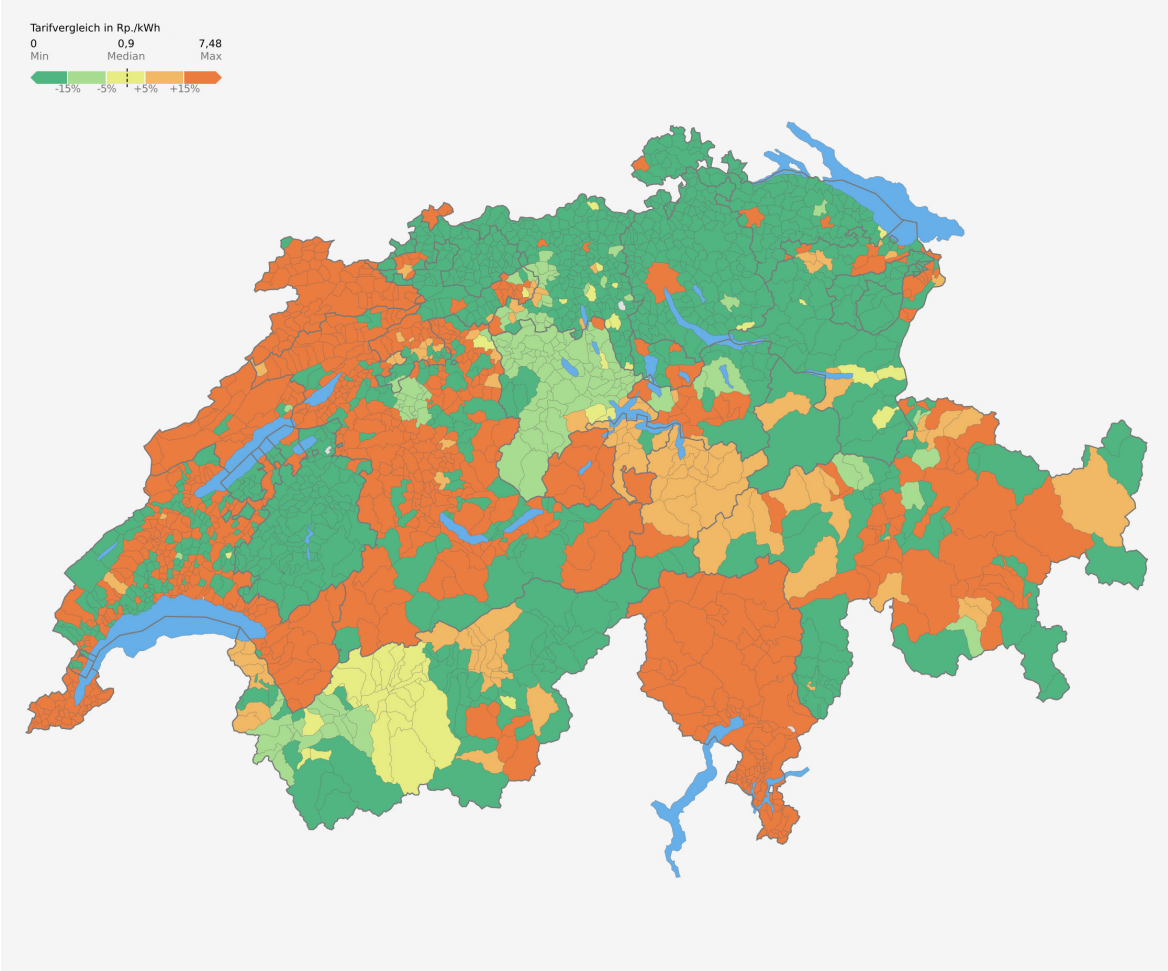


Figure 15: Median communal tariffs for cantonal and communal fees and payments to the state for consumer profile H4 in 2022

Overall electricity tariff

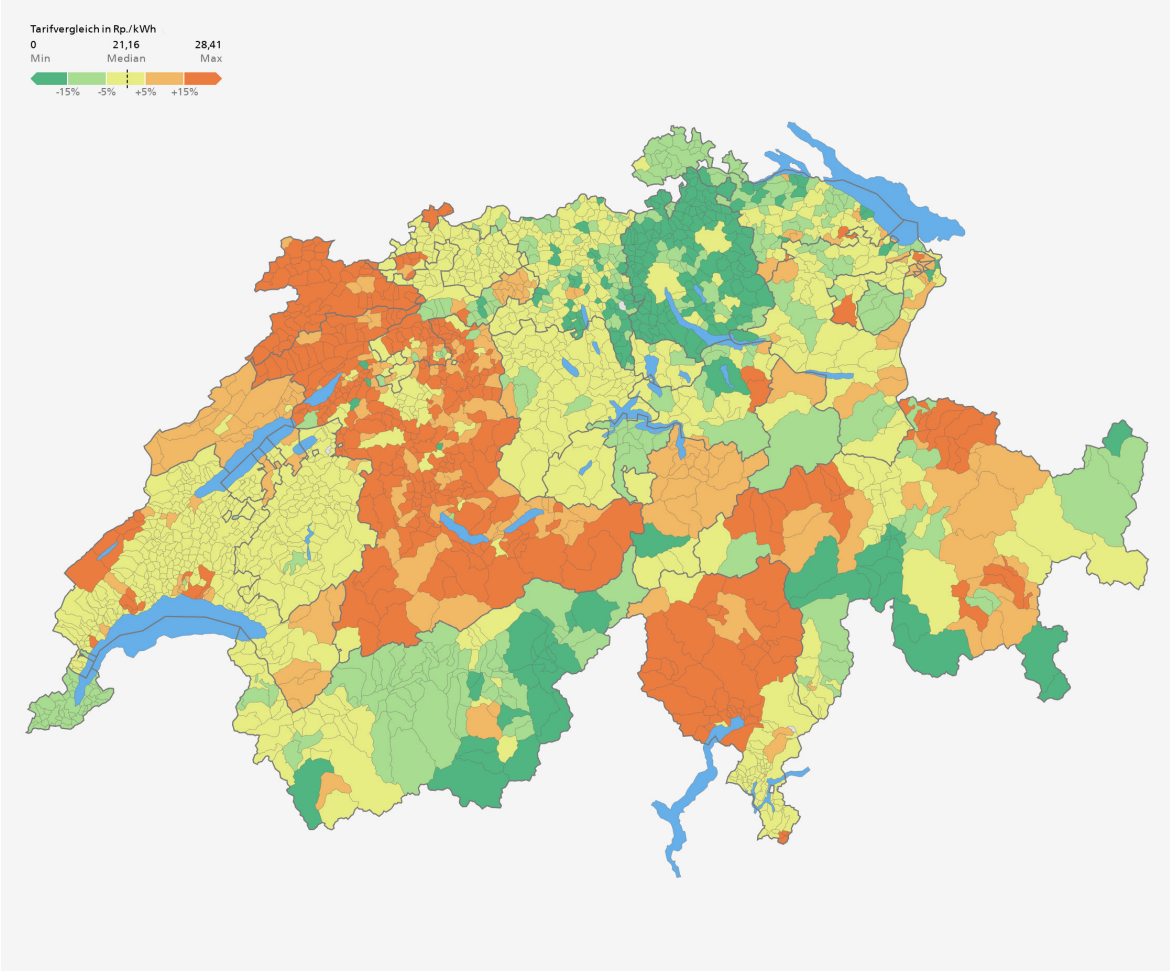


Figure 16: Median communal tariffs for the overall electricity tariff for the H4 consumer profile in 2022

The overall tariff weighted by inhabitants of a total of 21.16 cents/kWh (or 21.6 cents/kWh weighted by bill recipients) also contains the grid surcharge for the promotion of renewable energy. This was gradually increased from 1.5 cents/kWh to 2.3 cents/kWh during the period up to 2018 and has since been stable.

5.5 Submission of cost calculations and tariffs with EDES

Every grid operator must submit the cost calculation, which forms the basis for the grid and energy tariffs for the following year, to ElCom in electronic format by the end of August. In 2021, the year under review, a newly activated system was used to submit this data for the first time – the ElCom data delivery system EDES. To make the transition process as smooth as possible, ElCom provided grid operators with various user support documents (user guide, FAQ, instructions etc.) beforehand and invited them to attend various workshops and tutorials where the new features and their effect on the processes were presented.

The new web-based data delivery system provides various benefits compared to the previous, Excel-based solution. Checks are now integrated into the online forms. This means that the grid operators can be provided with support through automated feedback when completing the cost calculation forms – in other words before official submission to ElCom. This 'prior check' enables further improvement in the quality of the data submitted and reduces rectification workload for grid operators.

Checks that verify compliance of the information with the law and ElCom directives have also been integrated into the new forms. If anomalies occur, these checks request the grid operators to either correct the value entered or to justify its use (compliance checks, 'comply or explain'). Further checks will be directly implemented in the new data collection system in future. Whereas the data submitted by grid operators was initially analysed for errors and inconsistencies by around 180 checks in previous years and fed back to the operators for correction, this process has not been applied recently. Network operators will now only be contacted if clear deviations exist despite all plausibility and compliance checks in the form.

ElCom underlined the importance of the cost calculation in 2020 and provided a clarification concerning submission and subsequent amendment (Directive 1/2020). This states that amendments to submitted cost calculations can only be carried out upon request and following approval or at the request of ElCom. Grid operators must also confirm that the cost calculation data submitted on 31 August is correct and complete by providing a legally valid signature. If a network operator wishes to amend data at a subsequent stage, they must submit a well-founded application to ElCom.

5.6 Examination of tariffs

The fact that a number of grid operators have accumulated significant shortfalls over recent years is an issue in ElCom's view. In late summer it requested all grid operators with high shortfalls to either write off the coverage differentials not reduced within the stipulated three-year period on a tariff-neutral basis or to present a reduction plan to ElCom. A number of grid operators have already declared that they will write off their shortfalls on a tariff-neutral basis (cf. section 5.10).

The significant price rises on the electricity market in the final quarter of 2021 meant that various queries were received from grid operators and end consumers (cf. section 6.3). ElCom published frequently asked questions (FAQs) in a notification entitled Steigen-

de Elektrizitätspreise: Fragen und Antworten zur unterjährigen Anpassung der Energietarife, zur Ersatzversorgung und zur Rückliefervergütung (Rising Electricity Prices: Questions and Answers on the Intrayear Adjustment of Energy Tariffs, Substitute Supplies and Feed-In Remuneration) on 7 December 2021. As a general rule: The published tariffs are fixed for at least a year and cannot be subsequently adjusted. A free end consumer cannot switch back to basic supply. In the event of the lack of a supplier, the free end consumer obtains electricity physically from the local distribution grid. This substitute supply is not explicitly governed by the applicable law. In such cases, ElCom recommends that the substitute supply is contractually governed with the local distribution grid operator.

In line with its longstanding past practice, ElCom examined the compliance of tariffs in depth during the year under review. Preliminary examinations were also introduced for various grid operators. These verifications did not provide any indication of the need for an in-depth tariff assessment procedure.

Grid costs

After over a decade of regulatory activity, the core issues concerning the grid have largely been resolved, either through decisions by ElCom or court decisions. In particular, this applies to the issue of historic and synthetic evaluation of grid installations. A grid operator whose assets were ruled on several years ago nevertheless submitted an application for a re-assessment of certain network components. Synthetic values will now be calculated on the basis of construction invoices (incl. cost estimates) and the inclusion of costs from the ducting and cable categories. Some installations with historic valuations will also be re-evaluated on the basis of the annual summary procurement costs of several installations and divided by the number of installations in the year concerned. Building values will also be calculated on the basis of insurance valuations. In the case of some particularly older installations, the commissioning date will be replaced by the accounting capitalisation date, which would mean an increase in the residual values of the installations. All applications clearly contradict the provisions of electricity supply legislation and were consequently dismissed in full.

The installation costs involved in the rollout of smart meters was also an issue. Various grid operators wanted to capitalise these costs contrary to the provisions of industry documents, which stipulate that installation costs for smart meters are included in other costs as operating costs. As it complies with electricity supply legislation, ElCom adopted this solution, which means these installation costs must be explicitly declared as operating costs in the cost calculation based on the tariffs. ElCom reaffirmed this view during the year under review. Capitalisation of the installation costs would result in unequal treatment of those grid operators that have already completed extensive roll-out and cannot capitalise these costs retroactively.

During the year under review, ElCom also issued a decision concerning the assumption of system services costs and EnA surcharges incurred through end consumption in territory abroad, but which falls under the Swiss control zone. ElCom left open the question as to whether Swiss law applies on foreign territory in this regard. The decision concerned the reimbursement of system service costs and EnA surcharges over previous years not incurred in the consumption of the end consumers connected directly to the distribution grid of the operator con-

cerned (Art. 15 para. 2 let. a and c ESO [status as of 1 January 2017]).

In the year under review, ElCom also received an application from several communes concerning the definition of the access point for the power supply of buildings and installations against the distribution grid operator in these communes. In addition to the definition of the access point for the power supply, the communes also requested that the distribution grid operator should be obliged as a precautionary measure to determine with immediate effect the access point on their distribution grid for the supply of power to buildings and facilities with electrical installations for the building connection points, particularly for electricity connections for electric mobility and energy-intensive data processing facilities. ElCom rejected this application as the imposition of precautionary measures requires a situation where disadvantages would otherwise arise which could not be compensated for as part of the final decision. This is not the case in the scenario ruled upon. This means the matter only concerns the assumption of costs which could simply be reimbursed.

Energy costs

With regard to energy provided to end consumers with basic supply, the key issues in the year under review were the average price method and the CHF 95 and CHF 75 rule (applicable from 2020).

The average price method concerns the issue of how electricity procurement costs are divided between the basic supply end consumers covered by the monopoly and free market customers. In specific terms, it aims to ensure trading activities are adequately taken into account in the calculation of the recoverable energy costs. ElCom identified various network operators which had billed their fixed end consumers disproportionately high energy costs over the previous years and as a result may not have applied the average price method in accordance with the practice of the courts and ElCom. In its final vote on 15 December 2017, Parliament also upheld Article 6 para. 5 ESA and therefore ElCom's average price method supported by the Federal Supreme Court. As a result, ElCom then initiated proceedings against various network operators.

Two more of these proceedings were concluded in the year under review – but one does not yet become legally enforceable. In both cases, the recoverable costs of energy procurement for the basic supply tariffs had to be reduced. Trading transactions not previously taken into account in the procurement portfolio have now been included in the calculation of the average price. As the electricity market prices were well below the generation costs of the respective in-house power plants during the relevant period, this resulted in a cost-reducing effect in favour of end consumers with basic supply.

The interest rate used for the calculation of the generation costs (WACC production) had to be reduced in one of the two cases. In the calculation of the recoverable generation costs of a production plant, the imputed depreciation and the imputed interest are recoverable on the assets required for production. WACC production aims to adequately take account of the risks of power generation. ElCom decided to use the WACC for the

promotion of large-scale hydropower, which is defined annually by DETEC, as the maximum permitted interest rate for WACC production in accordance with electricity supply legislation. The interest on net current assets applied by the network operator was also removed from generation costs.

In the remaining proceedings still in progress, all or some of the following points are contentious: definition of the quantity and cost of energy to be used when calculating the average price method, implementation of ElCom Directive 2/2020 on WACC production, interest on energy coverage differentials and differentiation of grid operators within a group company.

The CHF 95 or 75 rule once again required various grid operators to make adjustments. This rule was established by ElCom in order to facilitate an assessment of the reasonable administrative and distribution costs and profits of grid operators relating to the distribution of energy to basic supply consumers. The following principle has applied since early 2020: If the declared total of administrative and sales costs, including profit, does not exceed CHF 75 per invoice recipient, they will not be evaluated more closely by ElCom for reasons of prioritisation. One grid operator complained that it was not able to generate a profit through sales due to the reduction of the threshold from CHF 95 to 75. The application for maintaining the threshold at CHF 95 was rejected. ElCom approved the reduction after taking account of costs and profits over the years. ElCom set out the application of the CHF 75 rule in detail in its Directive 5/2018. This states that if: administrative costs – after evaluation by ElCom – of over CHF 75 per invoice recipient are recoverable, a grid operator may factor in a profit using the same calculation method as on the grid, provided the total amount does not exceed CHF 120 per invoice recipient.

5.7 Sunshine Regulation

The 'Sunshine Regulation' uses a transparent and standardised process to compare the quality, cost efficiency and tariffs of different network operators. It makes divergences clearer to see. This type of regulation supplements the tariff evaluation procedures, which can be extremely resource-intensive in some cases. Here, selected indicators relating to quality of supply and services, as well as to costs and tariffs, measure the quality, costs and efficiency of the provision of services by the individual suppliers. In addition, compliance indicators demonstrate adherence with the legally stipulated deadlines and regulatory requirements. This direct comparison of network operators is intended to create incentives to eliminate any identified shortcomings, without the need for intervention by the regulator. For comparison purposes, network operators with similar structures are grouped together.

To calculate the indicators, ElCom essentially uses data that is submitted each year by the network operators relating to cost calculations, tariffs and supply quality surveys. ElCom also uses data from the Federal Statistical Office (FSO) which is publicly accessible. This means there are practically no additional administrative costs for network operators associated with the Sunshine Regulation.

To evaluate the indicators, ElCom divided the approximately 620 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). The individual results are calculated on this basis. These were sent to the operators individually in December 2021.

The indicators calculated remained unchanged in the year under review. During the current year, the situation is to be reviewed to determine whether any new indicators should be incorporated into the calculations or existing ones amended. As in previous years, ElCom published various explanatory documents and results on the Sunshine Regulation on its website. These publications are aimed primarily at the network operators concerned, but also at interested members of the public.

As in previous years, the creation of a legal basis for the publication of results within the framework of the revision of the Electricity Supply Act was again a key issue: The aim is to make the publication of the individual results of the network operators accessible to a wide audience – in the same way as the tariffs on ElCom's electricity price website. During the year under review, ElCom began preparing for subsequent publication once the legal basis is established.

5.8 Issues relating to measurement services

In its decision 233-00093 of 6 April 2021, ElCom decided that an uncertified smart meter, which was installed prior to 1 January 2018, could be used until the end of its lifespan. The installation of a smart meter does not require the end consumer's consent. The network operator must guarantee the data security of measuring systems and comply with data protection law. This applies regardless of whether or not the measuring system is certified. The use of an uncertified measuring system did not violate data security or data protection law in the case ruled upon. There is a sufficient legal basis for the processing of the measurement data in accordance with Article 8d para. 1 let. b ESO. The procedure in accordance with Article 8d ESO is proportionate and in the public interest. The decision was challenged at the Federal Administrative Court. A judgment had not been issued by the time of publication of this Activity Report.

In accordance with Article 8a para. 2 let. c of ESO, measurement customers are entitled to have access to the load profile data of the last five years and to download it in a standard international data format. The capital and operating costs required to meet this requirement are classified as recoverable network costs (Art. 8a para. 2bis ESO); The access must be provided by 30 June 2021 (Art. 31l para. 6 ESO). Exemptions can be made in the case of significant additional costs for systems which do not comply with the ESO. Load profile figures cannot be deleted after a year, even if they are not relevant to billing. Article 8a para. 2 let. c ESO does not contradict Article 8d para. 3 ESO.

5.9 Unbundling

The statutory provisions on the separation of network operation from other areas (unbundling) are becoming increasingly important as network operators are stepping up their participation in competitive areas of the market. ElCom therefore paid particular attention to the unbundling of network operations, the prohibition of cross-subsidisation and the prevention of the use of information advantages from the network area during the year under review. The SFOE is responsible for the prosecution of criminal violations of the regulations on unbundling.

ElCom answered numerous queries and provided information for and raised awareness amongst network operators. ElCom also concluded a case concerning suspected cross-subsidisation from regulated network costs in projects outside of the network area.[1] Due to the cost calculations submitted annually, ElCom carried out a preliminary evaluation to establish whether grounds for unlawful conduct existed that would justify the opening of proceedings (in-depth tariff evaluation). The assets, network costs and energy costs (production and sales costs) were analysed for irregularities based on the cost calculations, forms and surveys submitted. This focused on the breakdown of operating costs and internal billing. No irregularities were found for the assets and network costs. As the preliminary evaluation carried out by ElCom did not provide any indication of potential cross-subsidisation at the expense of network operation, it was decided not to open proceedings.[2]

1 cf. Newsletter 02/2021 of the ElCom available at www.elcom.admin.ch > Documentation > Newsletter

2 The violation of the CHF 95 rule identified was corrected by the company via the coverage differentials.

5.10 Shortfalls

According to Article 19 para. 2 ESO, network operators must refund the differences between their revenues and costs to end consumers via the tariffs in the subsequent periods if the earnings exceed the recoverable costs (surpluses). In the same way, network operators can factor into the tariffs any budgeting, sales and price differences which lead to shortfalls. This must generally take place within three years (cf. ElCom Directive 2/2019)[1].

ElCom has established that the shortfalls of many network operators are not being reduced or at least not to a sufficient extent. Around CHF 1.5 billion had been accrued by the 2020 tariff year. Distribution grid operators are not obliged to apply shortfalls based on cost increases, but can also write them off. Companies may also apply to ElCom for an extension of the reduction period from three to a maximum of five years.

Accumulated shortfalls present risks of future tariff increases. In accordance with Directive 2/2019, interest can also be paid on the shortfalls at the expense of end consumers at the applicable WACC rate of 3.83 per cent. The incentive for shortfalls in the cur-

rent interest-rate environment is generally high. This is why ElCom has focused heavily since 2019 on communicating that Directive 2/2019 concerning the reduction of these coverage differentials must be complied with. While the communication campaign achieved a certain degree of success, the Commission did not deem progress to be sufficient as the cost calculation for the 2021 tariffs indicated that there were still around CHF 1.3 billion in shortfalls in total.

ElCom therefore launched a multi-year campaign to reduce the shortfalls. In an initial step, over 400 network operators were written to in later summer 2021 whose shortfalls in the cost calculation for the 2021 tariffs on the grid and/or energy for the 2021 tariffs amounted to over 10 per cent of their revenues. In the communication, the network operators were requested

- to write off shortfalls on a tariff-neutral basis if they decided not to apply them or
- to submit a justified application with a reduction plan if the shortfalls are not reduced in line with the Directive.

The communication provided for tariff-neutral write-off of coverage differentials and the recovery of imputed interest.

The reduction plans are currently being assessed. The issue of shortfalls will continue to be monitored closely.

1 Available at www.elcom.admin.ch > Documentation > Directives

5.11 Merger for own consumption, practice model, feed-in remuneration at cost, and feed-in remuneration

ElCom answered various questions concerning mergers for own consumption. The opportunity for use of the distribution grid by the merger for own consumption was addressed several times. ElCom determined that the use of the existing distribution grid is not permitted. The creation of a district merger for own consumption using the individual distribution grid is not provided for under the applicable energy law. ElCom also determined that the act and ordinance do not govern the question of whether several mergers for own consumption and other end consumers who are not part of the merger for own consumption may be connected at a (home) connection point. There are no explicit legal restrictions under power supply and energy law that exclude this. Provided the provisions of Article 14 EnO are met at the place of production and correct measurement of the merger for own consumption (grid use and feed-in) in accordance with Article 18 para. 1 EnA and any non-participating end consumers (grid use) are ensured, several mergers for own consumption and additional end consumers may be connected at the same (home) connection point. Installation operators can, under certain circumstances, sell their self-generated energy at the location of production to several end consumers without end consumers forming a merger for own consumption in accordance with Article 17 EnA. ElCom issued the notification 'Praxismodell Eigenverbrauch' (Own-Consumption Practice Model) in 2020.[1] This notification was updated on 30 June 2021 after the receipt of queries. It was determined that grid operators are not obliged to enable joint own-consumption for installation operators under the practice

model. Implementation nevertheless seems desirable in the context of the Energy Strategy 2050. Several clarifications about measurement (section 2.2.) and an annex on the differences between merger for own consumption and the practice model were also provided.

In proceedings concerning feed-in remuneration at cost, the Federal Supreme Court decided that the photovoltaic system in question was only visually but not structurally integrated. In 2020, ElCom had awarded one-off compensation to ensure protection of trust, which covers the actual costs of the visual integration incurred as a result of modifying the installation to meet the requirements of an earlier SFOE Directive that was not compatible with the Energy Ordinance. The installation operator lodged an appeal against this ElCom decision with the Federal Administrative Court. It rejected the appeal in its legally valid judgment A-6525/2020 of 7 September 2021 and fully confirmed ElCom's decision.

Another ElCom decision on feed-in remuneration at cost from 2020, on which it based the rejection of a deadline extension for the project progress report by Swissgrid AG, was confirmed during the year under review by both the Federal Administrative Court (judgment A-2974 of 8 March 2021) and by the Federal Supreme Court (judgment 2C_351/2021 of 30 September 2021).

In its decision 222-00001 of 11 May 2021, ElCom decided on the determination of feed-in remuneration for renewable energy. ElCom decides if grid operators and producers cannot reach agreement (Art. 62 para. 3 EnA). The feed-in remuneration for electricity from renewable energies is based on the costs avoided for the procurement of electricity of the same value (Art. 15 para. 3 let. a EnA). Article 12 para. 1 EnO stipulates that feed-in remuneration is based on the costs for the procurement of electricity of the same value from third parties and the generation costs of self-owned production plants. There is no acceptance obligation for certificates of origin. In ElCom's view, Article 12 para. 1 EnO complies with the law. The decision was challenged and proceedings are pending with the Federal Administrative Court. The inclusion of the generation costs is being disputed.

1 Available at www.elcom.admin.ch > Documentation > Information.

6 Market surveillance

Electricity is traded on various European exchanges as well as bilaterally via broker platforms. The Swiss trading companies are leading market participants.

6.1 Market transparency in wholesale electricity trading

At the start of the year, ElCom was still conducting a review of negative prices in 2020. The Market Surveillance section's activities focused on the high prices on the wholesale electricity trading market during the second half-year 2021. Gas and electricity prices on the spot and futures markets soared, hitting new highs on a weekly basis. Electricity prices were mainly driven by gas, coal and CO2 prices, which rose to a very high level during the second half-year. The low gas storage levels and concerns over supply saw gas prices skyrocket.

The 'Algorithmic trading – impact on trading' workshop postponed in 2020 was successfully held online this year. This explored the issue of 'algorithmic trading' from various perspectives. It included an academic analysis but also discussions about the impact of the practical use of algorithms in short-term trading on the stock exchange and which precautionary compliance measures are being taken by market participants. In a look across the border, the Federal Network Agency provided details of a case involving a REMIT violation due to the use of algorithms in the gas market. ElCom then presented the results of its market survey and its notification on algorithmic trading.

The annual Market Transparency Report, which provides an overview of the Market Surveillance section's key activities, was also

unveiled during the workshop. In addition to the various analyses carried out, the Market Transparency Report also provides an overview of the annual development of the spot and futures market reports. This is based on the spot and futures market reports which ElCom has published weekly since 2018.

An analysis of the publication of insider information on the EEX transparency platform indicated that the information published for market participants is sometimes difficult to understand. When power plants are started up or shut down, this period should be published as a ramp event. The reporting is now being updated at ElCom's recommendation. The starting point is now when the start-up or shutdown of the power plant begins. Additional information can be provided in a text field.

ElCom's reporting infrastructure has been improved and the cyber security concept updated due to the rising data volumes. As a result, the storage space required has been reduced and analyses can be carried out more easily and quickly.

Discussions with some market surveillance authorities of neighbouring countries were held online again this year. These meetings keep participants up to date with ACER developments and enable them to discuss current market events and developments. Against this background, coordination meetings were also held with FINMA, SIX and EPEX Spot.

ElCom also continued its activities at European level in 2021 by participating in the CEER Market Integrity and Transparency Working Group (CMIT). Cooperation on the comprehensive survey about the implementation of market transparency and integrity in the EU represented a major part of its participation. The results of this survey provided ElCom with an insight into the REMIT regulatory processes in Europe.

The topic of this year's ACER EMIT forum was a look back at 10 years of REMIT (Regulation on Wholesale Energy Market Integrity and Transparency) as well as a look to the future under the title of 'REMIT beyond'. Current developments, such as the increased use of algorithms on the market and growing deployment of flexibility – in particular for the provision of system services – and any impact on market prices were also discussed at this forum. Participants agreed that while the REMIT reporting system works well, perfect data quality is difficult to achieve. Efficient data analysis depends on very high data quality. Greater flexibility over the scope of data reporting would enable REMIT to keep pace with market developments, particularly with regard to the market coupling of balancing market platforms. However, as the REMIT landscape is evolving, it may need to be updated and modified at some point. REMIT has only been partially implemented in Switzerland itself. A parliamentary initiative submitted in December 2021 entitled Greater transparency and integrity on the electricity wholesale market to ensure fair prices for electricity consumers[1] could lay the foundation for alignment with REMIT. The parliamentary initiative has not yet been addressed.

1 cf. Initiative Parlementaire - Grossen Jürg. 21.510

6.2 Market Surveillance: facts and figures for 2021

The number of market participants registered with ElCom in 2021 rose from 78 to 82. By contrast, the number of registered reporting mechanisms (RRM) remained unchanged at nine. These are used to send the data on energy trading transactions of registered market participants in the EU markets to ElCom. As in previous years, ElCom received the fundamental data and the publications on insider information via its own specially created interfaces – ENTSO-E and the EEX transparency platform.

The number of transactions reported also increased again in 2021. ElCom received 45.2 million reported transactions during the period under review. This increase in the data delivered is moderate and is explained by a trend towards increasingly shorter-term trading activities and the related greater use of automated trading algorithms.

The majority of the reports – just under 90 per cent – once again related to standard contracts in 2021. The dominance established in previous years of spot over futures transactions in the standard contracts was maintained, with a slight rise from 94 to 95 per cent. Most of the data sent comes from continuous short-term trading, which accounts for 58 per cent. The registered market participants reported the conclusion of 8,685 non-standard contracts, which represents a change of around 40 per cent year-on-year.

However, there was a greater increase in the fundamental data. Over a million more reports were registered than in 2020, which is an increase of just under 20 per cent on the previous year. There was also a moderate change in publications of insider information. The number of reported incidents rose by around 15 per cent compared to the previous year.

To obtain better market understanding and to efficiently monitor and assess the performance of the markets and the pricing mechanisms, ElCom uses other data, such as the EEX settlement prices, which are used as a reference in the analyses, as well as information from Refinitiv. In addition, information from public sources, such as Swiss Meteo, is also used to produce various reports and analysis.

The processing and analysis of the data collected enables evaluation of developments on the (European) wholesale trading markets. As market prices in Switzerland are heavily influenced by developments and events in neighbouring countries, this information is of great importance.

The fundamental data available is also used in various publications, particularly in the spot and futures market reports and the market transparency report, which helps improve transparency for production and consumption-side market participants. All data available helps increase the quality of ElCom's analyses, studies and publications.

6.3 Sharp price rises in the EU and Switzerland

The electricity prices on the spot and futures markets soared during 2021. An electricity supply contract in Switzerland at every hour of the supply year 2021 (Cal 21 base) was traded on the futures market in 2020 for between EUR 37.95 per MWh and EUR 53.15 per MWh. Buying the same electricity supply in 2021 on the spot market at the day-ahead auction would have cost EUR 115 per MWh. While electricity prices for the 2022, 2023 and 2024 supply years were traded at similar prices at year-opening, the price difference between these electricity contracts continually widened over the course of the year. A contract for electricity supplies in Switzerland at every hour for the 2022 supply year (Cal 22 Base) still cost EUR 52.5 per MWh (EEX closing price on 11 January 2021) at the start of the year and reached a high of EUR 332.48 per MWh (EEX closing price on 22 December 2021) at the end of December. The highest price for electricity supplies for the 2023 supply year stood at EUR 144.80 per MWh (EEX closing price on 21 December 2021).

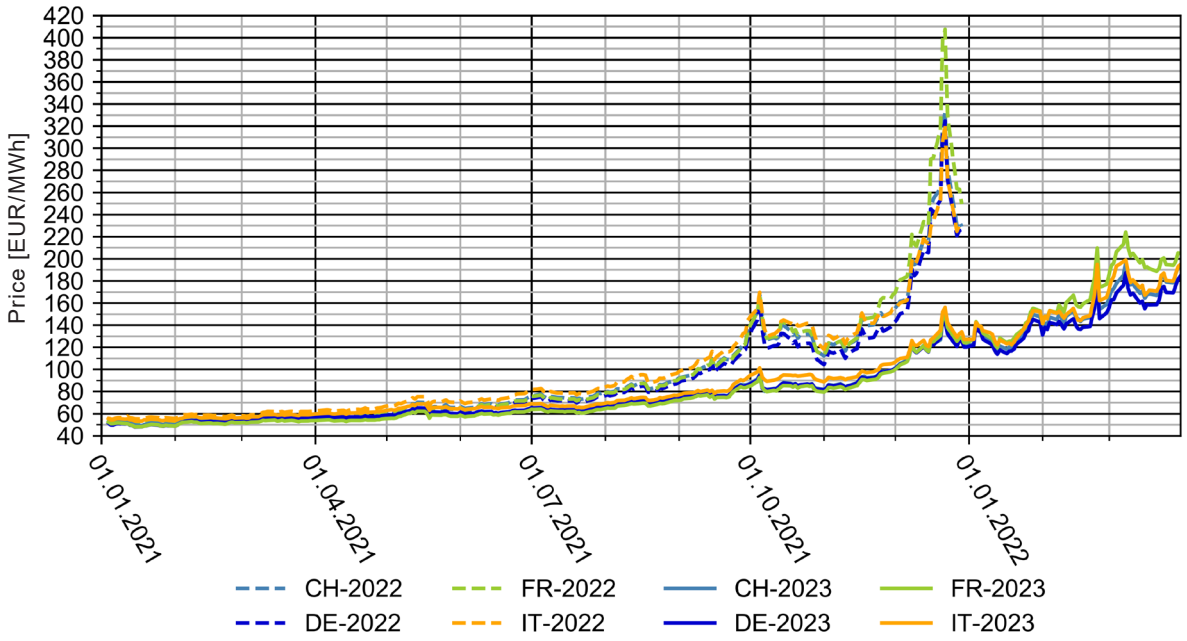


Figure 17: Prices over the course of 2021 for annual product base for delivery year 2022 and 2023 for delivery location Switzerland (CH), France (FR), Germany (DE) and Italy (IT).

Electricity prices were mainly driven by high gas, coal and CO2 prices. Low gas storage levels and concerns over supply saw gas prices soar during 2021. Winter 2020–21 was relatively cold in Europe and production from renewable energies was below the norm, which led to stronger demand for gas in Europe and meant that gas storage levels declined further. Liquid gas (LNG) prices were higher in Asia than in Europe during 2021, which meant that LNG continued to be transported to Asia. Delays to the commissioning of Nord Stream 2 resulted in soaring gas prices from September 2021 and for the 2022 supply year. These high gas prices have improved the competitiveness of coal in the European fuel mix and consequently increased demand for coal, in turn driving coal prices up. The CO2 price has also climbed sharply since the start of 2021. The 'Green Deal' and 'Fit for 55' package were major drivers on the CO2 market.

Significant price fluctuations on the wholesale market are increasing credit and liquidity risks for Swiss energy supply companies (large energy suppliers and producers), which are very active on the wholesale market.

Electricity is mainly traded over the counter (OTC) in Switzerland, despite trading via stock exchanges increasing over recent years. Forwards are executed over the counter, while futures are traded on the stock exchange.

The advantage of futures is that there is no counterparty risk. The exchange ensures there is no credit default through daily margin calls. However, margin calls require companies to deposit funds with the exchange to provide financial coverage for their trading position. The disadvantage of this is that companies can face short-term liquidity shortfalls in the event of significant changes in the price level or a major spike in volatility. For example, if energy suppliers sell power production capacity from their own plants or electricity speculatively via the EEX exchange early, they can face liquidity shortages due to the margin calls. The revenues from the electricity sales for the 2022 supply year have not yet been entered in the accounts, but the price difference between the current market price and the sales price agreed at the time must be entered at the stock exchange as a monetary amount.

There is no margining for forwards traded OTC unless explicitly agreed in the EFET contract. There is no liquidity risk but default of the counterparty can arise, which means a credit risk exists.

Sharp price fluctuations may force counterparties – possibly due to liquidity shortfalls or speculative trading strategies – to declare bankruptcy. This means the credit risk for Swiss energy suppliers has also risen sharply recently. If counterparties are forced into bankruptcy, futures market transactions already concluded may have to be executed again on the market at much less favourable conditions. This can present financial challenges.

The steep price rises for electricity supplies in the 2022 supply year are less of an issue for Swiss basic supply customers. In accordance with Article 6 para. 3 ESA, the electricity tariffs are fixed for at least a year and must be published broken down by network usage,

energy supply, duties and payments to the state. Article 10 ESO obliges electricity supply companies to publish the network usage and electricity tariffs by 31 August at the latest. Most Swiss electricity supply companies which do not have sufficient production capacity of their own to meet their basic supply requirements constantly purchase supply quantities on the wholesale market up to three years in advance and have generally covered the needs of their basic supply customers by the time when tariffs are published. This cautious procurement strategy is now paying off both for the 2021 supply year, where the spot prices were well above futures market prices, and for the 2022 supply year, where futures market prices soared, particularly during the second half of 2021.

Rising energy prices are having an immediate impact for customers on the free market, who have not purchased their energy in advance. The impact on basic supply customers will be delayed until the next time the tariffs are set. Wholesale market prices for electricity supplies for the 2023 supply year have not risen as sharply as for the 2022 supply year. The tariffs of electricity supply companies, which have to meet a significant share of their basic supply requirements on the market, are nevertheless expected to increase for 2023 compared with 2022.

ElCom has a longstanding and established policy on subsequent or intra-year tariff adjustments. Subsequent adjustment of the published energy tariffs is not permitted. This is due to the legal deadline for the publication of tariffs, which could be circumvented by the option of making subsequent adjustments at will. The published energy tariffs also provide end consumers with a decision-making basis for switching. Even with the current rising electricity prices, adjustment of energy tariffs after publication at the end of August is not permitted under this policy. As usual, network operators can offset the deviations between the tariff revenues and the production costs actually incurred via coverage differentials over the following years.

No false incentives should be created through substitute supplies by increasing energy prices. The draft of the Federal Act on a Secure Electricity Supply from Renewable Energy Sources (consolidation bill) provides for the governance of substitute supplies by law. The relevant provision is set out in Article 7.

High prices on the electricity wholesale market, but in particular high price differences between the winter months of December, January, February and March, are having an impact on reservoir levels and, as a result, also on security of supply. If the wholesale market prices are much higher for December 2021 than for subsequent months, for example, there is a high probability that the reservoirs have been emptied to a greater extent than usual in December due to the market situation. ElCom is closely monitoring the development of these price differences to identify any effects on security of supply at an early stage.

6.4 Analysis of the Swiss borders – 2018–21

The framework and conditions under which electricity can be imported and exported in future are more uncertain than ever in light of the current debate over the continuation of bilateral relations with the EU. It now appears that Switzerland may also be dependent on greater electricity imports longer term – at least temporarily – as the planned decommissioning of the nuclear power plants will result in a substantial reduction in domestic power production, which the expansion of renewable energies may not be able to offset quickly enough. In view of this situation, the developments in commercial cross-border capacities – which are required on the electricity wholesale market to trade electricity with neighbouring countries – were analysed for the period 2018–21. The full report can be viewed on ElCom's website.[1] The development of the daily capacities (average over 24 hours) is shown in Figure 18:

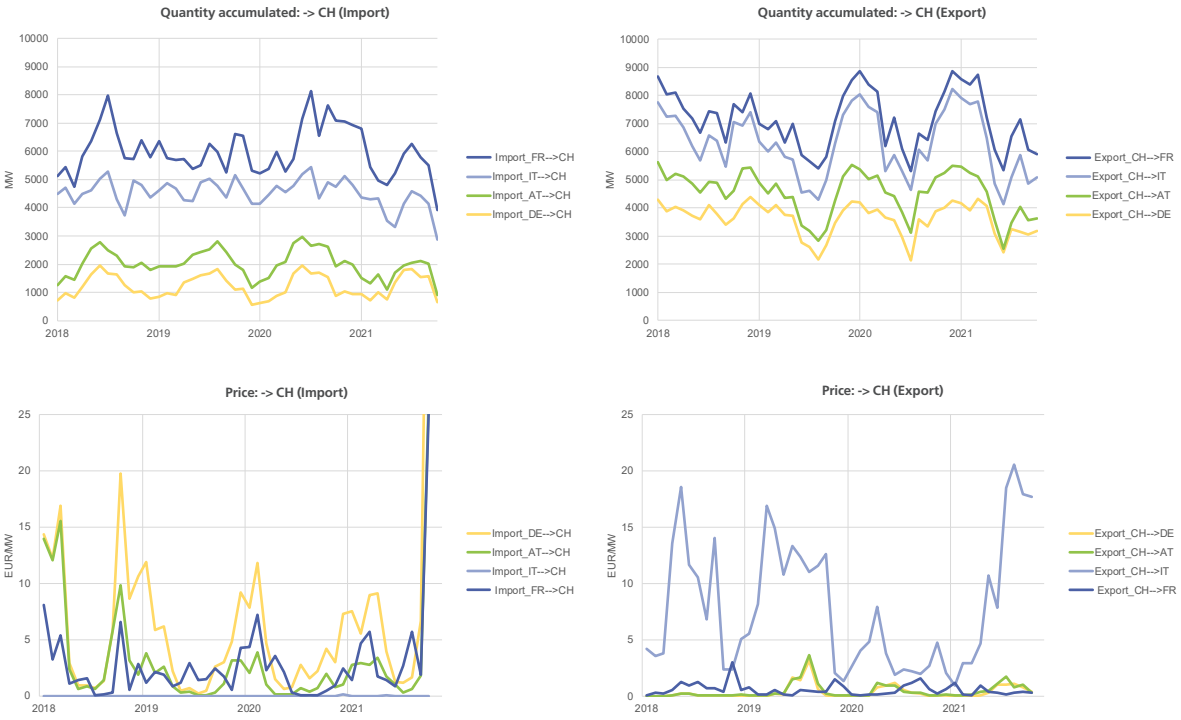


Figure 18: Top: Monthly average of auctioned daily capacities per border, cumulative. Bottom: Monthly average of clearing prices of daily auctions per border. Data considered until October 2021.

In addition to annual capacities, the analysis also covers monthly and daily capacities. There is no strong trend across all capacities with volumes neither rising or falling significantly. If Switzerland fails to conclude an electricity agreement with the EU, there is a latent risk that the management of cross-border capacities will become more difficult and the capacity volume available for trading will be reduced. In this respect, the implementation of the EU's minRam rule[2] needs to be monitored.

Cross-border capacity prices have generally fallen slightly, mainly because the electricity price differences between Switzerland and neighbouring countries have narrowed to some extent. However, the extraordinary electricity price developments in autumn 2021 led to a trend reversal. It remains to be seen whether this will last.

Profit can definitely be generated by optimising annual and monthly capacities over daily capacities. However, this requires accurate market development forecasting. Recent years have shown that the market can be mistaken or surprised by unforeseen events, such as the coronavirus crisis or the extreme gas prices observed in autumn 2021.

1 Available at www.elcom.admin.ch > Documentation > Reports and studies.
2 Available at www.elcom.admin.ch > Documentation > Reports and studies.

6.5 ElCom recommendations on the reporting of inside information

As part of the Market Surveillance section's monitoring activities, the reports of nuclear power plant maintenance work on the EEX transparency platform were compared with the actually reported schedules on the ENTSO-E transparency platform in December 2020. ElCom established that Swiss market participants report the time of decommissioning for scheduled maintenance work differently on the EEX transparency platform. Publication on the EEX transparency platform sometimes related to the start and sometimes to the end of ramp events when the power plant is shut down. Swiss market participants tended to refrain from reporting ramp events at this point.

The ACER Q&A document has been continually updated. It contains a summary of frequently asked questions by market participants and other stakeholders and responses from ACER about Regulation (EU) No. 1227/2011 on Wholesale Energy Market Integrity and Transparency (REMIT). In the June 2020 version, the question as to whether a ramp event had to be published as insider information when starting up or shutting down power plants was answered as follows in section III.7.14.:

Ramping situations that qualify as inside information under Article 2(1) of REMIT (i.e. a ramping situation of a precise nature which

has not been made public, which relates, directly or indirectly, to one or more wholesale energy products and which, if it were made public, would be likely to significantly affect the prices of those wholesale energy products) should be disclosed under Article 4 of REMIT.[1]

Over the course of 2021, the Market Surveillance section held several meetings with Swiss market participants and the EU regulators about inside information and ramp events. These meetings sought to find an industry solution for Switzerland. The goal was to reach agreement on a uniform reporting procedure in line with the ACER recommendations and European industry standards for reporting ramp events at nuclear power plants.

Clarifications with market participants showed that there are neuralgic points during ramp events at nuclear power plants which can be achieved with a practical linear increase in production and maintained for a long period of time. From 2022, a text field, which shows the duration of the various start-up and shut-down ramp events more transparently, will be added to the REMIT reports on Swiss nuclear power plants on the EEX transparency platform. In addition, the start time of the power plant outage will be at the beginning of the ramp event; the start time of the start-up of the power plant will be when the power plant begins to start up. This aims to improve transparency on the electricity market and enable more accurate forecasting of the impact of prices on wholesale energy products on the short-term market for all market participants.

1 Source: ACER REMIT

7 International activities

There are very close international links on the electricity market due to the level of physical interconnection. Not only does this enable trading, but is also extremely important in terms of stability of supply.

The decline in electricity consumption due to the lockdowns and the economic downturn in 2020 eased with the economic recovery in 2021, which was supported in the EU through the EUR 800 billion Next Generation EU (2020) economic recovery plan.

In contrast, sudden, significant and relatively unexpected price rises for gas, other energy sources (coal, oil etc.) and electricity from the second half of 2021 led to record highs, which gradually spread to all wholesale markets (exchanges).

In countries where consumers or electricity generation are directly dependent on gas or even coal, this soon sparked political debate about the causes of the problem and support measures, with major disagreements in the EU between the southern and eastern member states and their northern counterparts, which rely more heavily on renewable energy sources.

While some criticised the new EU legal framework (Clean Energy Package, 2019), the implementation of which was delayed in 2020–21 due partly to COVID, others were in favour of it. However, the problems are due more to inadequate national energy policies and laws and the EU's geopolitical dependence on fossil fuels from third countries than the reforms which the EU has driven forward since 2009 and 2019, particularly in the electricity sector.

The revision and implementation of the methods of some specific EU network codes, which were also delayed in 2020 due to the COVID crisis, were resumed and accelerated in 2021 in the areas of grid operation, grid connection, congestion management and reserve power supply (e.g. capacity calculations for intraday, D-1, reserve power supply and futures markets). At the request of the European Commission, a unique project for an additional new network code was launched in 2021 concerning cyber security

in the electricity sector. ENTSO-E is set to complete this project in 2022 in consultation with ACER for definitive adoption as an EU regulation (Network Code on Cybersecurity to set a European standard for the cybersecurity of cross-border electricity flows).

Like the other EU laws and network codes, it seeks to harmonise the legal framework in the aim of liberalising and integrating the national electricity markets. It also seeks to achieve positive effects for European consumers, renewable energies, security of supply, competition and innovation.

On 15 December 2021, the European Commission proposed a comprehensive reform of the gas sector to create the conditions for transition from fossil-based natural gas to renewable and low-CO2 gases to improve the resilience of the gas system. The EU aims to cut its greenhouse gas emissions by at least 55 per cent by 2030 to meet the obligations on carbon neutrality it entered into under the Paris Agreement in 2015 and to achieve its ambitious European Green Deal.

In view of Switzerland's strong integration with neighbouring European countries, all of these developments and changes within and outside of the EU are of major importance – whether for the electricity sector, security of supply or at political, legal or economic level.

The most relevant development for ElCom in 2021 in terms of international cooperation was the termination of the Memorandum of Understanding (MoU) by ACER. ACER and ElCom signed this MoU in 2015, agreeing ElCom's observer status in ACER's electricity working groups. The high degree of integration of Switzerland's power grid in Europe was the joint motivation for entering into this form of collaboration. Since the withdrawal from negotiations on a Switzerland-EU framework agreement in May 2021, the escalation over Swissgrid's participation in the balancing platforms and Brexit, the EU authorities have adopted a firmer stance towards Switzerland. ACER then terminated the MoU in August 2021, which means ElCom no longer has a direct insight into the relevant working groups.

7.1 Congestion management

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

As the import and export capacity available is limited, they are mainly assigned based on market-oriented procedures in accordance with Article 17 para. 1 ESA. The following exceptions apply: Priority is given to supplies based on long-term contracts concluded before 31 October 2002 (this concerns several contracts with France that are still running), on one hand, and supplies from hydropower plants on the border on the other. Thirdly, capacities in intraday trading are not currently priced.

That means the lion's share of the capacities of cross-border lines is allocated within the framework of explicit auctions which award the transport right separately from the energy transaction. In contrast, the transport right is automatically granted to

the highest bidder when electricity is sold on the market in implicit auctions.

In recent years, the EU has gradually harmonised the rules on the management of connecting lines and congestion management. This led to significant changes compared to the practices previously adopted by transmission grid operators.

The gradual introduction of flow-based market coupling (FBMC) by more and more EU member states enables a more efficient use of network capacity and provides incentives for eliminating congestion through targeted investment. Limiting cross-border capacity between countries and price zones is also the best way of preventing this congestion from shifting to the border. The FBMC will be expanded to 13 EU states in mid-2022 and presumably to further states too in future, including Italy.

Through these efforts, the EU and ACER are endeavouring to increase import and export opportunities and improve competition and security of supply. This presupposes avoidance of any distortion of trade flows between price zones and countries in favour of purely internal or domestic flows, whereby international trade flows are generally diverted from the cheapest to the most expensive price zone due to price differences on the market.

To that end, the EU Regulation 2019/943 on the internal market for electricity of 5 June 2019 stipulates that at least 70 per cent of the capacity of all lines must be released for commercial cross-zonal trading so that market integration and supply security can be improved at a pan-European level. For this 70 per cent of cross-border capacity exceptions, are only provided up to 2025.

In 2021, the borders between Bulgaria, Hungary, Slovakia and Romania and their EU neighbours were incorporated into Single Day-Ahead Coupling (SDAC). This aims to achieve a uniform pan-European electricity market with a day horizon (D-1). This means almost all EU states and virtually all or at least the main connection lines within the EU are now part of SDAC. Their capacities are allocated using a joint optimisation algorithm which couples the wholesale markets of the various EU regions.

As far as the intraday market is concerned, in September 2021 Italy joined the 21 other EU countries and Norway, which have been participating in single intraday coupling (SIDC) since 2018–19. This is similar to SDAC, but has a shorter time horizon. This is extremely important for integrating intermittent renewable energy, such as wind and solar power. A fourth expansion to Greece and Slovakia is scheduled for the end of 2022. The two implicit auctions for the allocation of cross-border capacity between Switzerland and Italy introduced in April 2019 were replaced by the introduction of two explicit auctions from September 2021.

The ACER report published in autumn 2021 on the EU electricity market in 2020 highlights the challenges faced on the path to greater integration of the EU single market. For the first time the ACER report also includes reflections on the change of energy and climate policy in the EU, obstacles to free pricing, certain regulations on the interruptibility of demand and the reform efforts of nine south-eastern European third states (members of the Energy Community) to adopt the EU's acquis communautaire in the energy sector as far as possible.

As the physical flows do not necessarily correspond to the scheduled trade flows, they limit the options for exchange at borders and often require costly interventions to reduce the risks to network stability (redispatch etc.). Since 2020, ACER has recommended sharing the costs of such preventative and curative measures based on the principle of causality to guarantee, optimise and maximise exchange capacity.

The development of EU regulations and methods, from which Switzerland has been almost completely excluded, may result in increasing congestion on the Swiss grid despite some positive aspects. These will impact on both trading and physical flows within and outside of the EU, which means Swissgrid's grid will be overloaded more frequently.

Switzerland was previously only partially involved in certain EU developments. However, ElCom and Swissgrid worked with ACER, the European Commission as well as transmission grid operators and regulatory authorities abroad to optimise cross-border capacity. As previously mentioned, this has been complicated by the termination of the MoU by ACER in August 2021.

Swissgrid is involved in pending legal proceedings with the European Commission. Swissgrid's participation in various platforms on the cross-border trading of reserve power supply is also in jeopardy unless there is a political solution or judgment by the EU court in favour of Swissgrid.

A cooperation agreement on the integration of Swissgrid on the Italian border was signed at the end of 2021 after two years and the approval of all of the region's regulators (Italy, France, Austria, Slovenia and Switzerland). This is a positive development for all parties concerned.

On the other hand, the United Kingdom ended participation in the EU internal electricity market and in the FBMC. This was due to Brexit and the new partnership agreement of 24 December 2020, which entered into force on 1 January 2021. The United Kingdom had to return to explicit allocation of cross-border capacity. The trade and cooperation agreement between the UK and EU nevertheless aims to achieve efficient trading via direct current connection lines and provides for the opportunity of developing multi-region loose volume coupling within 15 months. However, this will not be as efficient as the EU's standard model of flow-based market coupling (FBMC). The EU and UK will also continue to cooperate on the exchange of information, network development plans and risk prevention measures. However, the UK regulator (Ofgem) and UK transmission grid operator (National Grid) were excluded from ACER and ENTSO-E until future collaboration with these bodies has been established.

7.2 Merchant Lines

Merchant lines are cross-border transmission lines. In the event of an exemption, there is no requirement to grant network access to third parties on electricity transmission lines such as these. While the transmission capacity is managed by the network operators, its utilisation is reserved for the investors. These exemptions are limited to a specific timeframe upon expiry of which the line is transferred to the ownership of the national grid

operator. Switzerland had one merchant line at the Italian border during the year under review. On 3 August 2020, judgment A-671/2015 of the Federal Administrative Court relating to this merchant line was handed down concerning the amount of capacity exempted from non-discriminatory, third-party access. The complaint of the merchant line operator was partially upheld and the matter was referred back to ElCom for re-evaluation. The merchant line operator appealed against this judgment to the Federal Supreme Court. The Federal Supreme Court rejected the appeal against the decision of the Federal Administrative Court in its judgment 2C_734/2020 of 1 December 2021.

The discussions on the creation of an additional merchant line from Switzerland to Italy on an existing, disused line were stepped up again during the year under review. The possibility of ElCom being requested to grant an exemption to network access as a merchant line in the following year in accordance with DETEC's Ordinance on Exceptions to Network Access and to Allowable Network Costs in the Cross-Border Transmission Network (NetCEO) cannot be ruled out.

7.3 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 grid operator. Auction proceeds may be used to cover the costs of cross-border electricity supply, to meet the transmission grid's recoverable costs or for the maintenance and expansion of the transmission grid (Art. 17, para. 5 ESA). Swissgrid submits an application to ElCom outlining how it intends to use the proceeds and ElCom ultimately decides how they will be used (Art. 22 para. 5c ESA). In the period from 2009 to 2012, around CHF 40 million were used for reducing the recoverable costs of the transmission grid. The majority of the 2013 auction proceeds were earmarked for the maintenance and expansion of the transmission grid. Since, in the previous years, investments in the transmission grid were not carried out to the extent originally planned, and given the costs associated with court decisions, Swissgrid applied to ElCom for the proceeds from 2013 to 2018 to be used exclusively for reducing the network tariffs. In accordance with the ratio agreed in 2018 for the use of auction proceeds, 35 per cent of the auction proceeds in 2019 were used for the maintenance and expansion of the transmission grid and 65 per cent for reducing recoverable costs. In 2020, these figures stood at 45 and 55 per cent respectively.

Swissgrid submitted a proposal in the year under review regarding the use of auction proceeds from 2021 in which Swissgrid deviated from the agreed ratio of 55 per cent for the maintenance and expansion of the transmission grid and 45 per cent for reducing the transmission grid's recoverable costs. This was justified by various special effects. ElCom rejected the application in February 2021 and decided to maintain the agreed ratio on the use of proceeds. Due to the coronavirus pandemic, Swissgrid made an application for reconsideration in March 2021 and requested using the auction proceeds in 2021 solely for the reduction of recoverable

costs. This application was approved by ElCom in view of the extraordinary situation.

Swissgrid submitted an application in the year under review on the use of auction proceeds from 2022 in which it deviated from the agreed ratio of 65 per cent for the maintenance and expansion of the transmission grid and 35 per cent for reducing the recoverable costs of the transmission grid due to special effects (in particular the reduction of coverage differentials due to the implementation of the system audit, payment of compulsory purchase compensation for tranche B) and the COVID-19 pandemic. ElCom rejected the application and decided to maintain the agreed ratio of 65 per cent and 35 per cent on the grounds that the special effects specified could be planned for and the COVID-19 pandemic did not have the same surprising effect as in 2020. In general, ElCom aims to use the auction proceeds sustainably to smooth the tariffs and therefore to the benefit of end consumers. Use of the auction proceeds for the expansion and maintenance of the transmission grid is a suitable approach in this respect. This means the recoverable costs can be moderated long-term.

Figure 19 shows how the auction proceeds generated at Switzerland's borders were allocated between 2017 and 2021. The figures for 2021 are still provisional because the definitive calculations were not available at the time of publication.

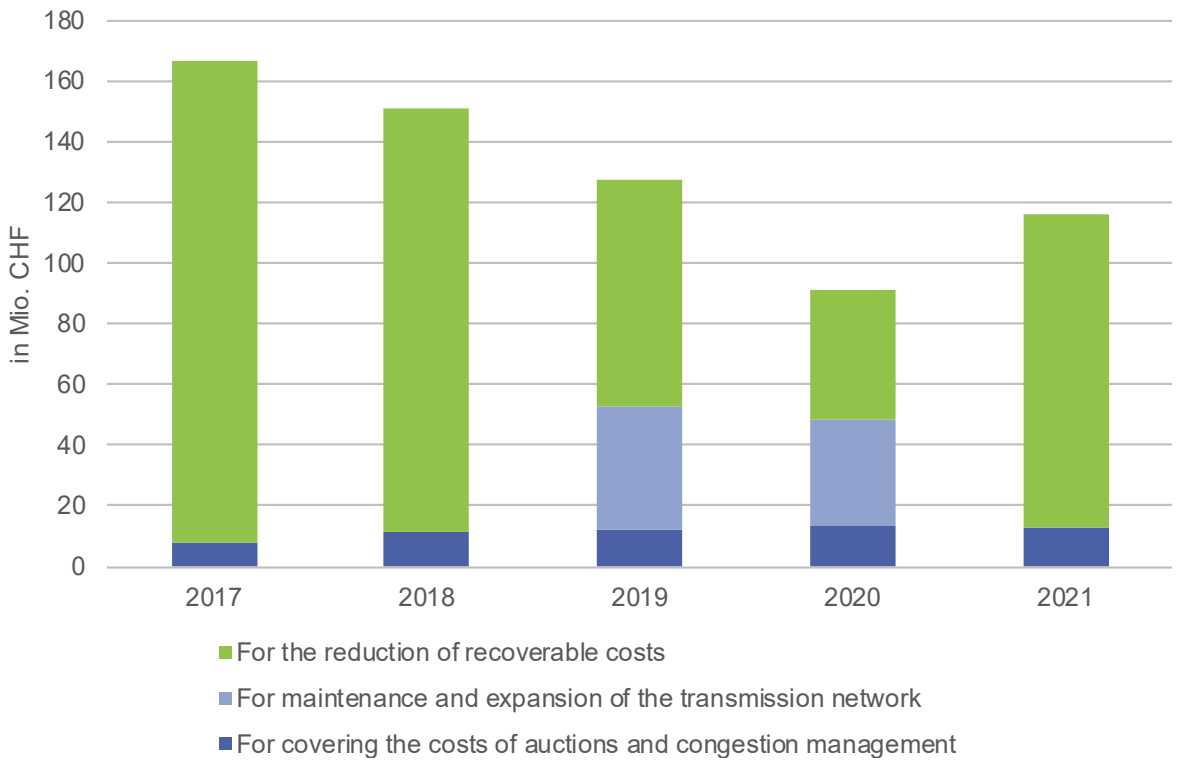


Figure 19: Use of auction proceeds from 2017 to 2021

7.4 International platforms for the reserve power supply

The reserve power supply must balance out sudden fluctuations in electricity consumption and generation, making it a vital component of electricity supply security. The EU's third internal market package systematically extends the procurement and use of the reserve power supply beyond national borders. Considerable price advantages in procurement on the market (and ultimately for end consumers) and better protection against possible congestion are expected in some cases.

Dedicated international trading platforms will therefore be established while platforms for the exchange of frequency containment reserve (FCR) and imbalance netting (IN) are already in operation and can be expanded if required. The platform for tertiary balancing power (Project TERRE – Replacement Reserve) has been operational since 6 January 2020 and Switzerland's go-live took place in October 2020. The other platforms for the exchange of balancing power (aFRR, mFRR) will begin operation in the course of 2022.

The FCR (Frequency Containment Reserves) cooperation between transmission grid operators dates back to the period before the introduction of EU network codes and is now the first regional cooperative arrangement to harmonise the market using the method specified by the Electricity Balancing Guideline (EBGL). This cooperative arrangement serves to procure primary balancing power in Europe's synchronous 50-hertz area in order to cut procurement costs and create market entry incentives for new balancing power providers and technologies. ElCom, as well as other regulators and stakeholders, are actively involved in the arrangement.

In 2019, the FCR cooperation arrangement took a first step towards a new market design through the introduction of daily D-2 auctions. New adjustments have since been regularly discussed and introduced with the aim of shifting the market design towards real time. An example of this is the introduction of D-1 auctions with a reduced product length of four hours in July 2020. Operations on the FCR platform are based on a complex allocation algorithm, which takes account of various pricing zones, additional conditions and a marginal pricing system, and calculates the respective product length.

Switzerland's participation on the three platforms for RR/TERRE, aFRR and mFRR is subject to an EU legal proviso according to which the European Commission decides on participation based on opinions from the ENTSO-E association and the European association ACER. ENTSO-E issued a positive opinion in September 2017 as did ACER in April 2018. However, access to the platforms is not guaranteed and depends heavily on the political relationship between Switzerland and the EU. The European Commission's Directorate-General for Energy reached a negative decision on participation in the TERRE platform, which continues to cast doubt over Swissgrid's participation.

ElCom supports Swiss participation in the platforms as it sees considerable risks to secure network operation from non-participation. These specifically consist of the very short-term occurrence of unscheduled, unannounced, large electricity flows via the Swiss network, which can lead to congestion and outages. This situation could also jeopardise the system security of the entire region surrounding Switzerland.

7.5 International bodies

To implement the EU Green Deal (2019), the EU wishes to cut greenhouse gas emissions by at least 55 per cent by 2030 ('Fit-for-55' package of 14 July 2021, which provides for a revision of the EU Renewable Energy Directive). On 15 December 2021, the European Commission proposed an additional reform package for the gas sector, its markets and infrastructure.

The EU is continuing to implement the Paris Climate Agreement (2015) so that Europe becomes the first carbon-neutral continent by 2050. The change in energy policy – with the digital transformation of the European economy and society – is a priority for the EU. This is receiving major support from the post-COVID Next Generation EU economic stimulation programme. The EU states had to present coherent energy and climate plans and feasible reforms of their own national energy markets for the period 2021 to 2030.

Cross-border and regional cooperation in the gas sector and efforts to ensure its integration and complementarity with the electricity sector are also to be stepped up. The goal is to achieve equal treatment of all energy sources to align the electricity and gas markets – in terms of taxation, for example – with decarbonisation. The European Commission's new set of legislative proposals of December 2021 aims to lay the foundation for a transition from fossil-based natural gas to renewable and low-CO2 gases – biomethane and hydrogen in particular – to improve the resilience of the gas system. This proposal comes against the background of a general rise in energy prices – including electricity prices – which intensified during the second half-year 2021 and which the EU and its member states are attempting to alleviate. Regulatory amendments will be examined during the course of 2022.

Following the termination of cooperation with ACER due to the breakdown of negotiations over the institutional framework agreement between Switzerland and the EU, ElCom lost its observer status in the ACER Electricity Working Group and its subgroups. This means it now no longer has direct information about developments within the EU of importance to Switzerland.

The European Commission also denied ElCom the opportunity to participate as an observer on the European Electricity Regulatory Forum in 2021. Known as the 'Florence Forum', this body focuses on the challenge of integrating the European single energy market. ElCom is endeavouring to make up for this lack of information by engaging in bilateral discussions and continuing to represent Switzerland's interests.

Regional Coordination Centers (RCC) must be introduced and the current Regional Security Coordinators (RSC), such as Coreso and TSCNet Services, must be replaced by July 2022 to support the provision of a secure, reliable and efficient electricity system and to carry out capacity calculations and security analyses. As agreed in 2021, Swissgrid can also remain a shareholder of TSCNet in future. While Swissgrid will have less decision-making power under the new structure, current assessments indicate the flow of information required for secure system opera-

tion will be ensured. The actual implementation of the RCC will nevertheless take several years and involve a great deal of uncertainty.

In 2021, ElCom continued to participate – together with the SFOE and Swissgrid – in the work of the Pentalateral Energy Forum (PLEF) on ensuring network security in winter and the distribution of redispatch costs. It took part in the discussions on the development of capacity management on the northern Italian border.

ElCom has also had observer status on the Council of European Energy Regulators (CEER) since 2012. CEER has defined a new strategy for the period 2022–25 entitled 'Empowering Consumers for the Energy Transition'. This is in line with the EU's general goals. The OECD Network of Economic Regulators (NER) has been working on resource structures and the strategic planning and performance evaluation of economic regulatory authorities since 2021.

8 Outlook

The geopolitical tensions clearly impacted on the electricity market in winter 2021–22. ElCom expects prices to remain high and volatile over the short and medium-term. Basic supply customers have not generally been affected by these price rises so far. However, an increase in the energy tariffs is anticipated in many places for the 2023 tariff year.

The main factor driving up electricity prices in Europe and also in Switzerland is gas prices, which have soared following the conflict between Ukraine and Russia. These price rises did not have any impact on basic supply electricity consumers in 2021 or 2022. The providers will announce their energy tariffs in August for the following year. As most energy supply companies procure most of their electricity requirements on the market, the price rises will also affect basic supply customers with a delayed effect.

As the energy supply companies generally purchase their electricity requirements up to three years in advance and have usually already met the demand for basic supply customers by the time of tariff publication, the sharp price rises from autumn 2021 will only have a limited effect on their procurement costs for 2021 and 2022 – this means any additional charges for end consumers through coverage differentials should remain moderate. The extent of any tariff increases for 2023 is difficult to predict and will differ from provider to provider. Based on the (heterogeneous) price increases, ElCom expects to receive more queries during the current year about the level and structure of tariffs, substitute supply and questions concerning market access and basic supply.

As the situation towards the end of 2021 showed, volatility on the electricity market and the extreme price fluctuations may be related to the liquidity challenges facing companies in the energy sector. In this context, the possibility of the liquidity problems of individual companies having a negative impact on the stability of the overall market and security of supply forcing state intervention to provide support cannot be ruled out. The lack of transparency over trading positions and the exposure of individual market participants in Switzerland makes it difficult for the authorities to assess the situation and to take any measures required. The Confederation has therefore begun work on possible adjustments to the framework conditions in which ElCom is also involved in an advisory capacity.

With regard to security of supply, ElCom is supporting the implementation of hydropower and gas-fired power plant reserves agreed by the Federal Council. In relation to the 'peak-load gas-fired power plants' concept drawn up by ElCom, further implementation issues now need to be addressed, coordination with the planned hydropower reserve ensured and the legal basis established. ElCom is involved in close consultation with the SFOE and the industry.

The extension of flow-based market coupling to CORE will be an important development in the coming year at European level. Simultaneously stepping up short-term trading via the international balancing platforms aims to ensure that Swiss network security is adequately provided for, even with additional unscheduled flows. ElCom is monitoring the parametrisation of Swissgrid's grid security calculations in cooperation with the network operators in the CORE region and balancing platform partners.

ElCom is awaiting decisions by the Federal Administrative Court on the following issues for 2022: Does a grid operator have to

take its own production costs into account when determining the level of feed-in remuneration? Does the use of an uncertified measuring system violate data protection law? What approach should ElCom adopt to an individual tariff evaluation?

Important legislation in the field of electricity is also pending. The SFOE is taking the lead on these proposals but ElCom can provide input during consultations. These include the Federal Act on a Secure Electricity Supply from Renewable Energy Sources with a revision of the Energy and Electricity Supply Act (consolidation bill), the Gas Supply Act and amendments to ordinances on the implementation of the Girod parliamentary initiative. In addition to an extended support for renewable energies, the latter will also introduce a legal basis for pilot projects (Sandbox) and extend the exemption from the average price method in accordance with Article 6 para. 5bis ESA. The planned legislative amendments to accelerate the construction of power plants (hydropower and wind), which will enter the consultation procedure in 2022, are also worthy of mention.

In 2022, one of the section's priorities will be prices and tariffs in the campaign on shortfalls. The around 600 submissions will be evaluated and the proposed reduction plans assessed. The aim is to provide grid operators with feedback in time for it to be taken into account in the 2023 tariffs. The requirements concerning the billing and certificates of origin in the field of energy will also be a priority issue in 2022. ElCom will monitor the declarations of grid operators more closely and take corrective measures where necessary. ElCom will also continue to follow the political developments concerning interest on assets required for operation (WACC).

In the field of cyber security, ElCom will gradually begin implementing the concept developed (cf. section on Cyber security) on the monitoring of cyber security from 2022. In parallel, the EU will also shortly bring into force the Networkcode Cybersecurity (NCCS). This will also have implications for Swiss grid operators, particularly Swissgrid. In this context, requirements will have to be met concerning regulation and the role of the regulator. In the field of cyber security, the conditions to enable Swissgrid to reach agreements with neighbouring TSOs must be established by 2022.

At international level, discussions will be continued at technical level, especially between transmission grid operators. In terms of technical operation, Switzerland and the grid operator Swissgrid will be integrated into the Synchronous Area Framework Agreement (SAFA) of all TSOs in continental Europe. By contrast, Switzerland's future involvement in European market coupling (which simplifies trading) and the related calculations of cross-border capacity remains difficult to predict. The development of flow-based market coupling in Europe and the application of MinRAM rules, under which the neighbouring countries will have to reserve at least 70 per cent of cross-border capacity for trade between EU member states in future, may result in restrictions on Swiss import and export capacity.

9 About ElCom

The Commission from left to right: Dario Marty, Laurianne Altwegg (Vice President), Werner Luginbühl (President), Andreas Stöckli, Sita Mazumder, Felix Vontobel, Katia Delbiaggio

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

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

No. of network operators: around 620
No. of network levels: 7
Lengths of electricity networks: Network level 1 – approx. 6,700 km | network level 3 – approx. 8,600 km | network level 5 – approx. 45,000 km | network level 7 – approx. 147,000 km (overhead lines and cable, including building connections)
Transformers: network level 2 – 149 | network level 4 – 1,143 | network level 6 – approx. 59,000 (including mast transformers)

No. of measurement points: 5.7 million | **No. of invoice recipients:** 5.5 million

Total network use revenue: CHF 3.3 billion

Annual investments: approx. CHF 1.4 billion

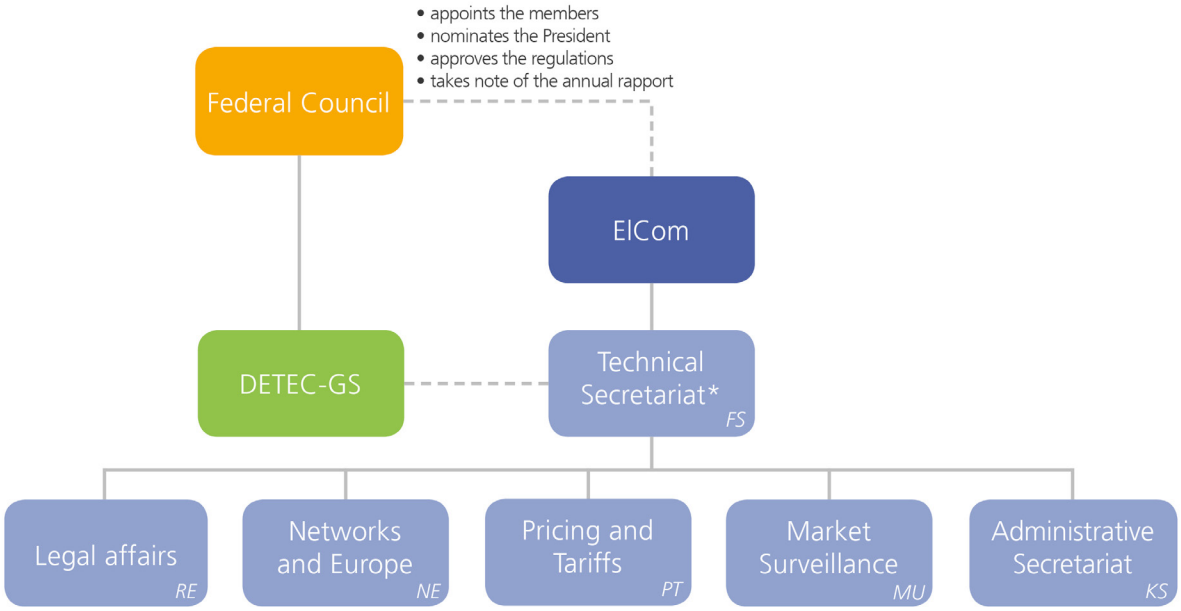
Annual electricity consumption: 55TWh
Production: 69TWh
Electricity imports: 33TWh | **Electricity exports:** 38TWh

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

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

9.1 Organisation and personnel

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



*Administratively linked to the general secretariat of DETEC

Figure 20: ElCom organisational chart

9.1.1 Commission

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

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

President:

- Werner Luginbühl (since 2020): former member of the Council of States

Vice President:

- Laurianne Altwegg (since 2015): Political science graduate, responsible for energy, environment and landscape at the Consumers Association of Western Switzerland (FRC)

Members:

- Dario Marty (since 2018): Degree in electrical engineering (university of applied sciences), former Head of ESTI
- Sita Mazumder (since 2018): PhD in economics, Professor of Economics and Computer Science at the Lucerne School of Information Technology, Lucerne University of Applied Sciences and Arts

- Andreas Stöckli (since 2019): Attorney-at-law, Professor of Constitutional and Administrative Law at the University of Fribourg
- Katia Delbiaggio (since 2020): PhD in political science, Professor of Economics at the School of Business, Lucerne University of Applied Sciences and Arts
- Felix Vontobel (since 2020): Degree in electrical engineering (university of applied sciences)

Committees
In the year under review, the Commission's committees were as follows:

Pricing and Tariffs
- Katia Delbiaggio (chairperson)
- Laurianne Altwegg
- Sita Mazumder
- Andreas Stöckli

Legal Affairs
- Andreas Stöckli (chairperson)
- Werner Luginbühl
- Lauriane Altwegg

Networks and Supply Security
- Dario Marty (chairperson)
- Werner Luginbühl
- Lauriane Altwegg
- Katia Delbiaggio
- Felix Vontobel

International Relations
- Felix Vontobel (chairperson)
- Werner Luginbühl
- Dario Marty

Market Surveillance
- Sita Mazumder (chairperson)
- Katia Delbiaggio
- Andreas Stöckli
- Felix Vontobel

Resignations and new appointments
There were no resignations or new appointments in 2020, the year under review.

Representation of gender and language regions
There were three female and four male ElCom Commission members during the year under review, which corresponds to a ratio of women to men of 43 per cent. In terms of representation of language regions, the ElCom Commission members are as follows: German-speaking region: five persons; French-speaking and Italian-speaking regions: one person each.

9.1.2 Technical Secretariat

The Technical Secretariat provides the Commission with technical and specialist 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 administrative level, the Technical Secretariat is affiliated with the General Secretariat of the Federal Department of the Environment, Transport, Energy and Communications (DETEC). The Administrative Secretariat is ElCom's central contact point for the general public, the electricity industry and the media. It coordinates the activities of the Commission and the Technical Secretariat and provides the Commission with administrative support. As of 31 December 2021, the Technical Secretariat employed 45 personnel on a full-time or part-time basis, including three apprentices. This corresponds to 36.7 full-time equivalents (FTE). The employees are made up of 17 women and 25 men, which represents a female proportion of 39.5 per cent. The average age of all employees is 44. Breakdown by national language:

- Italian: 2 employees
- French: 6 employees
- German: 34 employees

Head of the Technical Secretariat (45 employees)

Until 31 October 2021:

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

Since 1 November 2021:

Urs Meister
Dr. oec. publ. (doctorate in political science)

Networks and Europe (10 employees)

Michael Bhend
degree in engineering, Swiss Federal Institute of Technology Zurich

Pricing and Tariffs (9 employees)

Barbara Wyss
PhD in economics

Market Surveillance (5 employees)

Cornelia Kawann
degree in engineering, doctor of technology, MBA

Legal Affairs (9 employees)

Nicole Zeller
lic. iur., attorney-at-law

Administrative Secretariat (7 employees)

Simon Witschi
M.A.

9.2 Finances

In the year under review, ElCom had a budget of CHF 13.2 million at its disposal. Its effective expenditure amounted to around CHF 13.1 million. This amount covered ElCom's entire personnel and operating costs, including the additional expenditure associated with the replacement of existing IT systems.

On the income side, ElCom received a total of CHF 5 million, the main sources of which were payments of supervisory fees by Swissgrid for ElCom's cooperation with authorities abroad and court costs paid by parties involved in legal proceedings.

9.3 Events

ElCom Forum 2021

After a two-year interval due to the pandemic, the ElCom Forum was held for the 11th time on 5 November 2021 at the Lucerne Culture and Congress Centre. Around 300 guests from the energy industry attended presentations and discussions on compatibility between security of supply and renewable energies. Eminent speakers from industry, the administration and science reviewed the current situation and looked at the major challenges ahead. The ElCom Forum 2022 will be held on 18 November.

Informational events for grid operators

ElCom held six information events for grid operators during spring 2021. These events were held virtually due to the coronavirus pandemic. They addressed current issues from the Pricing and Tariffs section, legal changes and the latest energy policy news from the SFOE. Just under 600 people took part in the six events held in three languages. Both the participants and employees of ElCom and the SFOE regarded this as a welcome opportunity to share professional experience.

Market surveillance workshop

As in previous years (with the exception of 2020, the year of coronavirus) a market surveillance workshop was held in May 2021, albeit online during the year under review. The 2021 workshop focused on the latest developments in monitoring the wholesale energy markets in Switzerland and Europe and on algorithmic trading.

10 Annex

10.1 Facts and figures

A total of 152 new cases were received in 2021 and 203 cases were brought forward from the previous year. 201 of these cases were concluded in the year under review – which represents a ratio of 57 per cent. General enquiries are those submitted via the contact form on the ElCom website or via email and which deal with routine matters. Handling these enquiries normally takes anywhere from a few hours to one or two days. Occasionally, general enquiries may lead to proceedings. In 2021, 418 such general enquiries were received. All but 23 of these were dealt with in full (94 per cent). A total of 29 decisions were pronounced in the year under review. A large portion of these concerned applications for increasing network capacity.

Complaints, etc.	Brought forward from previous years[1]	Received in 2020	Dealt with in 2020	Carried forward to 2021
Specific matters relating to tariffs	31	18	21	28
Increases in network capacity	29	47	48	28
Other cases	143	87	132	98
Total	**203**	**152**	**201**	**154**
General enquiries	18	418	413	23
Total including general enquiries	**221**	**570**	**614**	**177**

Table 7: ElCom activities: statistics for 2021

10.2 Meetings

The members of ElCom attend monthly plenary meetings. In addition to these, the five committees hold their own meetings and ElCom also organises workshops and other extraordinary meetings. In the year under review, the members of ElCom (in various compositions) attended a total of 12 full-day and 15 half-day meetings within Switzerland. Once a year, ElCom organises a retreat during which its members visit local grid operators. The Commission met with Repower during the retreat in the year under review.

10.3 Publications

Directives

18.05.2021	WACC production

Notifications

28.01.2021	Continuous cross-border intraday trading
30.06.2021	Own-consumption practice model
07.07.2021	Consultation procedure on the revision of the NCHA – ElCom
21.07.2021	Questions and answers on the Energy Strategy 2050

Reports and studies

26.01.2021	Analysis of the negative prices for Switzerland, France and Germany between 1 January 2015 and 31 May 2020
28.05.2021	Market Transparency 2020 – report by ElCom
03.06.2021	Import risks – analysis
03.06.2021	Import risks – summary
13.10.2021	Brief report on network-related measures to ensure short-term and medium-term security of supply and network stability

10.4 Glossary

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

Distribution network	High, medium or low voltage network for the purpose of supplying electricity to end consumers or electricity supply companies.
EEX	European Energy Exchange
EIV	Non-recurring remuneration
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
EnV	Energy Ordinance
EPEX	European Power Exchange
ESTI	Swiss Federal Inspectorate for Heavy Current Installations
EU	European Union
European Green Deal	EU growth strategy for a sustainable economy
FCR	Frequency controlled normal operation reserve
FINMA	Swiss Financial Market Supervisory Authority
FOCP	Federal Office for Civil Protection
FSO	Federal Statistical Office
H4	5-room apartment with electric cooker and tumble dryer, but without an electric boiler
HV	High voltage
ICT	Information and Communications Technology
IDM / IDM CH Index	Intraday Market / Intraday Market Index Switzerland

IN	Imbalance Netting
KEV	Feed-in remuneration at cost
kVA	Kilovolt ampere
kWh	Kilowatt hour
kWp	Kilowatt peak
LV	Low voltage
Median	Value in the middle of a data series arranged by size, i.e. half of all the observations are smaller and half are larger than the median figure. (Unlike the average figure, the median is resistant to statistical outliers.)
MV	Medium voltage
MVA	Megavoltampere
MW	Megawatt
MWh	Megawatt hour
Net transfer capacity (NTC)	Maximum exchange programme between two network zones that is reconcilable with the safety standards of both zones and which takes technical uncertainties regarding future network situations into account.
Network access	Right to use a network in order to obtain electricity from any supplier or to feed electricity into a network.
Network use	Physical use of a network system based on feed-in or withdrawal of electricity.
NO	Network operator
NextGenerationEU	temporary EU recovery plan to repair the damage caused by the Corona pandemic
NPP	Nuclear Power Plant
OT	Operational technology

PGV	Plangenehmigungsverfahren (planning approval procedure)
PLEF	Pentalateral Energy Forum
PV	Photovoltaic system
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 power supply	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
SIDC	Single Intraday Coupling
Strand km	A cable strand (strand km) consists of several conductors (e.g. 1 km with 3 phase or single phase conductors = 1 km). In the case of cable lines, one kilometre describes the absolute length of the cable. For overhead lines, for example, 3 phase conductors correspond to one strand (see VSE document NBVN-CH edition 2007).
StromVG	Federal Electricity Supply Act
StromVV	Federal Electricity Supply Ordinance
SÜL	Electricity Transmission Lines sectoral plan

System services, SDL	The ancillary services necessary for the safe operation of networks. The main components are system coordination, balance management, provision of reserve energy, self-contained start and independent operation capability of generators, voltage stability (including reactive energy), operational measurements and compensating active power losses.
Transmission network	Network used for the transmission of electricity over large distances within the country and for connection to networks outside the country, usually operated within the range of 220 to 380 kV. The following items are integral parts of the transmission network: a) transmission lines and support structures; b) coupling transformers, switching systems and measurement, control and communication equipment; c) systems that are used jointly with other network levels, mainly in association with the transmission network or without which it is not possible to operate the transmission network safely and efficiently; d) switching fields before the transformer at the transfer point to another network level or a power plant.
TWh	Terawatt hour
VSE	Association of Swiss Electricity Companies
XBID	Cross-Border Intraday Market Project
ZEV	Zusammenschluss zum Eigenverbrauch (merger for own consumption)

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