

Annual Report

Year in review

The last reporting year was marked by turbulence in the energy sector and an uncertain supply situation in the winter of 2022/2023. Swissgrid made a significant contribution to guaranteeing a secure supply of electricity for Switzerland in the winter months. Despite challenging framework conditions, the company ensured high availability of the transmission grid. To make sure that it will remain able to meet the challenges it faces in the energy system in the long term, Swissgrid developed its Strategy 2027, thereby opening a new, five-year strategy period.



Grid operation

Very high availability of the transmission grid

The availability of the transmission grid was very high in the reporting year. There were no supply disruptions due to a cause in the transmission grid. However, 2022 was characterised by tense grid operations at times, especially in the summer, when a large number of construction projects and maintenance measures were carried out on the transmission grid. In parallel to the outages of grid elements necessary for this purpose, Switzerland recorded very high regional production, which led to considerable grid loads. The lower availability of nuclear power stations in France and exceptional market prices also resulted in high load flows on Switzerland's grid elements at times. Overall, Swissgrid had to carry out more redispatching, especially at the request of German transmission system operators.



Grid operation

Emergency synchronisation of the electricity grids in Ukraine and Moldova with Europe

The transmission systems in Ukraine and Moldova have been synchronised with the European interconnected grid since mid-March. The connection had been in preparation since 2017 and synchronisation was originally planned for 2023. Accelerating the process was technically feasible, and the appropriate measures were taken to successfully guarantee safe and stable operation. As a founding member of ENTSO-E, Swissgrid was in close contact with the European transmission system operators and ENTSO-E, and worked very hard to find solutions in various working groups and committees.



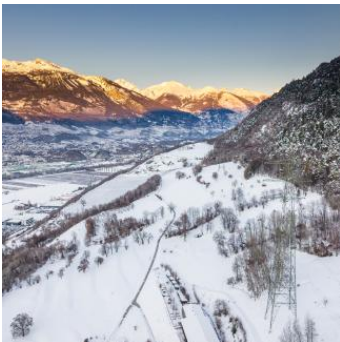
Grid operation

Swissgrid of the future

Preparing grid operations for future challenges

The demands on system operation have increased considerably in recent years – partly because of the growing decentralisation and complexity of the energy system. Swissgrid is implementing its «System Operations» vision to ensure that it can meet the challenges it faces in terms of monitoring and controlling the grid. The aim is to increase the resilience of its teams and to strengthen human resources.

Swissgrid is also launching its «Operational Planning» vision in order to guarantee rising investments in the grid whilst ensuring secure grid operation at the same time. The aim is to coordinate the various construction projects and maintenance measures more effectively and at the same time optimise the planning and implementation of the associated outages. One of the measures to be taken by Swissgrid for this purpose will be to create a platform to automate and digitalise outage planning.



Grid infrastructure

Commissioning of the new line between Chamoson and Chippis

On 30 September 2022, Swissgrid put the new extra-high-voltage line between Chamoson and Chippis into operation after four years of construction. The 30-kilometre-long connection is important for transporting energy from the Valais hydropower plants. The 77 pylons bundle lines from Swissgrid, SBB and Valgrid, enabling the removal of 90 kilometres of existing overhead lines and more than 300 pylons.



Line strengthened between Pradella and La Punt

The upgraded line between Pradella and La Punt has been in operation since November 2022. The two new 380-kV power systems will enable Swissgrid to increase transport capacity and hence security of supply in the canton of Graubünden and in Switzerland as a whole. As an alternative measure, Swissgrid provided considerable support to Engadiner Kraftwerke for the replacement of an overhead line between Pradella and Bever with an underground cable. This means that a total of

Grid infrastructure

1,100 overhead line pylons can be dismantled.



Grid infrastructure

Connection for the Nant de Drance pumped storage power station completed

On 1 April 2022, Swissgrid put the underground cable connection between La Bâtiaz and Le Verney in Martigny into operation. The demanding construction work took almost two years: the 1.2-kilometre-long tunnel was bored with a mini-tunnelling machine at a depth of 12 to 20 metres. Swissgrid was thereby able to complete the third and final section of the line and finalise the connection to the Nant de Drance pumped storage power plant.



Grid infrastructure

Start of construction and progress on several grid projects

In 2022, Swissgrid began upgrading the existing line between Obfelden and Samstagern to 220 kilovolts. The line between Bassecourt and Mühleberg will be upgraded to 380 kilovolts. In 2021, the Federal Supreme Court confirmed Swissgrid's plans for this important line for the greater Berne area and Central Switzerland. Construction work on the new 380-kV line between Mörel-Filet and Ernen has made good progress.



Grid infrastructure

Numerous projects have reached the approval and planning approval procedure stage

Numerous grid projects are awaiting approval and authorisation: Swissgrid has submitted an application to the Swiss Federal Office of Energy to begin the sectoral planning process for the construction project between Flumenthal and Froloo (Therwil). The project between Niederwil and Obfelden is one step further along: the Federal Council has defined the planning corridor and the transmission technology. As far as the grid project between Innertkirchen and Ulrichen is concerned, the Swiss Federal Office of Energy has proposed the planning corridor for the future line. The project between Bickigen and Chippis continues to be delayed. Although the planning approval for the voltage increase to 380 kilovolts was granted by the Swiss Federal Office of Energy, appeals have

been lodged against the project, so the Federal Court must now pass judgement.



Grid infrastructure

Pioneering project – underground cable in the Gotthard Road Tunnel

For the first time, an extra-high-voltage line will be combined with a national road tunnel. In 2022, Swissgrid submitted a planning approval application to lay underground cabling for the Gotthard line. Swissgrid will lay the 220-kV extra-high-voltage line over a total distance of 18 kilometres between Airolo and Göschenen – 17 kilometres of which will be in the second tube of the Gotthard Road Tunnel. Swissgrid will then dismantle over 70 high-voltage pylons and 23 kilometres of overhead line.



Grid infrastructure

Conversion and expansion of switchgear and transformers

In autumn 2022, Swissgrid began construction work at the Mettlen substation (Eschenbach), which is an important node in the Swiss transmission grid. The plan is to build two new 800-MVA transformers. Swissgrid has also submitted the planning approval application for the modernisation of the substation in Biasca in cooperation with SBB. The project involves replacing the open-air system by a modern, gas-insulated switchgear and installing an SBB frequency converter.



Grid infrastructure

Ongoing investments in the existing grid

In order for the transmission grid to operate properly, permanent maintenance is needed in addition to the conversion and expansion of the grid. This not only involves the replacement of conductors, the revision of circuit breakers, corrosion protection for supporting structures, deforestation or avalanche protection, but also the repair of installations after a damaging event.

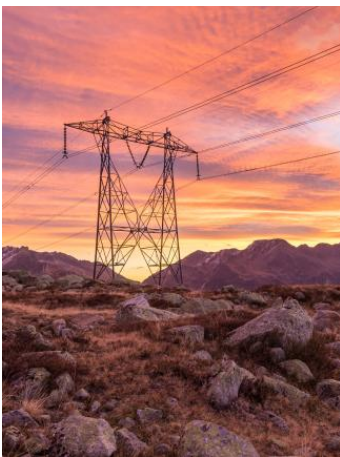


Grid infrastructure

Swiss context

Accelerating grid expansion

The period from the start of a grid construction project through to commissioning is currently at least 15 years. The federal approval and authorisation procedure comprises six phases. Time and again, objections and court proceedings cause projects to suffer significant delays. Swissgrid is committed to ensuring that the approval and authorisation procedures are made more efficient, thereby accelerating grid expansion. This is because the modernisation of the grid infrastructure is crucial for the success of the Confederation’s energy strategy.



Grid infrastructure

Swissgrid of the future

The grid of tomorrow

To ensure that the grid meets future needs, Swissgrid periodically draws up a multi-year plan known as the Strategic Grid. In the past reporting year, several important milestones were reached in planning the Strategic Grid 2040. Swissgrid defined its principles for long-term grid planning, and in the autumn, the Federal Council approved the Scenario Framework Switzerland (SZR CH) drawn up by the Swiss Federal Office of Energy. At the same time, the distribution system operators regionalised the national specifications in cooperation with Swissgrid. Swissgrid will now use this as a basis for drawing up the Strategic Grid 2040. This is expected to be presented to the public in 2024 following a review by the Federal Electricity Commission (ElCom).



Grid infrastructure

Security

More protection for Swissgrid substations

Swissgrid is increasing the level of protection of its substations with a project to implement structural and organisational measures and install safety systems. During the pilot phase, Swissgrid defined new safety standards, developed IT systems and introduced new processes. Implementation took place at the first substations in the course of the reporting year.



Security

Safety Culture Ladder certification successfully achieved

In 2021, Swissgrid introduced the Safety Culture Ladder (SCL), an assessment method that can be used to measure general safety awareness within the company. Another important milestone followed in the last reporting year: Swissgrid successfully passed the first SCL certification audit and achieved the targeted third level of the maturity model, which comprises a total of five levels.



Security

Business continuity management – being prepared for extraordinary situations

As the owner of one of Switzerland's most critical infrastructures, Swissgrid invests continuously in its resilience: in the area of Business continuity management (BCM), the company set up the necessary organisation to guarantee its core mission in the event of an incident. In November, the company also conducted a comprehensive exercise which involved deploying staff to decentralised assembly points and testing their cooperation on site and with the employees in the grid control rooms, as well as the use of BCM-relevant IT systems.



Security

Another milestone reached in the expansion of cybersecurity

The protection of information and systems that process information is of strategic importance to Swissgrid. This is because the organisation's ability to act and the functionality of the technical infrastructure are based on protected information and systems.

Swissgrid takes numerous measures to ensure comprehensive protection. The management of these measures was subjected to an audit process in 2022, which was successfully concluded with ISO/IEC 27001 certification. The certification is the result of Swissgrid's comprehensive efforts to ensure continuous development in the area of cybersecurity.



Security

High safety awareness – raising awareness among employees

The company is establishing a high safety culture within the company. This requires a common understanding and awareness of the topic of safety. In 2022, Swissgrid therefore held its very first one-day training course for all employees, during which safety-relevant topics were discussed. The focus was on occupational safety and cyber risks, among other things. Training will be organised annually in the future.



Market developments

European context

Swissgrid technically ready for the MARI platform

The MARI platform enables the exchange of fast tertiary control energy within the European internal electricity market. Since August, Swissgrid has been technically ready to be connected to the MARI platform. Swissgrid has specially adapted Switzerland's control energy products, among other things. The platform was put into operation in the autumn. In the absence of an electricity agreement with the EU, however, Swissgrid is not yet connected to the platform.



Market developments

European context

All preparations completed for connection to the PICASSO platform

In June, Swissgrid completed all the necessary technical preparations for connection to the international PICASSO platform. PICASSO enables the exchange of secondary control energy and integrates the netting function previously carried out by the International Grid Control Cooperation (IGCC). For the time being, there is no connection to the European platform due to the lack of an electricity agreement. Swissgrid remains a member of the IGCC until further notice.



Market developments

European context

Progress on consideration in Europe-wide capacity calculations

The lack of a political solution between Switzerland and the EU means that Switzerland is not part of the Italy North and CORE capacity calculation regions relevant to Swissgrid, nor of the coupled power markets. Thanks to the signature of the Synchronous Area Framework Agreement (SAFA), Swissgrid was nonetheless able to start negotiations with the transmission system operators from the Italy North capacity calculation region and conclude bilateral contracts at the end of 2021. These contracts have a term of one year at a time and must always be reapproved by the regulators involved. From a technical point of view, Swissgrid is fully involved in cross-border capacity calculation methods, in redispatching and in safety coordination processes throughout the contract term. The contract with Italy North was renewed at the end of 2022.

As far as the CORE capacity calculation region is concerned, a joint concept was developed with the participating transmission system operators to take account of Switzerland's grid elements in capacity calculations on the northern border, and a prototype was implemented in 2022. The next step will be to finalise the concept, which must still be approved by the transmission system operators and the regulators of CORE.



Market developments

European context

Revision of contracts due to provisions of the European Network Codes

The signature of the Synchronous Area Framework Agreement (SAFA) established a basis to allow Swissgrid to cooperate with European transmission system operators at a technical and operational level despite the lack of an electricity agreement. Swissgrid must therefore ensure that the provisions of the contract and the binding European Network Codes are complied with. The transmission code and the balancing concept have already been adapted for this purpose. In 2022, Swissgrid revised the framework agreements for ancillary services and held a new tender for the restoration cells for automatic start-up and island operation capability.



European context

Regional Operation Security Coordination to increase operational security

The Clean Energy Package resulted in changes to the coordination of pan-European grid operations in 2021. The capacity calculation regions were tasked with developing a Regional Operation Security Coordination (ROSC) methodology. Swissgrid is not part of the «Italy North» and «CORE» capacity calculation regions due to the lack of an electricity agreement. Given its importance for regional grid security calculations, Swissgrid should nevertheless be integrated into ROSC processes.

A higher degree of cooperation should also be achieved by the further development of the current regional security coordinators, such as TSCNET, into the future Regional Coordination Centres (RCC). The RCC will be formed in the new grid operation regions, which are referred to as System Operations Regions (SOR). Swissgrid is not part of the SOR and therefore cannot participate in the RCC. As a current shareholder of TSCNET, Swissgrid is currently endeavouring to find a way to continue to play a role in shaping TSCNET.



European context

70% rule – a sharp rise in the challenges facing Swissgrid

As part of the Clean Energy Package, the transmission system operators in continental Europe are required to make 70% of cross-border capacity available for energy exchange by the end of 2025 at the latest. If Switzerland is not fully taken into account in the capacity calculations for cross-border trade by then, unplanned electricity flows will increase even further. Likewise, neighbouring countries could be forced to restrict their cross-border capacities towards Switzerland if necessary. This is particularly problematic in winter, when Switzerland is dependent on imports and corresponding cross-border capacities.



European context

Without an electricity agreement, only limited participation is possible in Europe

The lack of an electricity agreement prevents Swissgrid from participating in many European processes and platforms. For example, the company is currently unable to connect to the MARI and PICASSO platforms, which are relevant for control reserves, and its future participation in TERRE is also at risk. Furthermore, Swissgrid is not part of Flow-Based Market Coupling or the CORE capacity calculation region bordering Switzerland. Nor is the company included in the System

Operations Regions, which means that it cannot participate in the Regional Coordination Centres that will play an important role in the coordination of grid operations in the future.

Swissgrid's isolation increases the risk of unplanned electricity flows in the Swiss grid. The company is therefore committed to using all the means at its disposal to be able to play an active role. Agreements have been reached, for example, to ensure that Switzerland is taken into account in the capacity calculation for Italy North. Swissgrid has also taken legal action against decisions by EU authorities for reasons of system security. In the longer term, however, these measures are not an adequate substitute for an electricity agreement.



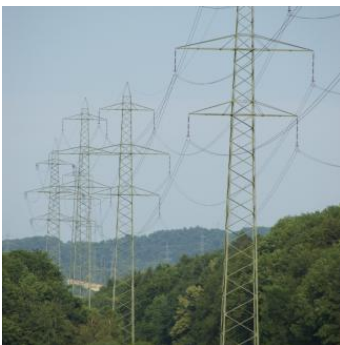
Market developments

Swissgrid of the future

Equigy – pilot project with ewz successfully completed

In the last reporting year, Swissgrid and ewz carried out a pilot project with the crowd balancing platform Equigy. This platform, which Swissgrid founded with TenneT and Terna, takes advantage of blockchain technology to make it easier to bundle and control small, flexible energy resources and to use them to stabilise the grid.

The focus of the pilot project was to determine how these energy sources can be used to stabilise not only the transmission grid, but also the distribution grid, and how cooperation between transmission and distribution system operators can be automated. This type of cooperation will become even more important in the future in order to be able to cope with the increasing decentralisation and associated complexity of the energy system. The next step will be for Swissgrid to carry out further pilot projects with more participants.



Grid infrastructure

Swissgrid of the future

Pylonian – knowing the condition of pylons in detail

In 2021, Swissgrid launched an innovative project, Pylonian, that involved placing Internet-of-Things sensors on pylons to measure variables such as pylon vibrations, pylon inclination, temperature and solar radiation. In addition, data-driven algorithms are being developed to detect parameters such as patterns and anomalies from the measured values. Swissgrid's aim is to monitor the condition of the pylons over their entire life cycle and therefore to be able to deploy maintenance work in a more targeted manner. Seven pylons have been equipped with the sensors so far, and their data is already being analysed on a continuous

basis. Swissgrid is now investigating the gradual expansion of the project to hundreds or thousands of pylons.



Grid operation

Swissgrid of the future

Compose – automated processes in outage planning

The aim of Swissgrid’s COMPOSE research and development project is to automate and optimise the outage planning of grid elements. At the same time, a decision-making aid for measures in the event of possible grid congestion is to be created. Planning outages is highly complex, as it affects the load flows in the grid in many ways. The use of mathematical optimisation and algorithms lends itself to this environment.

In 2022, Swissgrid developed a prototype that can simulate the effects of outages and identify the best time windows for their implementation. The next step will be to develop this prototype even further and to expand its functionalities.



Grid operation

Swissgrid of the future

eflux – visualisation of the current grid state

The eflux project aims to display the grid state in an easy-to-read way and make it accessible to new target groups on devices such as laptops, smartphones and tablets in addition to big screens in grid control rooms.

A cross-disciplinary team developed a new, schematised representation of the transmission system, based on the route map of the London Underground. The prototype provides a rapid guide and allows problem areas in the grid to be identified quickly. This simplifies the work of the operators, who have to recognise situations in the grid within a short time, analyse them and work out solutions. More specifically, the functionalities available include a zoomable display, animated load flows and time series diagrams. These options will now be made available to all employees as part of a follow-up project.



Swissgrid of the future

Company

Strategy 2027 – the start of a new, five-year strategy period

In the last reporting year, work was carried out throughout the company on Strategy 2027, which heralds a new five-year strategy period. In the coming years, Swissgrid will rely on its proven strengths with four ongoing priorities: «Security of Supply», «Grid Transfer Capacity», «Safety & Security» and «Operational Excellence». At the same time, the company is establishing a new emphasis by positioning «Innovation and Digitalisation» as an additional focus area and promoting the sustainable development of the company.

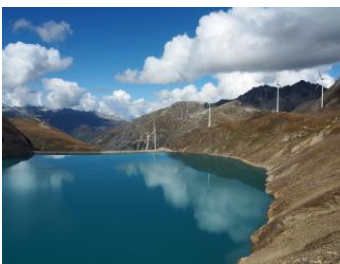


Swissgrid of the future

Company

Corporate Social & Environmental Responsibility – part of the new strategy

Swissgrid has set itself the goal of anchoring sustainability even more firmly within the company. By integrating Corporate Social & Environmental Responsibility (CSER) into its Strategy 2027, Swissgrid has taken an important step in highlighting sustainable development throughout the company. In the last reporting year, Swissgrid prepared a materiality analysis and selected a number of relevant Sustainability Development Goals. Swissgrid thereby laid the foundation for prioritising CSER measures and implementing them in all areas of the company.



Swiss context

Measures for a secure supply of electricity – expert report by Swissgrid and the industry

In association with the energy producers AET, Alpiq, Axpo, BKW and Repower, Swissgrid presented an expert report at a session event held by the federal parliament in spring 2022. The report outlined possible solutions for guaranteeing a supply of electricity in Switzerland that would be as secure and as CO₂ neutral as possible in the long term. The analysis was also presented to the Swiss Federal Office of Energy and the Swiss Federal Electricity Commission (ElCom).

The conclusion was that the «Federal Act on a Secure Electricity Supply from Renewable Energies» consolidation legislation goes in the right direction, but is not sufficient to ensure supply, especially in winter. The participating companies called for a build-up of reserves, for example by means of back-up power plants, and requested an acceleration of the approval processes for renewing the grids and for building new

production plants. Another important request was that an intergovernmental solution should be defined for the technical integration of Switzerland, as an alternative to an electricity agreement.



Swiss context

Procedures for hydropower and wind energy plants to be accelerated

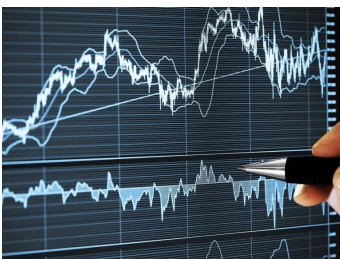
In February 2022, the Federal Council launched a consultation process on legislation to accelerate the introduction of renewable energy resources. The aim of the amendment to the Energy Act is to simplify and streamline the planning and authorisation procedures for the most important hydropower and wind energy plants. The expansion of photovoltaics should also be driven forward. Swissgrid presented its view on this amendment to the Energy Act in May 2022. Swissgrid welcomes the measures, but asks for a similar acceleration in the authorisation procedures for the grids, and submitted specific proposals to this end.



Swiss context

The Federal Council entrusts Swissgrid with electricity monitoring for the National Economic Supply

In view of a possible electricity shortage in Switzerland in the winter of 2022/2023, the Federal Council decided on 4 May 2022 that Swissgrid should develop a new monitoring system for the Energy Division of the National Economic Supply. The aim of this system is to obtain information on the current supply and market situation in Switzerland. In addition, it is intended to provide analyses regarding self-sufficiency and show how long Switzerland could ensure the supply of electricity without imports. Swissgrid put the system into operation on time at the end of the year.



Swiss context

Bundesrat überträgt Swissgrid das Strom-Monitoring für die wirtschaftliche Landesversorgung

Im Hinblick auf eine mögliche Strommangellage in der Schweiz im Winter 2022/2023 beschloss der Bundesrat am 4. Mai 2022, dass Swissgrid für den Fachbereich Energie der wirtschaftlichen Landesversorgung ein neues Monitoring-System entwickeln soll. Das Ziel des Monitorings ist es, Informationen über die aktuelle Versorgungs- und

Marktsituation in der Schweiz zu gewinnen. Zudem soll es Analysen zur Eigenversorgung liefern und aufzeigen, wie lange die Schweiz die Stromversorgung ohne Importe sicherstellen könnte. Swissgrid nahm das System planmässig Ende Jahr in Betrieb.



Grid operation

Swiss context

Preparations for a secure supply of electricity for Switzerland in winter

The conflict in Ukraine and the significant reduction in gas deliveries to Europe as a result, combined with turbulence on the energy markets, triggered an energy crisis in 2022 that also affected Switzerland. Swissgrid shared the Confederation's assessment that there were uncertainties with regard to the secure supply of electricity in Switzerland in the winter of 2022/2023.

The Federal Council enacted various measures to increase the security of supply in the short term and assigned new roles to Swissgrid. For example, the company was tasked with overseeing the auction of the hydropower reserve in October 2022. In addition, Swissgrid took structural measures to ensure that the voltage on the lines between Bickigen and Chippis and between Bassecourt and Mühleberg could be temporarily increased following the necessary approval. The connection of the reserve power plant in Birr to the transmission grid was also implemented by Swissgrid. What is more, the company took over the operational management of the possible use of emergency power groups as an additional reserve.

Swissgrid did everything in its power to help to ensure a reliable supply of electricity in Switzerland. The company took additional measures such as the early procurement of control power, for instance. Swissgrid also set up an internal task force right away at the beginning of July 2022.



Swissgrid issues another corporate bond

On 24 May 2022, Swissgrid issued another bond on the capital market with a volume of CHF 175 million. The proceeds of this bond will be used to repay current financial liabilities and to finance ongoing investments and procurement costs.

Company



Company

Election of two new Board members

Two new Board members were elected at the Annual General Assembly on 18 May 2022. Felix Graf, CEO of NZZ since June 2018, was newly elected to the Board of Directors as an independent member. He succeeds Isabelle Moret. In addition, Martin Koller, who has been with Axpo Holding since 2012, was elected as industry representative to replace Kerem Kern.



Grid infrastructure

Company

Maintaining dialogue with the industry and the population

It is particularly important to Swissgrid to provide transparent and continuous information about its activities, and in particular about its construction projects. In 2022, Swissgrid held information events about planned construction projects between Innertkirchen and Ulrichen, Flumenthal and Froloo (Therwil), and Airolo and Göschenen, among others. The temporary visitor centre in Bözberg to provide information about the opportunities and challenges of underground cables and overhead lines welcomed its final visitors in June 2022. The company was present at various trade fairs such as the Foire du Valais and the Vifra in Valais, the Assis européennes de la transition énergétique in Geneva and the LUGA in Lucerne.

Swissgrid also remained in close contact with the industry: major events were held in Castione and for the commissioning of the line between Chamoson and Chippis. In addition, Swissgrid organised events in hybrid or virtual format such as the grid forum, an industry webinar, the grid usage conference and the partner meeting of the balance group management.