swissgrid

Question 22.1052
Would a power failure in Germany spread to Switzerland? What solutions are available?

8 November 2022

On 29 September 2022, Piero Marchesi from the Swiss People's Party (SVP) submitted a question asking «Would a power failure in Germany spread to Switzerland? What solutions are available?». In this paper, Swissgrid sets out its position on the subject.

Cooperation with neighbouring countries makes a significant contribution to grid stability in Switzerland.

The 39 members (from 35 countries) of the European Network of Transmission System Operators for Electricity (ENTSO-E) are jointly responsible for the secure and coordinated operation of the European interconnected grid, the largest interconnected electricity grid in the world. The Swiss transmission grid is part of the European interconnected grid and is connected to neighbouring countries via 41 cross-border lines. Electricity exchange with European neighbours via these lines is systemically important and plays a key role in ensuring Switzerland's security of supply. The large number of power plants in the interconnected grid means, for example, that the failure of a single power plant can be managed more easily. Thanks to close cooperation with European partners, power plant failures – as well as overproduction – can be compensated. There is therefore a larger buffer overall to balance out fluctuations in the grid.

In addition, the cross-border exchange of electricity makes it possible to overcome supply bottlenecks in winter. Due to its electricity mix, Switzerland is dependent on imports in winter. Around 60 percent of Switzerland's utility power generation currently comes from hydropower. This is subject to seasonal fluctuations in production due to the differing water levels at different times of the year. In winter, up to 40 percent of the electricity consumed in Switzerland comes from abroad.[1]

Jointly managing grid incidents

The security of both the grid and the supply in the connected countries is mutually interdependent. Appropriate measures therefore have to be taken to prevent technical disturbances in one part of the grid from spreading to other regions due to knock-on effects. If there is a major disturbance in Germany, for example, the entire European grid is affected. Consequently, Swissgrid works closely with the European transmission system operators.

The transmission system operators in the European interconnected grid are prepared for disturbances affecting the grid, with well-rehearsed processes in place to minimise the impact of system disturbances and, in particular, to prevent and equalise major frequency deviations. The operators work together to prepare for disturbances and corresponding procedures are in place to enable the reinstatement of the system frequency of 50 Hertz. Swissgrid and Amprion (Germany), as the Coordination Centre South and Coordination Centre North respectively, are responsible for these processes as «frequency coordinator». In the event of a significant frequency deviation, they inform all European transmission system operators and initiate the appropriate measures. They coordinate these measures quickly and efficiently, ensuring that the system can be stabilised as quickly as possible. These well-rehearsed processes have already proven themselves in several situations. Most recently in the two grid disconnections that occurred in 2021 in Eastern Europe (January)[2] and the Iberian Peninsula (July)[3]. The two disturbances required close coordination

[1] Swiss electricity statistics 2021, Swiss Federal Office of Energy SFOE, 2021
[2] Continental Europe Synchronous Area Separation on 08 January 2021
[3] Continental Europe Synchronous Area Separation on 24 July 2021

between the transmission system operators. The automatic response and the coordinated measures by the transmission system operators enabled normal operating conditions to be rapidly reinstated.

Jointly coordinated measures can prevent critical grid situations
With regard to the winter of 2022/2023, Swissgrid shares the Confederation's assessment that the situation with regard to the secure supply of electricity is tense. In its «Winter outlook 2022-2023 early insights» published on 20 October 2022[4], the European Network of Transmission System Operators for Electricity (ENTSO-E) also described the supply situation for the coming winter as tense. According to ENTSO-E's assessment, critical grid situations can be prevented by coordinating appropriate preventive measures among European transmission system operators.

Integration into the European electricity system as an explicit legal mandate
According to Article 89 of the Federal Constitution, Switzerland shall endeavour to ensure a safe, economic and environmentally sustainable electricity supply. Integration into the European electricity system is an important prerequisite for achieving this goal. The legislator also took the importance of interconnection with Europe into account in the Electricity Supply Act. Cooperating with the European transmission system operators and ensuring sufficient international interconnection of the Swiss transmission grid represent an explicit legal mandate for Swissgrid (Art. 20, para. 2, lit. f, Electricity Supply Act). This is because in a large interconnected grid, greater grid security and security of supply can be achieved at lower cost.

Island grid operation in Switzerland would be associated with high risks and would significantly jeopardise both secure grid operation and the security of supply.

In the event of a power plant failure in Switzerland, «assistance» automatically flows into the Swiss grid from neighbouring European countries via the interconnected lines. This assistance is made up of the instantaneous reserve (inertia due to the rotating masses; as soon as a frequency deviation begins) and then the primary control reserve (activated automatically within 30 seconds across Europe on the generators of the power plants). Previously, secondary and tertiary control reserves were virtually exclusively the domain of national markets.

With the Electricity Balancing Guideline (EB GL), the EU has established a binding regulation for the procurement of control energy in the EU that transforms the control energy market from a national to a pan-European matter. The aims are to achieve more efficient procurement, a more reliable provision of control energy and lower costs for end consumers. As there is still no electricity agreement with the EU, Switzerland's participation in the new, pan-European platforms for the joint requesting of control energy, TERRE, MARI and PICASSO (cf. Factsheet), is not guaranteed. If Swissgrid were to be excluded from these platforms, this would lead to a further increase in unplanned load flows in the Swiss grid. As there are hardly any instruments left to take corrective action at such short notice, this would in turn jeopardise grid stability.

If Switzerland were in island operation, the entire reserve (primary, secondary and tertiary control power/energy) for a power plant failure in Switzerland would also have to be available or held in Switzerland. With a grid load of ten Gigawatts in winter and five Gigawatts in summer, ten to twenty percent of power would be lost in the event of an outage of Leibstadt. This would have a massive impact on frequency. The drop would be striking and would cause a grid disturbance. This would lead to a partial to complete power system failure. An island solution would therefore significantly jeopardise both secure grid operation and the security of supply.

Electricity self-sufficiency is neither technically possible nor economically viable.

With the current Swiss electricity mix, it is currently not possible to guarantee supply throughout the year at all times by means of domestic production. The expansion of production plants and storage capacities in

[4] ENTSO-E: Early insights of Winter Outlook Report 2022-2023

Switzerland would have to be massively driven forward and promoted to enable a situation in the distant future in which Switzerland could cover its electricity requirements throughout the year and at all times by means of domestic production. Switzerland's degree of self-sufficiency must undoubtedly be increased, but a Switzerland that is completely self-sufficient in terms of electricity is an illusion and is not possible from the point of view of grid technology nor is it viable economically.