

Interpellation 24.4225: Strategic grid Swissgrid 2040: connection to European high-voltage direct current transmission projects?

Swissgrid's position

Date 14th November 2024

1 Initial situation

On 27 September 2024, National Councillor Gabriela Suter (SP) submitted an interpellation entitled «Strategic grid Swissgrid 2040: connection to European high-voltage direct current transmission projects?» with the following text:

A line using high-voltage direct current (HVDC) technology has a higher power capacity than a conventional alternating current line. Power losses with direct current transmission are 30 to 50% lower. In addition, the power flow can be controlled to relieve the parallel alternating current (AC) grid. HVDC technology is particularly interesting for transporting electricity over long distances, for example, from offshore wind farms in the North Sea to the south. Germany is therefore planning several such lines. In the future, these lines will transport electricity generated by wind power in the north over long distances to the south with minimal losses. For the security of electricity supply, it would be important for Switzerland to be connected to these lines.

The Federal Network Agency's grid development plan envisages a DC interconnector from Germany to Switzerland between Böblingen (Germany) and Mettlen in the P678 project. The Federal Network Agency's report states that the «Swiss regulatory authority» was consulted and is in favour of the project: *«The Swiss regulatory authority pointed out that the project is regarded as positive, even though it is still under review, and indicated that the project is expected to be included in the «Strategic Grid 2040» grid development plan in Switzerland. Additional benefits are expected from the close interaction of the measure with the «Greenconnector» project, an HVDC connection between northern Italy and Switzerland, also designed for 1 GW.»*

However, these two projects are not mentioned in Swissgrid's planning principles for the Strategic Grid 2040. The following questions therefore arise:

1. Will a connection to southern Germany (project P678: DC interconnector Germany–Switzerland) be taken into account as part of the development of the Strategic Grid 2040?
2. Will a connection to northern Italy (Greenconnector project) be taken into account as part of the development of the Strategic Grid 2040?
3. Are there plans for an HVDC connection within Switzerland between the end stations at the Mettlen substation (interconnector Germany–Switzerland) and the Bonaduz/Sils substation (Greenconnector)?
4. If no HVDC connection is planned within Switzerland: does the Swiss extra-high-voltage grid have sufficient reserve capacity for the connection to these two HVDC projects?

2 Strategic Grid 2040

The «Strategic Grid 2040» is based on the legal provisions set out in Articles 9b to 9d of the Electricity Supply Act (StromVG) and the corresponding implementing provisions in the Electricity Supply Ordinance (StromVV). The grid operators ensure the appropriate involvement of the cantons and other stakeholders, such as SBB, environmental organisations and municipalities, in the planning process. The «Strategic Grid 2040» is based on the federal scenario framework in accordance with Article 9a StromVG and the additional demand in the grid area (Art. 9d Para. 1 StromVG). The «Strategic Grid 2040» was submitted to EICom for review at the end of June 2024. EICom has until the end of March 2025 to examine the submitted documents and inform Swissgrid of its findings (Art. 22 Para. 2^{bis} StromVG). **For this reason, a public version of the «Strategic Grid 2040» does not yet exist.**

The basis for planning the «Strategic Grid 2040» is the start grid, which comprises all existing grid facilities plus the projects whose implementation has already been decided on and which will be put into operation in the next few years. This start grid does not include a high-voltage direct current (HVDC) transmission connection to Germany or Italy.

The reason for this is that there is still no conclusive proof of the need for the two projects mentioned in the interpellation (DC interconnector between Germany and Switzerland and «Greenconnector»). The expansion requirements of the extra-high-voltage grid were determined in simulations using the regionalised data from the Swiss scenario framework adopted by the Federal Council. **The «Strategic Grid 2040» shows where in Switzerland the grid needs to be reinforced or expanded.**

A possible need for the expansion of international powerline construction projects, is not a result of the «Strategic Grid 2040» project. Swissgrid cannot carry out the necessary analyses on its own. This requires joint studies with foreign transmission system operators (TSOs), which are currently being carried out with neighbouring TSOs (these analyses include the projects mentioned in the interpellation). If these cross-border studies can demonstrate the added economic value of grid expansion for Switzerland, the respective projects will be included in Swissgrid's long-term grid planning.

3 Technology decision between direct current and alternating current

Swissgrid is working intensively on HVDC technology, its further technological development and expansion in Europe. The type of technology (direct current or alternating current) in future grid projects is not chosen at the grid planning stage but decided later as part of the individual grid projects or their approval processes. Although there are lower losses with HVDC connections, losses occur at the converter stations that can only be compensated for over longer distances. **Given this argument, along with the fact that the converter stations are associated with very high costs and require a large surface area, HVDC technology is only economically viable for long distances (depending on the case, overhead lines from a minimum of 400 km; cables from 25 km).**

4 Conclusion

The HVDC projects mentioned in the interpellation are currently being analysed by Swissgrid with the help of the neighbouring TSOs. Whether and where cross-border lines will be reinforced, and whether these lines will be designed as HVDC lines or conventional AC lines, will be examined, and decided on for each specific project.