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Parliamentary initiative 23.417
Accelerating the grid expansion process
Swissgrid's position

Date 9th April 2024

1 Initial situation

On 16 March 2023, the Green parliamentary group submitted a parliamentary initiative on «Accelerating the grid expansion process» aiming to adapt the legal basis so that the grids can be expanded more quickly in the future. It would apply in particular to projects of national interest that are necessary for the implementation of the Confederation's Energy Strategy 2050. Furthermore, the text of the initiative states: «If possible, expansion should also enhance the landscape, building culture and cultivated land, or help protect biodiversity. Overhead lines should be laid underground wherever possible.»

2 The transmission grid is crucial for the transformation of the energy system

As the backbone of the electricity system, the transmission grid makes a significant contribution to achieving the goals of Energy Strategy 2050. **Needs-based expansion of the grid is essential in order to guarantee Switzerland's security of supply in the long term.**

To ensure that the grid meets future needs, Swissgrid periodically draws up a multi-year plan known as the «Strategic Grid». The «Strategic Grid 2025» includes ten projects. Swissgrid has successfully completed four of these projects to date, while the others are still in the planning or implementation phase. **It currently takes an average of 15 years from the start of the project to the commissioning of the line for projects that are subject to the sectoral plan for transmission lines (SÜL).** Official processes account for around two thirds of this time. If objections are raised and court decisions made at a late stage, they often lead to considerable delays in projects, which can then take up to 30 years. **Even today, grid expansion is not keeping pace with power plant expansion.** This results in economically inefficient grid congestion and restrictions in electricity production.

Swissgrid began updating its long-term grid planning at the end of 2022 on the basis of the federal scenario framework. The «Strategic Grid 2040» describes and justifies the grid expansion requirements determined for the target year 2040. It is expected to be published in spring 2025.

3 Faster approval processes are vital

Experience shows that lengthy approval processes and delays due to objections or legal proceedings can lead to the project planning phase taking a very long time. Objections from cantons, municipalities and those people directly affected are a daily occurrence when large infrastructure projects are introduced.

Consequently, it is imperative to gain the support of politicians, the authorities and the population for the construction of this important infrastructure.

On 22 November 2023, the Federal Council decided to introduce a separate bill to accelerate grid expansion even further. A corresponding consultation draft is not expected to be drawn up until the end of 2024.

Approval processes and deadlines for grid projects must be rapidly improved and accelerated so that newly built plants (for generation, consumption and storage) can be connected to the grid as quickly as possible and so that the transport of electrical energy can be guaranteed from the generation site to the consumption centres.

The approval processes for production plants and their grid connections must be coordinated so that they can be completed simultaneously.

Swissgrid has published a corresponding statement (in German) in relation to the amendment of the Energy Act (acceleration of the expansion of electricity generation from renewable energies).

4 Revised legislation (Electricity law)

On 29 September 2023, after around two years of deliberation, the Swiss Parliament adopted the «**Federal Act on a Secure Electricity Supply from Renewable Energy Sources**» (revision of the Energy Act and the Electricity Supply Act) in the final vote. A **referendum** was called against the bill. The Swiss electorate will therefore vote on the issue on 9 June 2024.

With the new version of Article 71a of the Energy Act (EnA) contained in the above-mentioned legislative package, the legislator intends to promote and accelerate the construction of **large-scale photovoltaic systems and their connection lines**. These systems must feed at least 10 percent or 10 GWh of their expected production into the grid by 31 December 2025 in order to receive a one-off payment from the federal government amounting to a maximum of 60 percent of the investment costs. Full commissioning must take place by 31 December 2030. These decisions apply both to photovoltaic systems and to the corresponding grid connections. Large electricity generation units feed their production into Swissgrid's transmission grid. The **large-scale photovoltaic plant projects** concerned are subject to **cantonal authorisation procedures, while Swissgrid's grid projects are subject to a federal authorisation procedure**.

It is therefore of the utmost importance to speed up the expansion of the grid by means of efficient authorisation and approval processes.

5 Overhead lines or underground cabling? The decision lies with the Federal Council.

The Transmission Lines sectoral plan (SÜL) is the Swiss government's superordinate planning and coordination tool for the construction and expansion of transmission lines. For each project, the Swiss Federal Office of Energy (SFOE) appoints a support group made up of representatives of the federal government, the cantons, environmental organisations and Swissgrid.

Overhead lines currently make up 99 percent of the extra-high-voltage grid, as the use of underground cables in the extra-high-voltage grid is relatively new. **Both grid technologies have their advantages and disadvantages** (see Swissgrid brochure on overhead lines and underground cabling). The ground under an overhead line can be built on without major restrictions, for example, but it impairs the landscape because it remains so visible. However, underground cables also leave traces in the landscape, for instance in the form of aisles in forests, access roads and transitional structures that connect overhead lines to the underground cables. The ground above the cable conduit block can be used again for agriculture and vegetation. As roots could damage the underground cable, however, the route must be kept clear

of tall or deep-rooted trees. The frequency of faults is higher for overhead lines than for underground cables, as they are more exposed to natural influences (e.g. lightning, ice or falling trees). While overhead lines can be made available for use again within a few hours, it can take weeks or months to put underground cables back into operation. **This is because a fault on an underground cable is usually associated with damage. The service life of an overhead line is around 80 years, that of a cable line around 40 years**.

Swissgrid explores the overhead line and underground cable options for every project. These options are analysed by the support group on the basis of the SFOE's transmission lines evaluation scheme. This scheme consists of four equivalent assessment categories (covering spatial development, environmental, technical and economic aspects). The aim is to find the solution with the highest degree of acceptance. Each category comprises three to four groups of criteria. The support group awards points according to category and criterion. The comparison of the overall score provides a basis for discussion for the support group, which then makes a recommendation. **Ultimately, it is the Federal Council that decides on the planning area, the corridor and the technology (overhead line or underground cabling) of the future line.**

The construction costs of an extra-high-voltage line can vary greatly from case to case – depending on the topography, subsoil, potential natural hazards, and the technology chosen. **As a rule of thumb, a kilometre of underground cable in the transmission grid is between 1,5 and 10 times more expensive than a kilometre of overhead line.** When assessing the economic viability, Swissgrid considers not only the construction costs but also the life cycle costs of the various line variants.

6 Cabling increases the complexity of the overall system

Due to their **physical properties**, underground cables have an impact on **the stability of the entire transmission system.** Due to their physical properties, **underground cables increase the voltage more than overhead lines**. Swissgrid must ensure that the voltage across the entire transmission system never becomes too high. If the proportion of underground cabling in the transmission system increases, Swissgrid must build so-called **compensation systems** to reduce the voltage. However, these systems require a lot of space, are expensive and cause noise.

Furthermore, underground lines have **more reactive power** when in operation **than overhead lines**. Reactive power is useless electricity that «**blocks**» the line and cannot be utilised or converted into another form of energy. This power places an extra load not only on the grid, since the reactive current has to be transported in addition to the active current, but also on generators and transformers. Physically, a distinction is made between capacitive and inductive reactive power. They compensate for each other and ideally cancel each other out completely. Swissgrid tries to operate its lines as closely as possible to this point, which is referred to as «natural power». This is not possible with underground cables as they would heat up too much. Long underground cables therefore either reduce the effective power of a line (active power) or they require systems to compensate for the reactive power. This difficulty increases **in proportion to the length of the underground cable**. For the 18-kilometre cable project in the Gotthard Road Tunnel, for example, Swissgrid is having to build a compensation system in the Airolo substation to compensate for the reactive power.