

Factsheet

Synchronous Area Framework Agreement (SAFA)

Date April 2021

1 Initial situation

The European Union is pursuing the goal of completely liberalising the European internal electricity market in order to provide end customers (households and companies) with secure, sustainable, competitive and affordable energy. Since 1996 the internal market in electricity has gradually been established with a total of four «energy packages» to date. Among other things, the intention is to support cross-border energy exchange designated to target efficiency gains, competitive prices and higher service quality, while also contributing to greater security of supply and sustainability.

The prerequisite for efficiently exchanging energy among EU member states is instating binding rules for all parties. Prior to the energy packages, these rules were defined at a national level. Greater market integration and the migration to a new system of utility power generation with greater oscillations require greater efforts to be made in coordinating the national energy policy measures with those of neighbouring states and to utilise the possibilities of transnational electricity trade.

The European harmonisation of the rules for secure grid operation has been driven by the Italian power system failures of 2003, when it became apparent that the secure operation of a European interconnected grid requires a set of common rules. The first important step was «Operation Handbook», which was established in 2005 with the signing of a multilateral agreement between the European transmission system operators (TSO) and defined binding rules for secure grid operation and collaboration. Switzerland has been involved from the very start.

Since then, the European power system and the associated regulatory framework have continued to develop. The network codes are decisive for cooperation among the transmission system operators. With the «Synchronous Area Framework Agreement» (SAFA), continental Europe's transmission system operators, including Swissgrid, were contractually obliged to abide by the network codes as well as the jointly developed implementation rules, which are necessary to ensure operational grid security. This relates in particular to the «System Operation Guideline» (SO GL) and the «Network Code on Electricity Emergency and Restoration» (NC ER). These continue the collaboration contractually agreed in 2005 in line with the state-of-the-art and the adapted regulation.

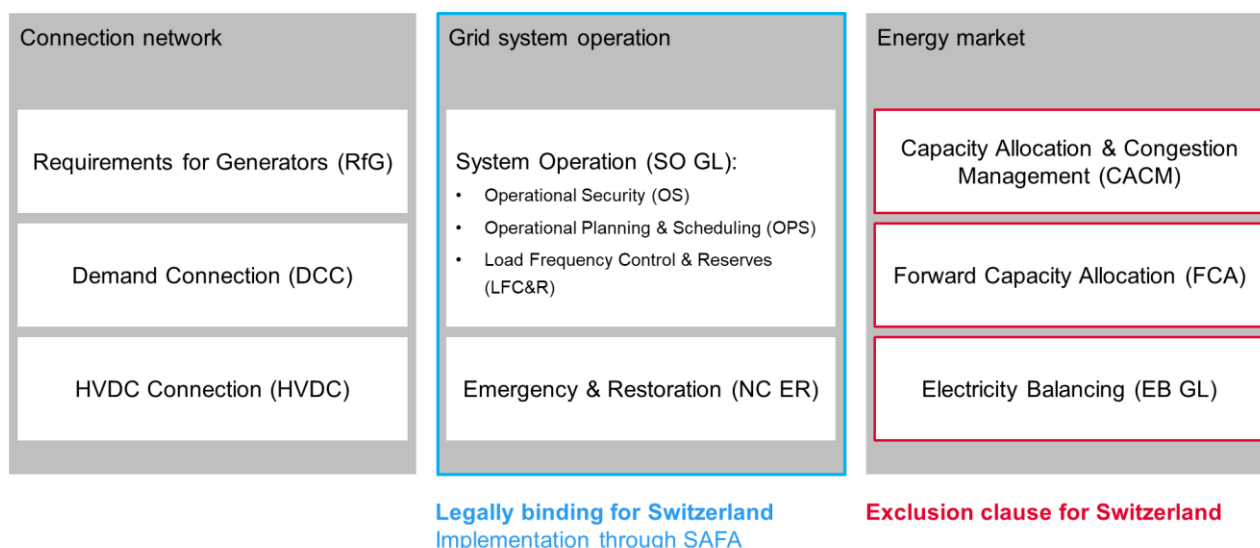
2 EU network codes

The network codes were established as a consequence of the EU's third energy package. These are legally binding regulations that the EU Commission enacted as EU regulations and are based on the drafts of the European Network of Transmission System Operators for Electricity (ENTSO-E). This collection of regulations contains uniform provisions on market and grid operation as well as on grid connection.

The following network codes came into force:

- 2015/1222 Capacity allocation and congestion management (CACM)
- 2016/631 Requirements for generators (RfG)
- 2016/1388 Demand connection (DCC)
- 2016/1447 Grid connection of high voltage direct current systems (high-voltage direct current connections, HVDC)
- 2016/1719 Forward capacity allocation (FCA)
- 2017/1485 System operation (SO GL)
- 2017/2195 Electricity balancing (EB GL)
- 2017/2196 Electricity emergency and restoration (NC ER)

Overview: Thematic assignment of the network codes



Switzerland was also involved in developing the network codes. As a member of ENTSO-E, Swissgrid makes significant contributions in consultation with the Swiss electricity industry in this respect. The aim of the network codes is to establish the technical conditions for an efficient and open EU internal market in electricity. Network codes therefore do not just affect the transmission system operators, but also generators, distribution system operators (DSO) and all key players in the electricity system.

The market-based network codes CACM, FCA, EB GL and the operational SO GL are formally referred to as «guidelines». Legally, they are just as binding as the network codes. The reason for the formal distinction is that guidelines contain provisions that are not directly enforceable. In addition, they require further implementation rules and delegate certain decisions to the national supervisory authorities or transmission system operators.

As mentioned above, network codes and guidelines are European law, but, for system-related reasons, some sections also apply in Switzerland.

3 What is a «synchronous area»?

ENTSO-E represents 42 transmission system operators from 35 countries. The countries comprise five synchronous areas and two isolated island systems (Cyprus and Iceland).

Synchronous areas are groups of countries that are connected via their respective grids and in which the alternating current has a synchronous cycle with a frequency of 50 Hertz (i.e. 50 cycles per second). The largest synchronous area is the continental European interconnected grid, which also includes the Swissgrid grid. Swissgrid sets the frequency requirement in this area. 1958 marks the year in which this interconnected grid was established, when the German, French and Swiss grids were connected in the «Star of Laufenburg». Today, this continental European interconnected grid extends from Portugal to Denmark and Turkey. Other synchronous zones are the northern European, British, Irish and the Baltic interconnected grid. The individual synchronous zones are connected by direct current cables.

The members of the individual synchronous zones also regularly publish coordinated grid development plans. These identify new electricity connections that will be required throughout Europe in the future.

The benefits of synchronous areas include, among other things:

- A more robust power system
- Cross-border optimisation of ancillary services leads to greater grid security and lower costs
- Mutual assistance in case of system disturbances

A «synchronous area» is usually divided into several control areas for which a transmission system operator takes on the role of control area operator. The task of control area operator includes the coordination of balancing capacity to be kept available so that the system frequency across the entire interconnected grid can be held constant even in the event of larger deviations between utility power generation and electricity consumption, and so that congestion can be mitigated.

4 System Operation Guideline and Network Code on Electricity Emergency and Restoration

The «System Operation Guideline» (SO GL) and the «Network Code on Electricity Emergency and Restoration» (NC ER) contain the provisions that affect grid operation and are therefore part of the SAFA.

4.1 SO GL – Key objectives and contents

The SO GL aims to harmonise requirements for transmission system operators, distribution system operators and significant grid customers. This is necessary to establish a clear legal framework for grid operation and facilitate EU-wide energy exchange. In addition, it aims to ensure the security of the system, the availability of the necessary data and information and their exchange between the transmission system operators as well as between the transmission system operators and all other stakeholders. Moreover, the objective is to support the integration of renewable sources of energy, enable more efficient grid utilisation and promote competition in the interests of the consumer.

Common provisions with minimum requirements for grid operation, the cross-border cooperation between the transmission system operators and the use of the relevant characteristics of the connected distribution system operators and significant grid customers are critical for the operational security of the interconnected power system.

The transformation of the EU's power market requires the formalised coordination of the transmission system operators. The provisions in this regulation for grid operation provide for an institutional framework that

is expected to enable better coordination between the transmission system operators and also obliges transmission system operators to cooperate with regional security coordinators (RSCs). The common provisions on the deployment of the RSCs and their tasks defined in the regulation are a first step towards enhanced regional cooperation and integration in grid operation.

RSCs are expected to provide recommendations to the transmission system operators in the capacity calculation region for which they were deployed. The transmission system operator has the right to decide whether to follow the RSC's recommendations. The respective transmission system operator therefore remains responsible for maintaining operational security in their control area.

4.2 NC ER – Key objectives and contents

The NC ER aims to harmonise requirements for technical and organisational measures to prevent the spread or amplification of a failure in a national grid and the spread of disturbances or blackout states to other grids. In addition, harmonised procedures are required, which transmission system operators apply to return the grid to the warning or normal state following the spread of a disturbance or a blackout state.

Among other things, the regulation requires every transmission system operator to develop a system defence plan and a restoration plan in the following three phases:

- A conceptual phase to define the precise contents of the plan
- An implementation phase in which all the necessary resources and services for actioning the plan are defined and introduced
- An activation phase in which one or more measures of the plan are applied in the operation

Harmonising the provisions for the development of the transmission system operators' system defence and restoration plans is intended to ensure the effectiveness of these plans across the entire EU.

The transmission system operators are expected to ensure that energy transactions continue to be executed in an emergency, blackout or restoration state. In addition, market activities and the associated procedures should only be suspended if no alternatives are available. Clear, objective and harmonised conditions under which energy transactions can be suspended and subsequently resumed are to be defined.

5 SAFA and «Swiss clause»

Among other things, the SO GL requires all transmission system operators to develop «Synchronous Area Framework Agreements» (SAFA). As part of the implementation of the SO GL and the replacement of the previous Operation Handbook, all continental European transmission system operators signed the SAFA in March 2019. SAFA contains a collection of principles and rules for operating the continental European synchronous area. It defines general rules of collaboration between the transmission system operators, incl. the implementation of Article 13¹ of the SO GL on the collaboration between the EU transmission system operators and non-EU transmission system operators, among other things.

As an electricity agreement has still not been reached between Switzerland and the EU, the adoption of SO GL and NC ER by Swissgrid is a complex process that cannot be taken for granted. Without an electricity agreement, Swissgrid is also excluded from the interconnection in the electricity market, which is regulated in the CACM guideline. But the SO GL refers to processes defined in the CACM guideline (capacity

¹ Art. 13 SO GL: **Agreements with transmission system operators who are not subject to this regulation:** Where a synchronous area encompasses both Union and third country transmission system operators, all Union transmission system operators in that synchronous area shall endeavour to conclude with the third country transmission system operators not bound by this Regulation an agreement setting the basis for their cooperation concerning secure system operation and setting out arrangements for the compliance of the third country transmission system operators with the obligations set in this Regulation.

calculation, coordinated redispatch) for certain processes (especially security analysis and remedial actions coordination).

A «Switzerland clause» in the SAFA ensures that the transmission system operators in the continental European interconnected grid must endeavour to find a joint solution for this discrepancy in order to integrate the Swiss grid into the system operation processes in line with the SO GL, which are linked with the CACM. This proposed solution must be approved by the national regulators. In return, Swissgrid is required to develop a portfolio of additional «remedial actions» (remedial measures, topological measures, redispatch, countertrading products, etc.). This framework also establishes the potential use of Swiss hydropower.

6 SAFA implementation in Switzerland

Important milestones in the implementation of SAFA are the new Transmission Code and the Balancing Concept. These electricity industry documents, which entered into force in May 2020, describe, among other things, principles and requirements for grid planning, balance group responsible party management and the ancillary services.

To allow Swissgrid to ensure compliance with the provisions of the SAFA agreement, network codes, Transmission Code, Balancing Concept and other electricity industry documents and agreements, the Operational Handbook, IT systems and training modules need to be adapted. These are being implemented by Swissgrid in comprehensive multi-year transformation projects.

6.1 Observability area

The SO GL contains provisions on collaborating with the transmission system operators.

As the National Grid Company, Swissgrid not only needs to consider the grid elements within its area of responsibility for secure grid operation in grid operational planning and grid operations management. It also needs to take account of grid elements of foreign transmission system operators (especially the transmission system operators in neighbouring countries), distribution system operators and significant assets (S-KWB, S-KAB), which have a significant influence on its grid.

The observability area includes various groups of grid elements and assets for which additional information is exchanged as part of grid operational planning and grid operations management or in which even outages and switching operations are coordinated. The additional time and effort for the initial detection of the relevant grid elements and assets, the arrangement of the necessary data exchange processes and the operational effort are counteracted by the added value of greater operational security and more efficient grid utilisation, especially in tightly intermeshed grids.

The Transmission Code describes the principles for defining and implementing the observability areas of Swissgrid and the asset operators.

Swissgrid is required to arrange the methods for defining its observability area with the relevant industry players and for regulating the necessary data exchange. This achieves the following outcomes:

- The observability areas of both parties are defined by the preparation of a list of the grid elements and assets, incl. an allocation to the groups of the observability area, in each case;
- The contractual documents defining the information and data exchange with all the necessary aspects in writing;
- Functioning information and data exchange in line with the agreements reached;
- Coordinated processes to ensure the maintenance of the exchanged information and data, and extension of this as necessary.