swissgrid

Swissgrid Ltd
Bleichemattstrasse 31
P.O. Box
5001 Aarau
Switzerland

T +41 58 580 21 11
info@swissgrid.ch
www.swissgrid.ch

Principles of ancillary services products
Product description – valid from 11.01.2021

Version 16 from 23.12.2020

Author Dimitrios Nousios, Stefanie Aebi
Market

Revision

Date	Version	Author / Department	Section
15.02.2017	1-9.2	Several	Creation of document
01.06.2018	10	Matthias Bucher / Market	Adjustments of SRL information for SRL+/-
23.08.2019	11	Tobias Ott, Roger Wiget / Market	Update of whole document
28.10.2019	12	Christoph Hodel / Market	Active power losses
03.02.2020	13	Markus Imhof, Iason Avramiotis / Market	Voltage Support, Tertiary Control
06.04.2020	14	Dimitrios Nousios, Stefanie Aebi / Market	Tertiary Control
02.06.2020	15	Dimitrios Nousios, Stefanie Aebi / Market	Tertiary control energy, primary control, award criteria
23.12.2020	16	Tobias Ott	Reference auction volume SRL/TRL

swissgrid

Content

1 Abbreviations and Definitions

Tertiary control energy	General term for energy products TRE, RR and RR_TRE
TRL	Tertiary control power
TRE	National tertiary control energy product – local and specific product
RR	Standard replacement reserve product
RR_TRE	Combination of the national tertiary energy and the standard replacement reserve product

2 Introduction

Since 1 January 2009, the ancillary services (AS) primary, secondary, tertiary control and compensation of active power losses in the Swiss transmission grid have been procured by Swissgrid predominantly in the Swiss control area via tenders. Product-specific framework agreements are signed between Swissgrid and the partners and regulate the rights and obligations of the respective parties.

«Voltage support» is a mandatory AS for all power plants connected to the transmission grid, in contrast to distribution grids, which can play an active role voluntarily. Voltage support is described in the concept of the same name and is contractually regulated by operational contracts.

This document provides a detailed description of the products put out to tender. As a result of the improvement options already announced and due to initial operating experience, the product definition will be continually refined over time within the scope of organisational and technical possibilities in order to meet new demands.

3 Frequency control[1]

3.1 General principles

Conditions for participation	• Only companies that have concluded a framework agreement with Swissgrid may submit bids. • The requirement for concluding a framework agreement is successful prequalification by Swissgrid. • The bidder is not compensated for costs incurred as a result of prequalification.
Tender periods	• Primary control: daily • Secondary control: weekly • Tertiary control: weekly and daily (only weekdays)
Framework conditions of the bids	• Every market participant may submit an unlimited number of bids. • A specific minimum size in MW is prescribed for each product.
Bid structure	Depending on the product (secondary, tertiary) a bid may comprise several volume/price combinations depending on the product (incrementally at different prices per MW) (multi-level bid).
Pool	The bidder is responsible for coordination in the pool of generating

[1] All changes regarding the Replacement Reserves (RR) product come into force with Swissgrid's participation in the TERRE project.

	units.
Power provision	• Continuous provision of the contracted control power. • Criterion: 100 % availability of the pool's capacity. • The location of the provision can be chosen freely within the pool and amended until the start of the relevant 15-minute period – see «Requirements for schedule data» [1]. • RR and RR_TRE bids are not considered in the power provision.
Monitoring and checks	On request, high-resolution, precise measurement data must be provided to Swissgrid by the operator – see «Requirements for monitoring data» [2].
Supply from abroad	The international exchange of primary control is possible within the «FCR Cooperation». The international exchange of replacement reserves (RR) is possible within TERRE.
Completion of tender	In accordance with the tender calendar at www.swissgrid.ch.

3.2 Primary control

The procurement of the primary control power required for Switzerland is realized by a combined auction between from Belgium, Denmark, Germany, France, Netherlands, Austria and Switzerland. This common cooperation is called «FCR Cooperation» and procures about half of the FCR (frequency containment reserve) of the synchronous continental European 50 Hz system.
https://www.entsoe.eu/network_codes/eb/fcr/

Demand forecast	Annual – ENTSO-E specifications
Volume of primary control power required for Switzerland and the cooperation	±61 MW (year 2019) – 1473 MW procurement for the whole cooperation (year 2019)
Maximum award within Switzerland	Approx. 161 MW (year 2019)
Product	Symmetrical control power bands

Tender period	• Daily
	  • 00:00 to 04:00
	  • 04:00 to 08:00
	  • 08:00 to 12:00
	  • 12:00 to 16:00
	  • 16:00 to 20:00
	  • 20:00 to 24:00

Bidders	All prequalified bidders
Bid structure	• Minimum output windows of ±1 MW • Prices are in €/MW • Divisible or indivisible bids

Maximum bid size	25 MW per bid
Award criteria	Minimisation of the procurement costs for the entire cooperation. In case of bids with the same price, the bid that was submitted first is given preference. Further details can be found on the cooperation website.
Call	Frequency controller with droop set on site for each machine
Remuneration of capacity	One clearing price for all contracted primary control power
Remuneration of energy	No remuneration for primary control energy delivered
Publication	The awarded bids are published anonymous on the Swissgrid website.

Figure 1 represents the import/export limit in MW per country according to system operation guidelines 2017/1485[2]. The values for each country represent the FCR volume in MW procured in the FCR cooperation for each country based on 2019 values.

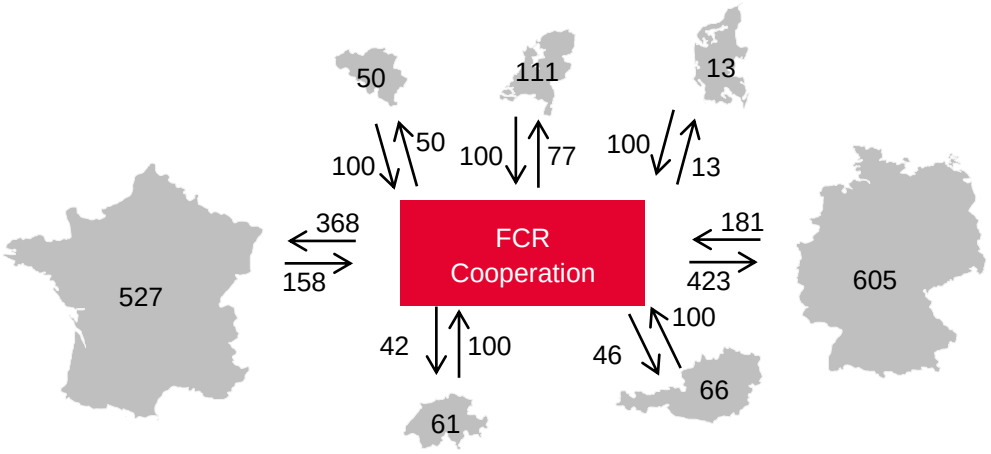

Figure 1 Demand, import- and export limits in MW per country for FCR

[2] These values represent the System Operation Guideline limits. Belgium procures a variable amount of FCR depending on a local market.

3.3 Secondary Control

The quantity awarded for secondary control and tertiary control will be calculated by means of a stochastic optimisation of bids, taking account of system security requirements (expressed as power deficit probability). The tender quantities specified are average values from the past and may vary from tender to tender.

Demand forecast	Annual update of the probability of a deficit depending on the procured quantities of SRL and TRL from the historical data of the previous year (imbalance, called quantity of TRL and SRL).
Volume of secondary control power required for Switzerland	No fixed quantities. The quantities range between SRL± und TRL± depending on the prices. Reference auction volume ca. 391 MW SRL+ and 380 MW SRL. Accepted quantities may differ substantially. I
Product	Separate control power bands according to direction (SRL+, SRL-)
Tender period	• Weekly • 00:00 Monday till 24:00 Sunday
Bidders	All prequalified bidders
Bid structure	• Minimum output windows of ±5 MW • Multiple volume/price combinations per bid are permitted (multi-level bids), each incrementally ±1 MW at different prices • A multi-level bid can contain levels for both positive control power (SRL+) and for negative control power (SRL-) • Prices are in CHF/MW • Only indivisible bids
Maximum bid size	100 MW per bid
Award criteria	Minimisation of the procurement costs for the entire cooperation. In case of bids with the same price, the bid that was submitted first is given preference.
Call	Proportional to the provider's contracted service in the corresponding delivery direction by control signal
Remuneration of capacity	Bid price for procured secondary control power
Remuneration of energy	In accordance with the control signal, with separate delivery direction, averaged over 15 minutes. **Positive SwissIX hourly price:** Positive SCP call (energy flow: bidder > Swissgrid): SwissIX hourly price + 20% although at least weekly base (cash flow: Swissgrid > bidder) Negative SCP call (energy flow: Swissgrid > bidder): SwissIX hourly price - 20% although maximum weekly base (cash flow: bidder > Swissgrid) **Negative SwissIX hourly price:** Positive SCP call (energy flow: bidder > Swissgrid): SwissIX hourly price - 20% although at least weekly base* (cash

	flow: Swissgrid > bidder) Negative SCP call (energy flow: Swissgrid > bidder): SwissIX hourly price + 20% although maximum weekly base* (cash flow: Swissgrid > bidder) *Including prices with +/- sign
Energy settlement	In accordance with the subsequent timetable (“Post Scheduling”) determined from the control signal, separated by delivery direction, averaged over 15 minutes (in 0.001 MWh).
Publication	The awarded bids are published anonymous on the Swissgrid website.

3.4 Tertiary control

3.4.1 Power provision

Demand forecast	Annual update of the probability of a deficit depending on the procured quantities of SRL and TRL from the historical data of the previous year (imbalance, called quantity of TRL and SRL).
Volume of tertiary control power required for Switzerland	No fixed quantities. The quantities range between SRL± und TRL± depending on the prices. Reference auction volume ca. 545 MW TRL+ and 524 MW TRL-. Accepted quantities may differ substantially. The breakdown of the quantities between weekly and daily tenders is based on the bid prices in the weekly tenders and expected prices in the daily tenders.
Product	Asymmetric control power bands

Tender period	• Daily
	  • 00:00 to 04:00
	  • 04:00 to 08:00
	  • 08:00 to 12:00
	  • 12:00 to 16:00
	  • 16:00 to 20:00
	  • 20:00 to 24:00
	• Weekly
	  • 00:00 Monday to 24:00 Sunday

Bidders	All prequalified bidders
Bid structure	• Minimum output windows of +5 MW or –5 MW • Multiple volume/price combinations per bid are permitted (multi-level bids), each incrementally ±1 MW at different prices • Prices are in CHF/MW • Only indivisible bids
Maximum bid size	100 MW per bid

Award criteria	Minimisation of the procurement costs for the entire cooperation. In case of bids with the same price, the bid that was submitted first is given preference.
Remuneration of capacity	Bid price for procured tertiary control power
Publication	The awarded bids are published anonymous on the Swissgrid website.

3.4.2 Energy supply

In addition to the power tendering process, tertiary control energy is put out to tender. In the energy tenders, all bidders, who receive a contract in the power tendering process, must submit TRE, RR and RR_TRE bids up to the awarded volume of tertiary control power. Additional TRE- and RR- bids can also be offered voluntarily, independently of the results of the power tendering process.

Demand forecast	According to the grid situation
Product	Asymmetric ramping product (TRE, RR and RR_TRE)
Delivery period	TRE and RR_TRE: 60 min. RR: 15, 30 or 60 min.
Bidders	All prequalified bidders
Bid structure	• The minimum bid size is -5 MW or +5 MW, respectively. • Obligatory and voluntary bids must always be held in reserve • The prices are in €/MWh, the energy prices can be adjusted intraday up to the bid deadline.
Maximum bid size	100 MW per bid
Operating availability	Minimum call duration according to product, unlimited deployment must be guaranteed

Call	Prioritized according to bid price of 1-h block. The call is in accordance with the bids, i.e. it is not possible to call parts of bids. Fast TRE bids: • Positive and negative TRE supply: The call takes place for a minimum call duration of 15 minutes, with a lead time of 15 minutes, taking into account 10 min. ramps and irrespective of the timing of the schedule interval. Slow TRE bids: • Negative TRE supply: The call takes place for a call duration of 60 minutes, with a lead time of 20 minutes, taking into account 10 min. ramps and always on the hour. RR bids: • Positive and negative RR supply: The activation takes place for a call duration of 15, 30, 45 or 60 minutes, with a lead time of 30 minutes, taking into account 10 min ramps and always on the hour. Fast RR_TRE bids: • If an RR_TRE bid is not called by TERRE as RR, it can be called as TRE. • Call as positive or negative RR: the call takes place for a call duration of 60 minutes, with a lead time of 30 minutes, taking into account 10-minute ramps and always on the hour. • Call as positive or negative TRE_s: the call takes place for a call duration of at least 15 minutes, with a lead time of 15 minutes, taking into account 10-minute ramps and irrespective of the timing of the schedule interval. Slow RR_TRE bids: • If an RR_TRE bid is not called by TERRE as RR, it can be called as TRE. • Call as positive or negative RR: the call takes place for a call duration of 60 minutes, with a lead time of 30 minutes, taking into account 10-minute ramps and always on the hour. • Call as positive or negative TRE_l: the call takes place for a call duration of at least 60 minutes, with a lead time of 20 minutes, taking into account 10-minute ramps and irrespective of the timing of the schedule interval
Termination of supply	At the end of a schedule interval (full quarter-hour). For slow TRE, RR and RR_TRE bids, which are called as RR or slow TRE, no termination of supply is foreseen.
Remuneration of energy	TRE: According to the bid for 1-h block and the energy supplied/used RR: Clearing price for all accepted bids
Energy settlement	According to post scheduling and taking into account ramps
Publication	The called volume of TRE is published on the Swissgrid website. The called volume of RR is published on the ENTSO-E Transparency Platform.

4 Active power losses and inadvertent deviation

Demand forecast	Studies and forecast by Swissgrid
Volume	According to active power loss forecast
Products	Baseload yearly, quarterly and monthly volume

Tender period	• Yearly
	  • first day of the year 00:00 – last day of the year 24:00.
	• Quarterly
	  • first day of the quarter 00:00 – last day of the quarter 24:00.
	• Monthly
	  • first day of the month 00:00 – last day of the month 24:00.

Bidders	Balance groups in the Swiss control area with a framework agreement for active power delivery.
Bid structure	• 1 MW windows (precisely) • Prices are in €/MWh
Maximum bid size	Unlimited, if the bid structure is compliant
Selection criterion	Bid price
Call	According to schedule
Compensation	Bid price for each 1 MW band awarded
Energy settlement	According to schedule
Supply from abroad	A delivery to compensate for active power losses must always be made via a balance group registered in Switzerland; this means that the energy transfer takes place in Switzerland.
Publication	All bids are published anonymous on the Swissgrid website.

Inadvertent deviation is charged using the daily active power loss forecast and procured on the exchange.

Until the delivery period December 2020, a call for tender with month-ahead delivery will be issued monthly on the fourth Wednesday. Bids are accepted for each 5 MW delivery. From November 2019 (delivery period year 2021) on, the new conditions according to the table above apply.

5 Voltage support

The voltage support concept was revised between 2018 and 2019 and is in operation since January 2020. The document «Voltage support concept for the Swiss transmission grid» [3] describes the current voltage support concept and the document «Voltage Support – settlement of reactive energy» [4] describes the detailed billing of reactive energy.

5.1 Mandatory voltage support

Every directly connected partner to the transmission grid is obliged to participate in voltage support. Power plants are obliged to participate in active voltage support. All other participants such as distribution grids, neighbouring system operators or customer plants are obliged to participate in semi-active voltage support. However, they may participate in active voltage support upon successful prequalification.

5.1.1 Active voltage support

Bidder	Power plants directly connected to the transmission grid. Distribution networks, neighbouring system operators and end customers upon successful prequalification
Contracts	The voltage support is regulated in the operating agreement
Provision	No actual provision of reactive power is required, but it is provided based on the «best of one's abilities» principle. However, the participant is obliged to provide all available reactive power resources.
Call	Via voltage plan
Compensation of compliant reactive energy	The operating agreement foresees the following compensation: • Compliant reactive energy exchange is compensated with the compensation rate (CHF / Mvarh)
Charging for non-compliant reactive energy	The operating agreement provides for the following charging components: • Non-compliant reactive energy exchange is charged at the ind. tariff reactive energy (CHF / Mvarh) • Non-compliant reactive energy exchange is additionally charged with the penalty for non-compliant reactive energy (CHF / Mvarh).
Monitoring	During operation, conformity is monitored using voltage measurement data – see «Requirements for monitoring data» [2].

5.1.2 Semi-active voltage support

Bidder	Distribution networks, neighbouring system operators and end customers
Contracts	The voltage support is regulated in the operating agreement
Provision	No actual provision of reactive power is required, but it is provided based on the «best of one's abilities». However, the participant is obliged to provide all available reactive power resources.

Call	Via voltage plan
Compensation of compliant reactive energy	The operating agreement foresees the following compensation: • Compliant reactive energy exchange is compensated with the compensation rate (CHF / Mvarh)
Charging for non-compliant reactive energy	The operating agreement provides for the following charging components: • Non-compliant reactive energy exchange is charged at the ind. tariff reactive energy (CHF / Mvarh)
Monitoring	During operation, conformity is monitored using voltage measurement data – see «Requirements for monitoring data» [2].

5.2 Extra-mandatory voltage support (phase shifter)

Bidders	Power plants, distribution systems and end customers connected directly to the transmission system
Contract	Bilateral agreements on the provision of extra-mandatory reactive power in which the bidder undertakes to provide the contractually defined capacity of reactive power on request from Swissgrid, in accordance with the «best of one's abilities» principle. Only companies that have completed a framework agreement following successful prequalification may submit bids.
Provision	No actual provision of reactive power is required, but it is provided based on the «best of one's abilities» principle. The participant is only obliged to deploy the contractually agreed machines for voltage support if they are available.
Call	Manually by e-mail or telephone
Compensation	The standard extra-mandatory reactive power provision agreement provides for the following compensation components: • Remuneration of exchanged reactive energy equal to that in the mandatory range (tariff in CHF/Mvarh). • Additional remuneration for starting up a machine to provide reactive power at Swissgrid's request (CHF per start, individual for each machine). • Additional remuneration for every hour of operation commenced for a machine requested by Swissgrid (CHF per hour commenced, individual for each machine).
Monitoring	During operation, conformity is monitored using voltage measurement data – see «Requirements for monitoring data» [2].

6 References

[1] Swissgrid Ltd., **Requirements for schedule data**, the current, valid version of which is published on www.swissgrid.ch.

[2] Swissgrid Ltd., **Requirements for monitoring data**, the current, valid version of which is published on www.swissgrid.ch.

[3] Swissgrid Ltd., **Voltage support concept for the Swiss transmission system from 2020**, the current, valid version of which is published on www.swissgrid.ch.

[4] Swissgrid Ltd., **Voltage support – settlement of reactive energy**, the current, valid version of which is published on www.swissgrid.ch.