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Principles of ancillary services products
Product description – valid from 01.11.2024

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Market

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23.08.2019	11	Tobias Ott, Roger Wiget / Market	Update of whole document
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23.08.2022	19	Stefanie Aebi	Adjustments of tertiary control information for MARI
24.10.2024	20	Fabian Streiff	Extra-mandatory voltage support

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Content

1 Abbreviations and Definitions

PRL	Primary control power
SRL	Secondary control power
SRE	Secondary control energy
TRL	Tertiary control power
Tertiary control energy	General term for energy products mFRR, TRE, RR, RR_TRE_mFRR, RR_TRE and TRE_mFRR
mFRR	Standard manual Frequency Restoration Reserve product
TRE	National tertiary control energy product – local and specific product
RR	Standard Replacement Reserve product
RR_TRE_mFRR, RR_TRE, TRE_mFRR	Combination of tertiary control energy products

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.

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

	• 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 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 on the Swissgrid website.

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.

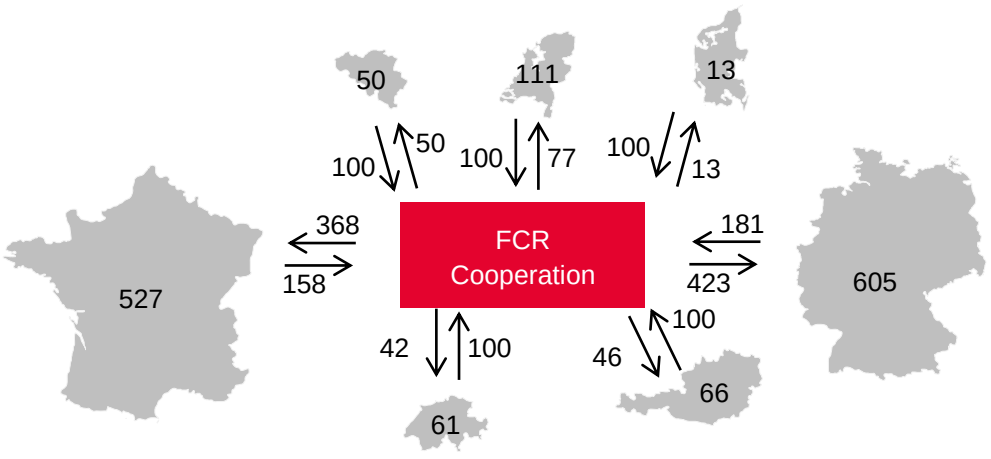

Figure 1 Demand, import- and export limits in MW per country for FCR

[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

3.3.1 Power provision

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. 406 MW SRL+ and 399 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.
Remuneration of capacity	Bid price for procured secondary control power
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.

3.3.2 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 SRE bids up to the awarded volume of tertiary control power. Additional SRE bids can also be offered voluntarily, independently of the results of the power tendering process.

Demand forecast	According to the grid situation

Product	Asymmetric product (SRE+, SRE-)
Delivery period	15 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	Retrieval takes place according to the offer price of the provider in the corresponding delivery direction by means of a control signal to the provider. If offers with the same price, the offer will be preferred, which was submitted earlier.
Remuneration of energy	According to the price calculated by PICASSO ("pay-as-cleared") and corresponds to at least (or for negative offers at most) the price demanded by the SDV. Should Switzerland's offers, e.g. due to temporary separation by the PICASSO platform, are not taken into account in the calculation of the price calculated by PI-CASSO, the price specified in sentence 1 will be replaced by the price requested by the ASP ("pay-as-bid").
Energy settlement	According to post scheduling determined from the activation signal separated by delivery direction (step size 0.001 MWh)
Publication	The requested amount of SRE, as well as the amount and price of each SRE offer (anonymized) per direction and per 15 minutes is published on the ENTSO-E Transparency Platform.

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. 480 MW TRL+ and 508 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; obligation to supply energy until 04:00 • 04:00 to 08:00; obligation to supply energy until 08:00 • 08:00 to 12:00; obligation to supply energy until 12:00 • 12:00 to 16:00; obligation to supply energy until 16:00 • 16:00 to 20:00; obligation to supply energy until 20:00 • 20:00 to 24:00; obligation to supply energy until 00:00 **Weekly** • 00:00 Monday to 24:00 Sunday; obligation to supply energy until 00:00
Bidders	All prequalified bidders
Bid structure	• Multiple volume/price combinations per bid are permitted (multi-level bids) • Increments of ±1 MW at different prices • Prices are in CHF/MW • Only indivisible bids
Minimum bid size	First power slice of at least 5 MW
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 awarded tertiary control power
Publication on Swissgrid homepage	Tendered quantities and periods as well as the awarded TRL quantity

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_mFRR bids up to the awarded volume of tertiary control power. Additional TRE_mFRR_da,TRE_mFRR_sa, mFRR_da, mFRR_sa, RR_TRE_mFRR_sa, RR and RR_TREnergie-_l 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_mFRR_da, TRE_mFRR_sa, mFRR_sa, mFRR_da, RR_TRE_mFRR_sa, RR and RR_TREnergie-_l)
Delivery period	• TRE_mFRR_da, TRE_mFRR_sa, mFRR_sa, mFRR_da and RR_TRE_mFRR_sa: 15 min • RR_TREnergie-_l: 60 min • RR: 15, 30 or 60 min

Bidders	All prequalified bidders
Bid structure	Obligatory and voluntary bids must always be held in reserve • Prices in €/MWh Energy prices can be adjusted intraday up to the bid deadline.
Minimum bid size	5 MW per bid
Maximum bid size	100 MW per bid
Operating availability	Minimum call duration according to product, unlimited deployment must be guaranteed
Calls	Prioritized according to bid price. The call is in accordance with the bids; only divisible offers can be called partially.
Call TRE_mFRR_da and mFRR_da bids	Positive and negative TRE_mFRR_da and mFRR_da supply: • Call duration: at least 15 min • Lead time: 12.5 min, taking into account 10 min ramps and irrespective of the timing of the schedule interval
Call TRE_mFRR_sa and mFRR_sa bids	Positive and negative TRE_mFRR_sa and mFRR_sa supply: • Call duration: 15 min • Lead time: 12.5 min, taking into account 10 min ramps and respecting the timing of the schedule interval
Call RR bids	Positive and negative RR supply: • Call duration depending on the offer: 15, 30 or 60 min • Lead time: 30 min, taking into account 10 min ramps and respecting the timing of the schedule interval
Call RR_TRE_mFRR_sa bids	If an RR_TRE_mFRR_sa bid is not called by TERRE as RR, it can be called as TRE_mFRR_sa. Call as positive or negative RR: • Call duration: 15 min • Lead time: 30 min, taking into account 10 min ramps and respecting the timing of the schedule interval Call as positive or negative TRE_mFRR_sa: • Call duration: 15 min • Lead time: 12.5 min, taking into account 10 min ramps and respecting the timing of the schedule interval

Call RR_TREnergie-_l bids	If an RR_TREnergie-_l bid is not called by TERRE as RR, it can be called as TRE. Call as negative RR: • Call duration: 60 min • Lead time: 30 min, taking into account 10 min ramps and always on the hour Call as negative TRE: • Call duration: 60 min • Lead time: 20 min, taking into account 10 min ramps and always on the hour
Termination of supply	No termination of supply is foreseen.
Remuneration of energy	• TRE: According to bid and call duration • mFRR: There are different clearing prices defined by the MARI platform for all accepted bids, depending on scheduled or direct activation. A price calculated by the MARI platform corresponds at least (or for negative offers at most) to the price requested by the BSP. ○ There is a single clearing price for positive and negative scheduled activations for each delivery period ○ The following applies to direct activations: ▪ There is one clearing price for all positive and one clearing price for all negative calls whose delivery is during the offer period. ▪ There is one clearing price for all positive and one clearing price for all negative calls whose delivery is during the quarter hour following the offer period. These clearing prices differ from the clearing prices that arise when offers of the following quarter hour are called during their offer period. • RR: Clearing price defined by the TERRE platform for all accepted bids. A price calculated by the TERRE platform corresponds at least (or for negative offers at most) to the price requested by the BSP.
Energy settlement	According to post scheduling and taking into account ramps
Publications	Offered and called volumes of combined bids TRE_mFRR_da, TRE_mFRR_sa, RR_TREnergie-_l and RR_TRE_mFRR_sa if activated due to an international redispatch (and thus not by TERRE or MARI): Swissgrid website. Offered volumes of bids mFRR_da, mFRR_sa, TRE_mFRR_da, TRE_mFRR_sa, RR_TREnergie-_l, RR_TRE_mFRR_sa and RR: ENTSO-E Transparency Platform. Called volumes of bids mFRR_da, mFRR_sa, TRE_mFRR_da, TRE_mFRR_sa, RR_TREnergie-_l, RR_TRE_mFRR_sa and RR if activated by MARI or TERRE: 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	Operating resources connected directly to the transmission grid (including power plants and frequency converters)
Contract	Bilateral agreements on the provision of extra-mandatory reactive power in which the bidder commits to provide the contractually defined capacity of reactive power on request from Swissgrid, in accordance with the «best of one's abilities» principle. Prequalification for active voltage support is a prerequisite for participation in extra-mandatory voltage support.
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 operating resources for voltage support if they are available.
Call	Manually by ECP, e-mail or telephone. Swissgrid defines the total operating resources to be used for voltage support on the extra-high-voltage grid for a certain time frame.
Compensation	Swissgrid compensates the operating resources used in addition to those used for the obligatory voltage support in order to achieve the required number of operating resources (compare Call). 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 domain (tariff in CHF/Mvarh). • In addition, compensation for the active energy required during phase shifter operation (individual for each operating resource). • In addition, remuneration for the operating time of the operating resources used for phase shifter operation (individual for each operating resource). This component covers the additional operating costs for extra-mandatory voltage maintenance; in particular the costs due to increased wear and tear of the operating equipment.
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.