Nezavisni operator sistema u Bosni i Hercegovini
Независни оператор система у Босни и Херцеговини
Neovisni operator sustava u Bosni i Hercegovini
Independent System Operator in Bosnia and Herzegovina

Ancillary Services Procedures

November 2021

History

Version/ Date	**Application**	**Author**	**Changes**
1 16.12.2014		NOSBiH	Initial Draft
1.2 4.6.2015		NOSBiH	Removing obstacles observed in the testing period and adapting to new Market Rules
1.3 15.10.2015		NOSBiH	3.1.2 - calculation of required secondary reserve in November 3.1.3.1 – the scope of procurement, price caps and the right to participate in the process 3.1.3.2 – invitation to deliver bids as instructed by NOSBiH 3.1.4.1 – "Methodology for determination..." the BSP's share is taken into account before the invitation to submit bids 3.3.2.1 – method of calculating aFRR energy 4.1.3.1 – the scope of procurement, price caps 4.1.3.2 – bids' delivery as instructed by NOSBiH 5.2 – Tender for losses in October
1.4 7.12.2015	1.1.2016- 31.12.2016	NOSBiH	Downward tertiary control included
1.5 18.11.2016 5.12.2016	1.1.2017 - 31.12.2017	NOSBiH	3.1.1 – liability to register aFRR structures 3.1.4.1 – Methodology for determination of necessary (required) aFRR capacity for the BSP – equal allocation

			3.1.4.2 – the missing quantities shall be paid by the price cap in case that no bids were accepted in a monthly tender 3.1.6.1 – coefficient for the penalty price for undelivered capacity 3.3.1 – Payment of actual instead of contracted secondary control capacity – it is considered that cheapest agreements are firstly realized 3.3.3 – penalty in case of unfulfillment 3.3.3.1 – included an additional analysis of the work of secondary control 4.1.1 – liability to register tertiary control structures 4.1.3.2 – non-publishing the tender results on website 4.2 – activation of tertiary control service (software balancing system) 4.3.1 – included penalties in case of non-provided tertiary control 6 – preliminary compensations, not final ones, shall be delivered two days before the energy delivery 8.1.2 - corrections of monthly reports included
1.6 9.6.2017	1.1.2018 -	NOSBiH	1.1 – definition of MEGAUNIT 1.2 – abbreviations P_D and P_G adjusted to the new definition of MEGAUNIT 3.1.1 –an obligation to update the characteristics of control premises for BSPs introduced 3.1.3.1 – a criteria for choice of the most favourable bid deleted from the Framework Agreement 3.1.6 – subtitles corrected 3.1.6.2 – defined price of missing capacity if there are no bids in a monthly tender procedure 3.2 - BSP's obligation to provide nominated capacity in real time, a possibility to change nominated power in intra-day activities

			3.2 and 3.3 – changes related to the new definition of MEGAUNIT 3.3.3.1 – additional items in analysing the quality of work of secondary control 4.1.1 - an obligation to update the characteristics of control premises for BSPs introduced 4.1.3 – missing quantity of tertiary control is to be determined by NOSBiH without SERC's decision 4.1.3.1 - a criteria for choice of the most favourable bid deleted from the Framework Agreement 4.1.4 – bids for tertiary control energy 4.2.1 – a direction introduced in an activation request, activation through the Balancing software 4.3.1.1 – Tertiary control energy in case of unfulfilled activation request
1.7 1.11.2021	1.1.2022	NOSBiH	2 – included market principles in the process of FCR frequency maintenance 3, 4 – introduced new terminology FCR, aFRR and mFRR 3,4 – included balancing services providers – BSP 3,4, - introduced new terminology LFC area and LFC block instead of regulation area and regulation block 3,4,6 – included references to SAFA Agreement instead to the Operational Handbook 3,4 – included 15-minute balancing period 3.1.5 – included process of capacity transfer 3.2 – included activation of aFRR-a according to MOL 4.1.3.2 – mFRR-a bid for capacity in resolution of 1 MW and removed restriction for the minimum bid of 10 MW 4.1.3.4 – included capacity transfer for mFRR 4.2 – altered characteristics of mFRRR product (activation in 12,5 min, minimum activation of 15 min, the time period between two activations 1 hour), and included activation over the Balancing platform 4.3.1 – settlement of mFRR-a capacity in 15-minute resolution 5 – in addition to annual tenders there was introduced a possibility to organize semi-annul, quarter and monthly tenders to procure energy for covering losses 6 – included financial compensations in accordance with FSkar process

			7 – introduced possibility of financial compensation for Q -V support Removed all perceived inconsistencies and mistakes in the entire document

This is an accompanying document to the Grid Code and the Market Rules which in detail define and manage the processes related to the system of ancillary services on the balancing level of the electric power system in Bosnia and Herzegovina. These Procedures shall define the activities and the sequence of activities as well as the rights and liabilities of the parties involved in the process of procurement, activation and settlement of ancillary services for the balancing of the electric power system in Bosnia and Herzegovina, for covering losses in the transmission system, for elimination of unintentional deviations of BiH LFC area and reactive-voltage support.

Contents

1 Definitions, marks and abbreviations

1.1 Definitions

The following definitions shall be used in these Procedures:

Agreggated Energy Data	means data that presents total amount of power injected i.e. withdrawn from the distribution system for a single Market Participant, data on energy delivered in accordance with a public service or realized losses in the network
Balancing Energy	means energy used by a transmission system operator to carry out balancing and is provided by a balancing service provider
Balancing Group	means one or group of more Market Participants that have or do not have injection and withdrawal points in BiH regulation area For a purpose of daily schedules delivery it is possible to establish Balancing Groups without injection and withdrawal points in BiH regulation area, so called Market Balance Groups.
Balancing Service	means balancing capacity or balancing energy
Balancing Capacity	means a volume of capacity that a balancing service provider has agreed to hold and in respect to which the balancing service provider has agreed to submit bids for a corresponding volume of balancing energy to the transmission system operator for the duration of the contract
Balance Responsible Party	means a Market Participant who, in accordance with the Contract on Balance responsibility, accepted balance responsibility for the Balance Group and is registered at NOSBiH as a Balance Responsible Party
Imbalance	means the difference between the measured amount of injected and withdrawn electricity and a programme of a Balance Responsible Party or a Market Participant taking into consideration activated balancing energy
Daily Schedule	means a schedule covering scheduled generation, consumption, trade and sale of electricity of a Balance Responsible Party or a Market Participant
LFC Area	means a part of a synchronous area, physically demarcated by points of measurement at interconnectors to other LFC Blocks, operated by one Transmission System Operators fulfilling the obligations of load-frequency control

Merit Order List	means a list of balancing energy bids sorted in order of their bid prices for the purpose of their optimal activation
Grid Code	means rules and procedures which, among other issues, regulate technical issues in regard of connection to the transmission system, ancillary services, measurements and daily schedules delivery
Unintentional Deviations	means the difference between actual and scheduled power exchange of a LFC area
MEGAUNIT	means a virtual structure representing a set of generation structures on the level from which the ancillary service of aFRR is provided
Balancing Period	means the basic time unit in which the bids are submitted and the balancing energy is calculated
Off- Peak Load Period	means the period from 24:00 until 06.00 during the day, a working day, weekend day or holiday
Imbalance Settlement Period	means the basic time unit for which the imbalance settlement of a Balance Resposible Party is done
Trading Period	means the basic time unit for which nominations are delivered within a daily schedule
Peak Load Period	means the period from 06:00 until 24:00 during the day, a working day, weekend day or holiday
Ancillary Services	mean all services which NOSBiH procures from the service providers for the purpose of ensuring system services i.e with purpose of maintaining safe and reliable operations of the power grid in BiH and continuous and qualitative supply of consumers
Programe	means scheduled electricity generation and consumption that is electricity sale and purchase on an hourly base for a Balance Responsible Party or a Market Participant
Producer	means a role of a Market Participant, a company which possesses a license for electricity generation
Balancing Services Provider	means a Market Participant whose resources are registered at NOSBiH as those providing balancing services

Ancillary Services Provider	means a Market Participant whose resources are registered at NOSBiH as those providing ancillary services
Balancing Services Exchange	means crossborder exchange of balancing capacity or balancing energy
Frequency Restoration Reserve	means the active power reserves available to restore system frequency to the nominal frequency and to restore active power balance and to maintain load frequency control
Frequency Containment Reserve	means the active power reserves available to restore system frequency after occurrence of active power imbalance in the system
Supplier	means a role of a Market Participant, an entity licensed to supply final consumers with electricity
Transfer of Balancing Capacity	means a transfer of balancing capacity from the initially contracted balancing service provider to another balancing service provider
Trader	means a role of a Market Participant, an entity licensed for electricity trading
Market Participant	means a holder of a valid license for generation, supply, or trading of electricity
Replacement Reserve	means the active power reserves available to restore or support the required level of frequency restoration reserves to be prepared for additional system imbalances, including generation reserves

1.2 Marks and abbreviations

In this Document the following abbreviations shall be used:

BRS	Balance Responsible Party
C_{SecEn}^{DOWN}	The lowest bid price of energy for downward secondary regulation
C_{SecEn}^{UP}	The highest bid price of energy for upward secondary regulation
C_{TertEn}^{DOWN}	The lowest price of energy for activated downward mFRR
C_{TertEn}^{UP}	The highest price of energy for activated upward mFRR
SERC	State Electricity Regulatory Commission

ENTSO-E	European Network of Transmission System Operators for Electricity
ESS	ENTSO-E Scheduling System
$k_{PenSecCap}$	Coefficient of charges for non-provided aFRR capacity
$k_{PenTertCap}$	Coefficient of charges for non-provided mFRR capacity
L	Average System Load
L_{Max}	Maximum System Load
LFC	Load-Frequency Control
MOL	Merit-Order List
NOSBiH	Independent System Operator in Bosnia and Herzegovina
P_D	The lowest generation unit of MEGAUNIT
P_G	The highest generation unit of MEGAUNIT
$p_{MaxSecCap}$	The price cap for aFRR
$p_{MaxSecCapMont}$	The price cap for aFRR for each month
$p_{MaxSecCapYear}$	The price cap for aFRR for a year
$p_{MaxTerCap}$	The price cap for mFRR
$p_{MaxTerEnUp}$	The price cap for upward mFRR
BSP	Balancing Service Provider
ASP	Ancillary Service Provider
P_{reg}^{DOWN}	Delivered balancing energy of downward aFRR and mFRR
P_{reg}^{UP}	Delivered balancing energy of upward aFRR and mFRR
R	Required aFRR
R_N	Required (planned) aFRR for BSP
S	Difference in prices of energy for upward and downward aFRR
W_{SecReg}	Secondary Control Power of aFRR for BSP

2 Frequency Containment Process – Primary Regulation

The process of frequency containment refers to balancing services used for stabilization (containment) of frequency during major disturbances in a synchronous area resulting with deviations from the nominal frequency values. The process shall be realized by activation of turbine controllers in line with generators' statism in a method described by the Grid Code and by self-regulation of generation and consumption after the frequency change occurs. The resources providing the balancing service of frequency containment in certain period make frequency containment reserve (hereinfater FCR).

2.1 Procurement of the Balancing Service to Maintain Frequency

Independent System Operator in Bosnia and Herzegovina (hereinafter NOSBiH) shall procure the balancing service of frequency maintenance through the public purchase procedure. In the first stage of the purchase procedure there shall be elected the qualified Balancing Service Providers (hereinafter BSPs) whose structures are able to provide FCR service, and in the second stage, through a mini-tender procedure, there shall be elected those BSPs which shall provide FCR service in a specific time period.

In case of a failure to procure the FCR capacity through the market procedure, the capacity shall be distributed to BSPs through a regulated procedure described in item 2.1.4.

2.1.1 Registration of Structures Providing the Balancing Service FCR – Pre-qualification

The right to participate in the market procedure to purchase FCR reserves, to be organized by NOSBiH, belongs to BSPs whose structures satisfy the technical preconditions for providing FCR service and that are registered as such with the Registry of FCR service providers.

The registration is done by submitting to NOSBiH the filled Request for registration of the structure to provide ancillary service and a copy of its valid generation licence if it is a generation structure. The Registration form of the structure providing ancillary services can be found on NOSBiH website.

NOSBiH shall consider the submitted requests as needed. In the process of considering the requests, NOSBiH may ask the BSP to:

- submit additional documents as to confirm the structure's ability to provide a specific balancing service,
- practically test the structure which is to provide a balancing service in accordance with the procedures described in item 2.1.1.1.

When the structure is determined as adequate to provide a specific ancillary service, it is entered into the Registry of ancillary service providers for a period of next five years and the BSP with that structure may participate in the purchase procedure of a specific ancillary service. Otherwise, BSP's Request for registration of structures to provide ancillary services shall be denied.

If, within a period of five years, some changes occur in technical characteristics of the concerned structure, the BSP shall be obligated to inform on such changes, and NOSBiH shall hold the right to test the structure in accordance with the procedures set in item 2.1.1.1.

2.1.1.1 Assessment of Technical Capabilities of Structures Providing FCR

NOSBiH shall assess technical capability of Structures that may provide FCR service in the initial registration of the Structure for providing FCR service or during the exploatation, if NOSBiH finds it necessary.

NOSBiH may enter into the Register those structures which previously provided FCR service without conducting the technical assessment, and also the structures which are obligated to be able to provide FCR service as set out by the Grid Code.

Technical assessment of the Structures providing FCR Service shall involve historical data and the testing of:

- the operational telecommunication infrastructure which enables efficient and accurate transmission of the measurement data from the Structures,
- Real time measurements of active output power,
- The ability for remote meter reading,
- Speed of response to frequency change.

Through the process of preparation and conducting the mentioned activities the BSP shall be obligated to fully cooperate with NOSBiH.

Each party shall itself bear the testing costs on each side. Technical validity verified upon the technical assessment shall last for 5 (five) years and may be extended with no further testing if the Structure succesfully provided the FCR service within the previous period, which is to be finally decided by NOSBiH.

In case that any of the BSP's structures does not meet the standards given in the Register, or in case that the BSP itself submits a statement that its structure may not provide the FCR service, the respective structure shall lose its active status in the Registry and may not be used as the FCR service provider.

In case that the BSP' structure only temporarily fails to comply with the standards entered in the Registry, NOSBiH may suspend the respective structure by the time the obstacles are

removed. During the time of suspension from the Registry, the respective structure may not be used as FCR service provider.

2.1.2 Determination of Required FCR Capacity

FCR capacity required in the electric power system of BiH shall be determined based on the notified k-factor. The k-factor is determined within the ENTSO-E for each LFC area and it represents the assumed reaction of an LFC area to a frequency deviation expressed in MW/Hz.

2.1.3 Procurement of FCR capacity

NOSBiH shall announce a tender procedure for procurement of FCR in June of a current year for the twelve months of a next year. FCR capacity shall be contracted on a monthly basis.

In the first stage of the purchase procedure NOSBiH shall sign a framework agreement with qualified BSPs whose structures are able to provide the FCR service, and in the second stage, through a mini-tender procedure, there shall be elected the most favourable BSPs which shall provide the FCR service in a specific time period.

If the required scope of FCR has not been purchased for a certain month, the missing quantities shall be provided through a monthly procedure for that month.

BSPs shall deliver their bids in accordance with the regulations of the Invitation for participating in the procedure to procure FCR.

2.1.3.1 Framework Agreement

In accordance with Article 32 of the Public Procurement Law of BiH, NOSBiH shall carry out an open procedure with the purpose of signing a framework agreement with Balancing Services Providers.

The Procedures for providing the balancing service of FCR on an annual basis shall be carried out at the beginning of June of current year for next year, and it shall, among other issues, define:

- The scope of the procurement procedure,
- Bids submission deadline,
- Bids format and bids submission method,
- The time period for publishing of the procurement's results,
- The instruction on appeal procedure.

The right to participate in the tender procedure belongs to those bidders whose structures have active status in the Registry of the FCR service providers for the period for which the service is procured.

Dynamics of an annual procurement procedure for a year Y shall be as follows:

1. Procurement publishing by 15th of June in Y-1 year,

2. Bids submission by 30th July in Y-1 year,
3. Bids evaluation by 6th August in Y-1 year,
4. Publishing the tender results by 8th August in Y-1 year,
5. The deadline for complaints by 18th August in Y-1 year,
6. Discussing possible complaints and creating a final list by 20th August in Y-1 year,
7. Concluding framework agreements by 10th September in Y-1 year.

NOSBiH shall conclude framework agreements with all BSPs satisfying the tender requirements.

2.1.3.2 Invitation for bids submission - Mini-tender

NOSBiH shall carry out the procedure proscribed by the Public Procurement Law of BiH and accordingly shall ensure receipt, validity check, confirmation of receipt and storing of the submitted bids. NOSBiH shall rank the submitted bids according to the price offered for FCR capacities. From the created list NOSBiH shall make selection of the most favourable bids until the required quantity of FCR capacity is covered.

Invitation for annual bids submission shall be organized in November of current year for 12 months in a next year.

If the required scope of capacity has not been purchased in an annual procurement procedure, the invitation for providing FCR capacity on a monthly basis shall be announced in month M-1 for calendar month M.

The procurement of FCR capacity for a month shall be carried out in one or two lots for the total volume of required capacity on a monthly basis. In the invitation for bids submission NOSBiH shall define the step which presents the integral number MW for which the price is submitted.

The invitation for bid, among other issues, shall define:

- The scope of the procurement procedure (required scope of FCR capacity),
- The deadline specified for the bids delivery,
- The method of delivering bids and the bids' format,
- The time period for publishing of the procurement's results,
- The criteria for selection of the most suitable bid,
- The instruction on appeal procedure.

The invitation for the bids submission shall be sent electronically to those BSPs with which the framework agreement for providing FCR service has been concluded.

The bids for capacity reserves procurement shall contain the following information:

- The bid preparation - date and time,
- Period (month) of delivery of capacity reserves,
- Pairs quantity (defined quantity) - unit price per the delivery time periods
    - Quantities are integer power values expressed in MW as defined in the Invitation,

- Prices are unit values of 1 MW capacity expressed in KM/MW/h with two decimals.

Final bids (pairs capacity - price) within an annual cycle through the months, on the basis of signed framework agreements, shall be delivered in line with NOSBiH's invitation and instruction.

Final bids (pairs capacity - price) within a monthly cycle, on the basis of signed framework agreements, shall be delivered as apropriate in month M – 1 for M month in line with NOSBiH's invitation and instruction.

After the public procurement procedure has been carried out, NOSBiH shall conclude contracts with selected BSPs. The contract form can be found on NOSBiH website.

NOSBiH shall deliver SERC a detailed report on any public procurement procedure conducted for purchase of FCR capacity.

2.1.4 Allocation of Missing Reserves per BSPs

If the required scope of FCR capacity has not been purchased through an annual or monthly purchase procedure for a certain month, NOSBiH shall allocate the missing quantities of FCR to BSPs in a transparent and non-discriminatory way. In doing so, it shall be taken into account that the share of BSP in providing the service during the year is in proportion to the planned generation of certain BSPs having into consideration the ability of a specific BSP to provide the service in a specific month. Allocation shall be done immediately after the monthly procurement of FCR has ended.

BSPs shall be obligated to provide FCR capacity allocated to them in the process of allocation of missing reserves.

2.1.5 Capacity Transfer

The BSP shall have the right and ability to transfer the contractual or allocated obligations for balancing service capacity to another BSP by mutual agreement. NOSBiH shall hold the right to reject the transfer of obligations for balancing service capacity or a part of the capacity from one BSP to another if NOSBiH considers that it will not endanger operational security of the electric power system.

In case of the transfer of balancing capacity, the receiving balancing service provider shall undertake all obligations for the transferred capacity pertaining to capacity price, penalty for undelivered capacity and the quality of the provided service. NOSBiH shall calculate all liabilities according to the capacity price which is equal to the initial price of capacity before the transfer.

The transfer of capacity shall be performed through the Balancing platform as follows:

- Through the balancing system both involved BSPs submit to NOSBiH appropriate (harmonized) requests 1 hour before the concerned interval (and maximum 35 days) at the latest,
- After NOSBiH verifies the confirmation (acceptance), it shall be considered that the capacity obligations are transferred between the BSPs.

2.1.6 Procurement of FCR through a Direct Settlement

If a BSP is not able to provide the contracted FCR capacity for next calendar month, it shall be obligated to inform NOSBiH therof by submitting a Statement by the 25th day of a current month at the latest. The Statement shall contain information on the period of time and quantities of FCR capacity which the BSP has failed to provide.

In this case, NOSBiH shall procure missing quantities of FCR capacity through a direct settlement in a transparent and non-discriminatory way.

2.1.7 Penalty for failure to fulfill liability

Where appropriate and on the basis of historical data, NOSBiH shall analyse FCR response to frequency deviations and shall eventually make a decision to introduce penalties for insufficiently provided service amounting to a weekly capacity fee.

2.1.8 Pricing for FCR capacity

FCR capacity shall be paid by the offered price (Pay-As-Bid).

The capacity contracted due to allocation of missing quantities of capacity shall be paid by the average price of FCR capacity realized by that moment in a specific year (taking into account the months for which the FCR capacity is procured). In case that FCR capacity is not realized for either month of a year, the price of capacity shall be equal to 0 (zero) KM/MW/h, or to the price determined by SERC's Decision.

2.1.9 Nomination of FCR in daily activities

Over the Balancing platform in daily activities BRP shall nominate the structures to provide FCR in a certain time period. Within the nomination of the contracted capacity there shall be submitted the quantity (MW) without the price for energy. Activated energy shall be calculated at prices in accordance to item 2.3.2.

2.2 Activation of FCR

The process of frequency containment refers to balancing services used for stabilization (containment) of frequency during major disturbances in a synchronous area resulting with deviations from the nominal frequency values. The process shall be realized by activation of turbine controllers after the frequency changes and in line with generators' statism in a method described by the Grid Code.

2.3 Settlement of FCR

FCR charge shall consist of the reserved capacity charge and the charge for activated balancing energy of FCR. Charges shall be settled and paid on a monthly basis.

2.3.1 FCR Capacity Charge

FCR capacity charge for the BSP in a month shall be calculated as the product of the contracted capacity, the price for capacity and number of hours (intervals) in a month in which the service has been provided.

2.3.2 FCR Energy Charge

Charges for activated energy for FCR shall be calculated for each 15-minute interval separately for each direction, as the product of activated energy and the price of energy.

Positive FCR shall be activated if lower frequency occurs, and in that case the BSP shall receive the remuneration for the delivered energy. In case of negative price for FCR energy, the payment direction shall change, i.e. the BSP shall pay to NOSBiH for the activated enegy.

Negative FCR shall be activated if higher frequency occurs, and in that case the BSP shall pay to NOSBiH the charge for the delivered energy FCR. In case of negative price for FCR energy, the payment direction shall change, i.e. NOSBiH shall pay to the BSP for the activated enegy.

2.3.2.1 FCR Energy

FCR energy shall be delivered by Swissgrid as a Coordinator of ENTSO-E control block South in Daily Settlement Report (DSR) and Monthly Settlement Report (MSR) within the FSkar process. For the needs of a BSP it shall be calculated as follows:

$$E_{FCR} = -FCPR * \frac{\Delta f}{200} * \frac{1}{4}\ h$$

Where:

Δf	Means average frequency deviation with respect to the nominal frequency value in a synchronous area, expressed in mHz, in one settlement period
FCPR	Means FCR volume for the BSP, i.e. the volume of power to be activated in case frequency changes up to 200 mHz

2.3.2.2 The Price for FCR Energy

The price for FCR energy shall be provided by the Coordination Centre Swissgrid in DSR – Daily Settlement Report and MSR - Monthly Settlement Report within the FSkar process pursuant to Annex 3 of SAFA Agreement (Synchronous Area Framework Agreement for Regional Group Continental Europe). This price shall be calculated on the basis of day-ahead

energy price in electric power exchanges in Continental Europe and taking into account correction factors in dependence of frequency deviation.

3 The Process of Automatic Frequency Restoration – Secondary Regulation

Automatic Frequency Restoration Reserves (aFRR) is intented to restore system frequency to the nominal frequency after disturbances in the BiH LFC area, and to keep power balance to the schedules values in BiH LFC area in line with other LFC areas. Regulation impulses from SCADA system at NOSBiH shall be sent to BSPs or directly to the controller of the structure providing the aFRR service.

3.1 Procurement of aFRR

aFRR capacity shall be procured in a public procurement process. In the first phase of the procurement process there shall be elected the qualified BSPs whose structures are able to provide the aFRR service, and in the second phase there shall be elected the qualified BSPs which shall provide aFRR in a specific time period.

3.1.1 Registration of Structures providing aFRR

The right to participate in the market procedure to procure aFRR capacity, organized by NOSBiH, belongs to BSPs whose structures satisfy the technical preconditions for providing aFRR and are registered at the Registry of aFRR providers.

BSPs, owners of the generation structures satisfying the technical preconditions for providing aFRR, shall be obligated, in accordance with the Grid Code, a licence issued by the relevant regulatory agency or some other document, to register the structure providing aFRR. The registration is done by submitting to NOSBiH the filled Request for registration of the structure to provide aFRR and a copy of its valid generation licence if it is a generation structure.

The request for registration of the structure providing aFRR may also be submitted to NOSBiH by any other subject that wants to register their structures as those providing aFFR service. A form of the Request for registration of structures to provide ancillary services is available on NOSBiH website.

NOSBiH shall consider the submitted requests as needed. When considering the requests, NOSBiH may ask the BSP to:

- submit additional documents confirming the structure's ability to provide a specific ancillary service,
- practically test the structure providing an ancillary services in accordance with the procedures described in item 3.1.1.1.

When the structure is determined as adequate to provide a specific ancillary service, it is entered in the Registry of the ancillary service providers for a period of next five years and the BSP

with that structure may participate in the procurement procedure of a specific ancillary service. Otherwise, BSP's Request for registration of structures to provide ancillary services shall be denied.

If, within a period of five years, there are some changes in technical characteristics of the concerned structure, the BSP shall submit any change, and NOSBiH shall hold the right to test the structure in accordance with the procedures set in item 3.1.1.1.

3.1.1.1 Assessment of Technical Capabilities of Structures Providing aFRR

NOSBiH shall assess technical capability of Structures that may provide aFRR in the initial registration of the Structure for providing aFRR or during the exploatation, if NOSBiH finds it necessary.

NOSBiH may enter into the Register those structures which previously provided aFRR service, without conducting the technical assessment.

Technical assessment of the Structures providing aFRR shall involve the testing of:

- Operational telecommunication and managing infrastructure which enables efficient and accurate transmission of the managing signal and response,
- Real time measurements of output active power of the generation structures providing aFRR,
- The ability for remote meter reading,
- Speed of response to the managing signal.

Through the process of preparation and conducting the above listed activities the BSP shall fully cooperate with NOSBiH.

Each party shall itself bear the testing costs. Technical ability identified upon the technical assessment shall last for 5 (five) years and may be extended with no further testing if the Structure succesfully provided the aFRR service within the previous period, which is to be finally decided by NOSBiH.

In case that any of the BSP's structures does not meet the standards entered into the Register, or in case that the BSP itself submits a statement that certain Structure may not provide the aFRR service, the respective structure shall lose its active status in the Registry and may not be used as the aFRR service provider.

In case that the BSP' Structure only temporarily fails to comply with the standards entered into the Registry, NOSBiH may suspend the respective Structure by the time the obstacles are removed. During the time of suspension from the Registry, the respective Structure may not be used as aFRRservice provider.

3.1.2 Determination of Necessary aFRR Reserve Capacity

Necessary aFRR reserve capacity in the electric power sector in BiH shall be determined on a monthly basis for peak load period and off-peak load period separately.

The period of peak load shall be from 06:00 until 24:00 during each day, whether a working day, weekend or holiday.

The period of off-peak load shall be from 00:00 until 06:00 during each day, whether a working day, weekend or holiday.

When determining necessary aFRR reserve capacity for LFC area BiH it is necessary to take into consideration the liabilities arising from ENTSO-E SAFA Agreement, actual needs of LFC area BiH (integration of renewable energy sources, intermittent consumption and similar) and plans for share and exchange of aFRR with other Control Areas (ENTSO-E Grid Codes).

Settlement of necessary aFRR reserve at the level of BiH for next year shall be made on a monthly basis, for peak load period and off-peak load period separately, on the basis of these data:

- NOSBiH official data on hourly gross electricity consumption (consumption + losses) in BiH transmission system for last 12 months,
- Coefficient of expected load change which is determined on the basis of planned changes in consumption.

aFRR reserve capacity shall be settled on a monthly level, for peak load periods and off-peak load periods separately. Settlement of monthly reserves shall be done at the begining of November of current year for 12 months in next year. According to NOSBiH official data on annual consumption in BiH within last 12 months, the necessary reserve capacity shall be calculated for each month of next calendar year.

The following algorithm shall be used to settle necessary aFRR reserves for the electro-power sector in BiH:

● By multiplication the data on hourly electricity consumption in the transmission system with appropriate coefficients of expected load change we will have the forecasted data on hourly consumption for the following year.
● For each month of the following calendar year these shall be determined:
▪ Standardized maximum consumption values for peak load periods (according to item 3.1.2.1),
▪ Average consumption values for off-peak load periods (according to item 3.1.2.2).
● Reached consumption values from previous step on a monthly level for peak load and off-peak load periods shall be used in the process of determination of monthly reserve capacity for aFRR R at BiH level, for peak and off-peak loads separately, by applying the formula from ENTSO-E Operation Handbook:

$$R = \sqrt{a * L_{max} + b^2} - b\ [MW]$$

where:

a, b - are empirically determined constants with values a = 10 MW and b = 150 MW,

L_{max} - is defined as the maximum forecasted load of BiH Control Area including the losses as well. The method for the determination of Lmax is given in items 3.1.2.1 and 3.1.2.2.

Following the general rounding rules, the rounding is done to a round number.

3.1.2.1 Determination of Standardized Maximum Consumption Values for Peak Load Periods in BiH

Peak load period is from 06:00 to 24:00 in each day, whether a working day, weekend or holiday.

For determination of necessary aFRR reserve capacity there shall be used the standardized maximum consumption value which is determined on a monthly basis by applying the following algorithm:

● select all the values of planned hourly consumption for the peak load period;
● rank the values of hourly consumption in descending order from highest to lowest values;
● starting from the highest hourly consumption to the lowest, the following procedure shall be conducted:

▪ observing the difference r between current (n) value and the value which is for *k* places distant from current (n+*k*) value: $r=L_n-L_{n+k}$

- ▪ if the observed difference *r* is lower or equal than/to pre-defined value rmax, the current value presents standardized maximum value and the procedure is completed $L_{max}=L_n$;

▪ if the observed difference *r* is higher than pre-defined value r_{max},, the calculation shall be repeated for the next consumption value in order.

Parametres *k* and r_{max} have these sizes:

k = 5 – the distance between numbers (consumption values) for which the difference is being examined

r_{max} = 10 MW – pre-defined value of the difference according to which the standardized maximum value is determined.

3.1.2.2 Determination of Average Consumption Values for Off-peak Load Periods

Off-peak load period is from 00:00 to 06:00 in each day, whether a working day, weekend or holiday.

For determination of necessary aFRR reserve capacity in off-peak load periods there shall be used the average value of off-peak load which is determined on a monthly basis by applying the following algorithm:

- select all the values of planned hourly consumption for the off-peak load period in a calendar month.
- find average monthly value for the off-peak period by addition of all values and the division by the number of the addends.

$$L = \frac{1}{n} * \sum_{i=1}^{n} L_i$$

L – average monthly value of hourly load in off-peak load period,

L – individual hourly load in off-peak load period,

n – number of hours in off-peak load period in a calendar month.

3.1.3 Procurement of aFRR capacity

NOSBiH shall carry out the annual public procedure to procure aFRR in June of current year for next year.

Contracting of aFRR shall be done on a monthly basis, for peak load periods and off-peak load periods separately.

If the required scope of aFRR capacity has not been contracted for a certain month, the missing quantities shall be provided through a monthly procurement procedure for that month.

Balancing Service Providers shall deliver their bids in accordance with the provisions of the Invitation for participating in the procedure to procure aFRR reserve capacity. The bids shall imply a symmetrical scope of capacities.

3.1.3.1 Framework Agreement

In accordance with Article 32 of the Public Procurement Law of BiH, NOSBiH shall carry out an open procedure with the purpose of signing a framework agreement with BSPs.

The Procedures for procurement and providing the ancillary service of aFRR reserve capacity on an annual basis shall be carried out at the beginning of June of current year for next year, and it shall, among other issues, define:

- The scope of the procurement procedure,
- The deadline specified for the bids delivery,
- The method of delivering bids and the bids' format,
- The time period for publishing of the procurement's results,
- The instruction on appeal procedure.

The right to participate in the public procurement procedure belongs to those bidders whose structures have active status in the Registry of aFRR service providers for the period for which the service is procured.

Dynamics of an annual procurement procedure for a year Y shall be as follows:

1. Procurement publishing by 15th of June in Y-1 year,
2. Bids submission by 30th July in Y-1 year,
3. Bids evaluation by 6th August in Y-1 year,
4. Publishing the tender results by 8th August in Y-1 year,

5. The deadline for complaints by 18th August in Y-1 year,
6. Discussing possible complaints and creating a final list by 20th August in Y-1 year,
7. Concluding framework agreements by 10th September in Y-1 year.

NOSBiH shall conclude framework agreements with all BSPs satisfying the tender requirements.

3.1.3.2 Invitiation for Bids submission

NOSBiH shall carry out the procedure proscribed by the Public Procurement Law of BiH and accordingly shall ensure receipt, validity check, confirmation of receipt and storing of the submitted bids. NOSBiH shall rank the submitted bids according to the price offered for aFRR reserve capacities. The price cap for aFRR capacity $p_{MaxSecCap}$ shall be determined by the State Electricity Regulatory Commission (hereinafter SERC) by its Decision in an annual $p_{MaxSecCapYear}$ and monthly $p_{MaxSecCapMont}$ procurement procedure separately. A bid with the price exceeding the price cap shall be rejected.

From the created list NOSBiH shall select the most favourable bids in line with required quantity of aFRR reserve capacity.

Invitation for annual bids submission shall be organized in November of current year for next year. The procurement procedure shall be organized for 12 months, for peak load periods and off-peak load periods separately.

If the required scope of capacity has not been purchased in an annual procurement procedure, the invitation for providing the ancillary service of aFRR reserve capacity on a monthly basis shall be announced in month M-1 for calendar month M.

The invitation for bid, among other issues, shall define:

•The scope of the procurement procedure (required scope of aFRR for peak load periods and off-peak periods separately),
- The deadline specified for the bids delivery,
- The method of delivering bids and the bids' format,
- The time period for publishing of the procurement's results,
- The price cap of the reserve capacity,
- The criteria for selection of the most suitable bid,
- The instruction on appeal procedure.

The invitation for the bids submission shall be published on NOSBiH website and shall be sent electronically to those BSPs with which the framework agreement for providing aFRR has been concluded.

The bids for capacity reserves procurement shall contain the following information:

- Date and time of the bid's preparation,

- Period (month) of delivery of capacity reserves,

● Time periods (peak load/off-peak load) of the delivery period and the related pairs of quantity-price,

● Pairs: quantity - unit price per the delivery time periods

▪ Quantities are integer power values expressed in MW

▪ Prices are unit values of 1 MW capacity expressed in KM/MW/h with two decimals.

Final bids (pairs capacity - price) within an annual cycle through the months, on the basis of signed framework agreements, shall be delivered in line with NOSBiH's invitation and instructions.

Final bids (pairs capacity - price) within a monthly cycle, on the basis of signed framework agreements, shall be delivered as apropriate in month M – 1 for M month in line with NOSBiH's invitation and instructions.

After the public procurement procedure has been carried out, NOSBiH shall conclude contracts with selected BSPs. The contract form can be found on NOSBiH website.

NOSBiH shall deliver SERC a detailed report on any public procurement procedure conducted for purchase of aFRR capacity.

3.1.4 Distribution of Missing Reserves per BSPs

In case that the market procedures described in item 3.1.1 do not provide the necessary scope of aFRR capacity, NOSBiH shall distribute this responsibility to BSPs .

3.1.4.1 Methodology for Determination of Required (planned) aFRR Reserve Capacity of BSPs

The Required (planned) capacity amount of an individual BSP in aFRR reserve capacity on a monthly basis shall be calculated before the invitation to submit the bids for aFRR capacity. These information shall serve as guidelines for the BSP when offering its aFRR capacity reserves in the procurement process.

For the calculation of the required reserve of BSP there shall be used the formula for peak load and off-peak load periods separately:

$$R_N = \frac{R}{N}$$

R – total required aFRR reserve capacity of BiH for peak load and off-peak load periods separately,

R_N – required (planned) aFRR reserve capacity of an individual BSP for peak load and off-peak load periods separately.

N – the number of registered aFRR service providers

Following the general rounding rules, the rounding is done to a round number.

In case that the described method does not provide the entire amount of required reserve *R*, that is if the value *R* is not divisible by *N*, NOSBiH shall re-allocate the additional liabilities per BSPs thereby satisfying the principle of equal allocation on an annual basis.

3.1.4.2 Distribution of Missing Reserves of aFRR per BSPs

If the required scope of aFRR capacity has not been purchased through an annual or monthly procedure for a certain month, NOSBiH shall distribute the missing quantities per BSPs taking into consideration the scope of capacity reserves purchased in the public procurement and the BSPs from which those quantities have been procured. The distribution procedure shall be done immediately after the completion of a monthly procurement of aFRR reserve capacity. BSPs shall provide the missing quantities.The price of thus distributed aFRR capacity reserve shall be regulated and equal to the weighted average price of accepted bids in a monthly procurement procedure, that is equal to the price cap for aFRR capacity $p_{MaxSecCapMont}$ if there were no bids accepted in a monthy procurement procedure.

Input data in the distribution of missing quantities of aFRR capacity per BSPs shall be:

● Procured quantities of aFRR capacity reserve through an annual and monthly public procurement procedure.

● Required share of individual BSP in the total amount of required aFRR capacity reserve, for peak load and off-peak load periods separately.

● The total quantity of required aFRR reserve capacity R on the level of EES BiH, for peak load and off-peak load periods separately.

In the allocation of missing reserves of aFRR there shall be included those BSPs which through the procurement procedure had been allocated with capacity amount less than the required (planned) amount. For these BSPs, the missing quantities of aFRR shall be allocated proportionally to the difference between required (planned) aFRR capacity and aFRR capacity allocated through public procurement procedures.

Following the general rounding rules, the rounding is done to a round number

3.1.5 Capacity Transfer

The BSP shall have the right and ability to transfer the contractual or allocated obligations for balancing service capacity to another BSP by mutual agreement. NOSBiH shall hold the right to reject the transfer of obligations for balancing service capacity or a part of the capacity from one BSP to another if NOSBiH considers that it will endanger operational security of the electric power system.

In case of the transfer of balancing capacity, the receiving balancing service provider shall undertake all obligations for the transferred capacity pertaining to capacity price, penalty for undelivered capacity and the quality of the provided service. NOSBiH shall calculate all liabilities according to the capacity price which is equal to the initial price of capacity before the transfer.

The transfer of capacity shall be performed through the Balancing platform as follows:

•Through the balancing system both involved BSPs submit to NOSBiH appropriate (harmonized) requests 1 hour before the concerned interval (and maximum 35 days) at the latest,

•After NOSBiH verifies the confirmation (acceptance), it shall be considered that the capacity obligations are transferred between the BSPs.

3.1.6 Procurement of aFRR Capacity through a Direct Settlement

If the BSP is not able to provide the contracted aFRR capacity for next calendar month, it shall inform NOSBiH on that by submitting a statement by the 25th day of a current month at the latest. The Statement shall contain information on the period of time and on quantities of aFRR capacity which the BSP has failed to provide.

In this case, NOSBiH shall procure missing quantities of aFRR capacity through a direct settlement in a transparent and non-discriminatory way. The highest price that NOSBiH shall pay this procurement shall be the compensation amount being paid in case of a failure to provide capacity which is defined in item 3.1.7.1 of these Procedures.

3.1.7 Penalties for Failure to Provide Capacity through the Nomination Process

If the BSP has failed to provide or nominate the contracted capacity of aFRR in the activities for next day, it shall pay compensation to NOSBiH for missing quanitites for each interval of not providing capacity. The compensation amount is defined in item 3.1.7.1 of these Procedures.

The contracted capacity of aFRR for BSP from previous paragraph shall present the total amount of capacity reserve contracted through an annual and monthly market procedure, a regulated allocation of liabilities for missing capacity, the transfer of capacity and a direct settlement.

3.1.7.1 Penalty Amount in case of Unfulfilled Obligations

Penalty amount for each non-provided MW of aFRR capacity shall be equal to the higher price of the price caps for aFRR, which is determined in an annual and monthly procurement for a specific month increased by coefficient $k_{PenSecCap} - 1$.

SERC shall in its decision determine coefficient $k_{PenSecCap}$ and it shall be from 1,1 up to 1,25.

3.1.7.2 Determination of aFRR Capacity Price

The contracted aFRR capacity shall be paid by offered price (Pay-As-Bid).

The capacity contracted due to re-allocation of missing quantities of aFRR capacity shall be paid by weighted average price of the bids accepted for aFRR capacity in a specific month, i.e. by price caps of aFRR capacity a $p_{MaxSecCapMont}$ in case that there were no bids accepted in a monthly procurement procedure.

3.2 The Activation of aFRR

The BSP shall ensure the continuous availability of aFRR in the entire range for which it has been nominated. The range of aFRR shall be equal to double value of aFRR capacity.

Nominated aFRR capacity shall be provided on the level of BSP and the BSP shall automatically deliver it to SCADA/EMS system at NOSBiH in real time in terms of upper and lower generation limits of MEGAUNIT. Regulation impulses from SCADA/EMS system at NOSBiH shall be sent to the BSP's managing centres or directly to generation units along with an Activation request for aFRR contracted capacity.

MEGAUNIT is a virtual structure representing a set of generation structures as defined by the Annex to the Agreeement on providing ancillary services which is concluded between NOSBiH and the BSP for the level on which the aFRR service is provided. An exchange of signals in real time (lower and upper limit, set-point and other signals) between SCADA systems shall be done for the level of MEGAUNIT. The regulation request shall be shared and sent to each BSP's managing centre or to generation units proportionally to the contracted capacity of each BSP or to the merit order list (MOL), i.e. in line with the algorithm implemented in SCADA system at NOSBiH.

Each day the BSP shall be obligated for a next day (in day D-1) to deliver to NOSBiH the bids for the contracted aFRR capacity. Bids shall be delivered in each settlement period, one price of energy for upward aFRR, and one price of energy for downward aFRR. The value of nominated capacity may be changed during intraday activities (in day D) until an hour H-1, but only with prior notice given to the operative staff at NOSBiH.

The difference in prices of energy for upward and downward aFRR in an hour must be lower or equal to the maximum value S which shall be determined by SERC's Decision on ancillary services. Format for bids delivery of aFRR energy shall be determined by NOSBiH.

At NOSBiH's request the BSP shall submit a list of generation units providing the service of aFRR.

Ancillary service of aFRR shall be performed automatically on the basis of the managing signals formed by AGC function of SCADA/EMS system at NOSBiH. The BSP shall enable the connection of aFRR to the system.

aFRR service provider shall also:

● provide nominated capacity in real time. The scope of aFRR delivered to SCADA at NOSBiH may not be changed within a settlement period, and it must correspond to the nominated capacity,

● keep operational those generation capacities which have the possibility to deliver nominated aFRR capacity,

● provide a possibility to receive a regulation signal from NOSBiH Centre and a possibility to allocate and forward the signal towards the generation structures within the BSP, or to enable a direct reception of the signal in the generation structure providing aFRR service,

● provide accurate and reliable real-time measurements necessary for aFRR activation (active power, upper and lower generation limits of MEGAUNIT, gradient response etc) and the status of the switch necessary for the BSP's connection to the system of aFRR.

● provide the nominated scope of aFRR in positive and negative directions,

● provide the speed of the aFRR response of minimum 10MW/min. If the realized scope of aFRR is below 10 MW, the BSP shall deliver the entire scope in one minute.

● enable activation of aFRR in its centre and structures continually during the term of the Agreement.

aFRR providers shall be obligated to automatically deliver real-time information to SCADA/EMS system at NOSBiH in terms of upper and lower generation limit of MEGAUNIT's generation. The difference between upper and lower generation limit shall present double value of available scope of aFRR (positive and negative regulation scope). Using the signals in its Centre NOSBiH shall set the generation of BSP's structures providing aFRR service to the desired value within the available scope.

The service provider shall be obligated to protect its structures from NOSBiH signals which might possibly set the generation amount beyond the contracted scope, and to ensure the most qualitative aFRR service.

3.3 Calculation of aFRR

The compensation for the provided service aFRR shall consist of the compensation for reserved capacity and the compensation for activated balancing energy of aFRR. If the BSP has failed to meet the contractual liabilities, NOSBiH shall apply penalty payment. Compensations and penalties shall be settled and paid on a monthly basis.

3.3.1 Compensation for aFRR capacity

The compensation for aFRR capacity of the BSP in one settlement period (15 minutes) shall be equal to the total amount of compensations in that period per individual agreements of BRPs for aFRR. In this process it shall be taken into account that at a daily market firstly the agreements with lower prices of capacity reserve are nominated and fulfilled.

Total compensation for capacity of the BSP shall be settled on a monthly basis as the sum of all hourly compensations in that month.

3.3.2 Compensation for aFRR energy

Those BSPs having the structures which deliver energy in the process of providing aFRR service shall have the right to get compensation for the delivered energy. The compensation amount shall be equal to the product of the delivered energy of aFRR and the price of energy for upward control which has been offered by the BSP in the balancing market activities for a next day (day ahead).

Those BSPs having structures which withdraw energy in the process of providing aFRR service i.e. which have reduced their power supply, shall pay to NOSBiH the compensation for undertaken energy. The compensation amount shall be equal to the product of undertaken aFRR energy and the price of energy for downward control offered by the BSP in the balancing market activities for a next day (day ahead). Especially, if the offered energy price for downward aFRR is negative, the BSP shall have the right to get compensation equal to the product of activated aFRR energy and the offered price.

3.3.2.1 aFRR Energy

aFRR energy for the BSP in one settlement period shall be calculated as an integral to the request submitted by NOSBiH for aFRR activation.

With the purpose of comparison and analysis of the regulation response, aFRR response shall be calculated as follows:

$$W_{SekReg} = W_{ostv} - \frac{P_G + P_D}{2}$$

Where:

W_{act} means actual generation of the BSP (MEGAUNIT) at SCADA system at NOSBiH in a specific imbalance settlement period

P_G means the integral of upper generation limit for the BSP (MEGAUNIT) from SCADA system at NOSBiH

P_D means the integral of lower generation limit for the BSP (MEGAUNIT) from SCADA system at NOSBiH

If the activated energy in one imbalance settlement period exceeds zero, the BSP enters the regime of providing the ancillary service of aFRR and it has delivered energy into the system. If the activated energy in one imbalance settlement period is bellow zero, the BSP enters the regime of providing the ancillary service of aFRR and it has withdrawn energy from the system.

Activated aFRR energy may not be larger than the capacity nominated in day ahead activities i.e. than the delivered scope of regulation.

3.3.2.2 The price of aFRR energy

The price of energy for upward and downward aFRR shall be equal to the offered price for upward and downward aFRR, respectively.

3.3.3 Penalties for Failure to Fulfill Obligations

NOSBiH shall impose penalties on the BSP if it fails to fulfill the contractual obligations and shall do so for each MW of non-provided aFRR service by the price determined as defined in item 3.1.7.1. The amount of the penalty for unfulfilled capacity obligation shall be determined depending on the type of unfulfillment as follows:

1. If the BSP within one imbalance settlement period has failed to provide qualitative supply of aFRR service, the penalty shall be calculated in relation to the nominated capacity. The quality of provided aFRR service of the BSP within one imbalance settlement period shall be calculated according to the rules under 3.3.3.1.

2. If the BSP has failed to nominate the contracted capacity in activities for next day, the penalty amount shall be determined in relation to non-nominated capacity.
3. If the BSP, by submitting a statement, has informed NOSBiH on inability to provide the contracted aFRR capacity, the penalty amount shall be calculated for the capacity specified in the statement.
4. In the BSP has failed to provide the nominated capacity in real-time, the penalty shall be calculated for the difference between the nominated and actually delivered aFRR capacity.

Contracted capacity for a specific imbalance settlement period is the capacity contracted with the BSP through an annual and monthly market procedure, through the process of capacity transfer and through allocation of the missing quanities of aFRR per BSPs and through the mechanism of direct settlement between NOSBiH and the BSP.

Nominated capacity is the capacity nominated by the BSP in a daily market for providing aFRR service through the Balancing platform at NOSBiH.

Actually delivered aFRR capacity shall be calculated as the half of the difference between upper and lower generation limit of a specific BSP delivered at SCADA system at NOSBiH.

$$P_{SekCapIsp} = \frac{P_G - P_D}{2}$$

where:

P_G Means the integral of upper generation limit for MEGAUNIT BSP from SCADA system at NOSBiH

P_D Means the integral of lower generation unit for MEGAUNIT BSP from SCADA system at NOSBiH

3.3.3.1 The Quality of aFRR service

It is considered that aFRR of a specific BSP within an imbalance settlement period would have satisfying quality if the following conditions are met:

- If the regulation has not been disconnected on BSP side longer than a cumulative period over 5 minutes within a specific settlement period (AGC signal at SCADA/EMS system at NOSBiH: *"Unit blocked"* or *"Unit off remote control"*) and
- If AGC signal *"Unit Not Following"* has not be active longer than cumulative 15 minutes within a specific settlement period.

If at least one of these criteria has not been met, it is considered that the aFRR was not of satisfying quality in a specific settlement period.

NOSBiH shall make a detailed analysis of aFRR service as appropriate. In that process the following will be analysed:

- whether the BSP during an hour change the scope of aFRR in real time in comparison to the nominated scope,
- whether the upper and lower generation limits delivered to SCADA system at NOSBiH are outside the technical possibilities of MEGAUNIT,
- whether the speed of BSP response (the gradient forwarded by the BSP to SCADA system at NOSBiH) is in accordance with the defined minimum response requirements for aFRR,
- nominations in a planning phase (ESS and Balancing), generation limits of the BSP as the limits of control, request (set-point) for generation from SCADA system at NOSBiH, response of BSP's generation structures and other signals and recorded values.

NOSBiH shall use these analyses in reaching a final decision on the quality of aFRR service.

The BSP shall be entitled to compensation for aFRR capacity for hours in which the aFRR service has not been working properly due to the reasons which are out of the BSP's control, which shall, for each particular case, be determined by NOSBiH's and the BSP's authorized personnel.

4 The Process of Manual Frequency Restoration– Tertiary Regulation

Manual Frequency Restoration Reserve – mFRR is intented to restore system frequency to the nominal frequency after disturbances in the BiH LFC area, and to keep power balance to the schedules values in BiH LFC area in line with other LFC areas. It is applied by changes in generation or consumption of the structures providing mFRR balancing service based on an

electronic, written or phone request sent by NOSBiH to the BSP. mFRR service may be positive (upward - increase in generation i.e. reduction of consumption) and negative (downward – reduction of generation, i.e. increase in consumption).

4.1 Procurement of mFRR

The balancing service of mFRR is procured through the public purchase procedure. In the first phase of the purchase procedure there shall be elected the qualified BSPs whose structures are able to provide mFRR service, and in the second phase there shall be elected qualified BSPs which shall provide the service in a specific time period.

The public purchase procedure shall be carried out for upward and downward mFRR separately.

4.1.1 Registration of Structures Providing mFRR

The right to participate in the market procedure to purchase mFRR capacity, which shall be organized by NOSBiH, belongs to BSPs whose structures satisfy the technical preconditions for providing this service and are registered at the Registry of upward and downward mFRR service providers.

BSPs, owners of the generation structures that satisfy the technical preconditions for providing this service in accordance to the Grid Code and the license issued by the Regulatory Agency or other document, shall register that structure for providing mFRR service. The registration shall be done by submitting at NOSBiH a properly filled Request for registration of structures for ancillary service providing. If it is a generation unit, it shall be necessary to deliver a copy of valid generation license.

The Request for registration of structures providing mFRR service may be submitted at NOSBiH by other entities (producers and consumers) which want to register their structures as those providing mFRR service.

A form of the Request for registration of structures providing ancillary services shall be available on NOSBiH website.

NOSBiH shall consider the submitted requests as needed. When considering the requests NOSBiH may require from the BSP:

● to submit additional documents confirming the structure's ability to provide a specific ancillary service,

● to test the structure to practically provide ancillary service in accordance with the procedures described in item 4.1.1.1.

If the structure is identified as an adequate provider of upward/downward mFRR service, it shall be entered in the Registry of structures providing that ancillary service for a period of next 5 years and the BSP with that structure may participate in the procurement procedure of a specific ancillary service. Otherwise, a BSP's Request for registration of structures providing

ancillary services shall be denied. If, within a period of five years, there are some changes in technical characteristics of the concerned structure, the BSP shall submit such changes, and NOSBiH shall hold the right to test the structure in accordance with the procedures set in item 4.1.1.1.

4.1.1.1 Assessment of Technical Capabilities of Structures Providing mFRR

NOSBiH shall assess technical capabilities of the Structure providing upward and downward mFRR service in the initial registration of the Structure for providing that service or during the exploatation, if NOSBiH finds it necessary.

NOSBiH may enter into the Register those structures which provided mFRR service in previous period without assessment of their technical capabilities.

The assessment of the Structures providing mFRR Service shall involve testing of:

- Real time measurements of active power output of the generation structures providing mFRR service,
- The ability for remote meter reading,
- Speed of response i.e. ability to activate upward or downward power regulation within 12,5 minutes following the activation request.

Through the process of preparation and conducting the above listed activities, the BSP shall fully cooperate with NOSBiH.

Each party shall itself bear the testing costs. Technical validity verified upon the assessment shall last for 5 (five) years and may be extended with no further testing if the structure succesfully provided mFRR service for previous period, which is to be finally decided by NOSBiH.

In case that any of the BSP's structures does not meet the standards entered in the Register, or in case that the BSP itself submits a statement that its structure may not provide the service of mFRR, the respective structure shall lose its active status in the Registry and may not be used as mFRR service provider.

In case that the BSP' structure only temporarily fails to comply with the standards entered in the Registry, NOSBiH may suspend the respective structure by the time the obstacles are removed. During the period of suspension from the Registry, the respective structure may not be used as mFRR service provider.

If Ancillary Service Providers have any complaint about or an appeal against NOSBiH's decisions in terms of their technical validity, they may use the procedures for dispute resolution set by the Grid Code.

4.1.2 Determination of Required mFRR Capacity Reserve

Required mFRR capacity in the electric power sector in BiH shall be determined by taking into account the power of generation units in BiH, power of the largest consumers, deviations in

previous period and regional agreements on mFRR allocation and exchange with other system operators.

4.1.3 Procurement of mFRR capacity reserve

NOSBiH shall carry out an annual procedure to purchase upward and downward tertiary mFRR separately in June of current year for next 12 months of following year. Contracting of upward and downward mFRR capacity shall be done on a monthly basis.

If the required scope of mFRR capacity has not been purchased for a certain month, the missing quantities shall be provided through a monthly procedure for that month.

BSPs shall deliver their bids in accordance with provisions of the invitation to participate in the procedure of public procurement of upward and downward mFRR.

SERC shall in its decision determine the price cap of upward and downward mFRR capacity. The bid with the price exceeding the price cap shall be rejected.

If the required scope of mFRR capacity has not been purchased through a monthly procedure for a certain month, and if it is expected that there will not be enough bids for mFRR energy in a daily market, NOSBiH shall determine capacity for providing mFRR service in a regulated manner and shall inform SERC thereof.

4.1.3.1 Framework Agreement

In accordance with Article 32 of the Public Procurement Law of BiH, NOSBiH shall carry out an open procedure with the purpose of signing a framework agreement with BSPs for providing upward and downward mFRR service.

The Procedures for providing upward and downward mFRR shall be carried out by NOSBiH at the beginning of June in a current year for 12 months in next year, and the invitation shall define:

- The scope of the procurement procedure,
- Bids submission deadline,
- Bids format and bids submission method,
- The time period for publishing of the procurement's results,
- The instruction on appeal procedure.

The right to participate in the public procurement procedure belongs to those bidders whose structures have active status in the Registry of upward and downward mFRR service providers for the period for which the service is procured.

Dynamics of an annual procurement procedure for a year Y is as follows:

1. Procurement publishing by 15th of June in Y-1 year,
2. Receiving bids by 30th July in Y-1 year,

3. The bids' evaluation by 6th August in Y-1 year,
4. Publishing the tender results by 8th August in Y-1 year,
5. The deadline for complaints and appeals by 18th August in Y-1 year,
6. Discussing possible complaints and appeals and creating a final list by 20th August in Y-1 year,
7. Concluding framework agreements by 15th September in Y-1 year.

NOSBiH shall sign framework agreement with all BSPs fulfilling the tender qualifications.

4.1.3.2 Invitation for Bids Submission

In accordance with signed framework agreements NOSBiH shall organize annual and monthly cycles for submission of bids for providing upward and downward mFRR service.

Bids for upward and downward mFRR capacity shall be submitted in pairs power (MW) – price (KM/MH/h) in a format defined by NOSBiH. Power shall be the integer value MW. The price shall be expressed with two decimals. In capacity bids, the BSP shall not be obligated to specify the structures that will provide mFRR service.

An annual cycle of collecting bids shall be organized as instructed by NOSBiH in the end of current year for next 12 months in next year. If the required scope of mFRR capacity has not been purchased for a certain month in the annual cycle, the missing quantities for that month shall be provided through a monthly procedure in month M – 1 for month M.

NOSBiH shall carry out the procedure proscribed by the Public Procurement Law of BiH and accordingly shall ensure receipt, validity check, confirmation on receipt and storing of the submitted bids. NOSBiH shall rank the submitted bids according to the price offered for upward and downward mFRR capacity reserves. From the created list NOSBiH shall select the most favourable bids to the level of the required quantity of mFRR capacity reserve.

Invitation for submission of bids for providing mFRR service shall contain:

● The scope of the procurement procedure (required scope of upward and downward mFRR per months),

● The deadline specified for the bids delivery,

● The method of delivering bids and the bids' format,

● The time period for publishing of the procurement's results

● The price cap of upward and downward mFRR capacity reserve,

● The criteria for selection of the most suitable bid,

● The instruction on appeal procedure.

The invitation for submission of bids shall be sent electronically to those BSPs with which the framework agreement for providing upward and downward mFRR service has been concluded.

Participants in the procurement procedure shall submit their bids in a format defined by NOSBiH. Each participant has the right to send one or more bids in the capacity procurement procedure for a defined delivery period (month and/or year).

The bids for capacity reserves procurement shall contain the following information:

● Date and time of the bid's preparation,

● Period (month) of delivery of capacity reserves,

● Pairs quantity – price per delivery time intervals,

▪ Quantities are integer power values expressed in MW

▪ Prices are unit values expressed in KM/MW/h with two decimals.

NOSBiH shall electronically send the procurement's results to the participants of the procurement procedure in accordance with the confidentiality clauses.

After the public procurement procedure has been carried out, NOSBiH shall conclude contracts with selected BSPs. The contract form can be found on NOSBiH website.

NOSBiH shall deliver SERC a detailed report for each public procurement procedure conducted.

4.1.3.3 The price of mFRR capacity

Upward and downward mFRR capacity shall be paid by offered price (Pay-As-Bid).

Balancing Market Operation Rules defines the method for submission of bids related to mFRR energy.

4.1.3.4 Capacity Transfer

The BSP shall have the right and ability to transfer the contractual or allocated obligations for balancing service capacity to another BSP by mutual agreement. NOSBiH shall hold the right to reject the transfer of obligations for balancing service capacity or a part of the capacity from one BSP to another if NOSBiH considers that it will endanger operational security of the electric power system.

In case of the transfer of balancing capacity, the receiving balancing service provider shall undertake all obligations for the transferred capacity pertaining to capacity price, penalty for undelivered capacity and the quality of the provided service. NOSBiH shall calculate all liabilities according to the capacity price which is equal to the initial price of capacity before the transfer.

The transfer of capacity shall be performed through the balancing platform as follows:

•Through the balancing system both involved BSPs submit to NOSBiH appropriate (harmonized) requests 1 hour before the concerned interval (and maximum 35 days) at the latest,

•After NOSBiH verifies the confirmation (acceptance), it shall be considered that the capacity obligations are transferred between the BSPs.

4.2 The Activation of mFRR a

mFRR service shall be activated for the needs of the electric power system of BiH according to the balancing reserve merit order list (MOL) made by NOSBiH for upward and downward regulation separately, in line with the bids submitted for energy at Daily Balancing Energy Market and in accordance with the Balancing Market Operation Rules.

NOSBiH shall decide on activation of mFRR service.

Derogations from the merit order list may be caused by faults in the electric power system of BiH or in ENTSO-E system such as unexpected power flows, congestions, outage of OHL (failure to transmit electricity) etc.

Any derogation from the merit order list shall be recorded in the dispatchers' book and in the balancing system software accompanied with an appropriate explanation.

In terms of the mandatory bids for mFRR balancing energy, the BSP shall inform NOSBiH every day on generation units (on the level of an aggregate) that will provide upward and downward mFRR service in the scope of mandatory bids for a next day on an hourly basis.

NOSBiH may not activate the bids fully.

NOSBiH shall define when mFRR reserve is to be activated for the reqested capacity in full or partial amount.

NOSBiH shall give instruction to the BSP at least 15 minutes before the moment of activation.

The Operational dispatcher at NOSBiH shall give an order for mFRR activation on the basis of his/her operational judgement at any moment.

Restrictions in the process of activation of bids with contracted capacity of upward and downward mFRR are:

● Minimum duration of mFRR activation is 15 minutes.

● Maximum period of daily activation of mFRR of one bid is of up to 8 hours in a single session or in few activations.

● The period between activation of one bid is 1 hour.

mFRR service provider shall be obligated to:

● ensure workforce availability to receive requests from NOSBiH (by a phone, telegram and throughout the Balancing system software),

● provide the contracted scope of mFRR,

● ensure defined speed of response of mFRR.

Nomination, activation and calculation of voluntary bids (bids without contracted capacity) in the Daily Balancing Market shall be described in the Balancing Market Operation Rules.

4.2.1 mFRR Activation Request

Upward and downward mFRR activation shall be instructed by the operational staff from the Dispatch Centre at NOSBiH. The activation request shall be sent to the operational staff of the BSP. All information related to the staff, contact details and other details necessary for communication between NOSBiH and the BSP shall be an integral part of the Agreement on ancillary services providing.

The activation request shall be sent by a phone (written request) or through the Balancing platform.

The activation request sent by phone shall contain:

1. Unique number of the activation request and the time of the instructing,
2. The BSP receiving the request,
3. Unique number of the bid that is being activated,
4. Starting time,
5. Direction (upward/downward),
6. Power that is being activated,
7. Name and surname of the Request's sender and recipient.

The request's receiver shall repeat the request's words and shall confirm activation of mFRR by sending a telegram from his/her operating book.

In case of the activation through the Balancing platform, NOSBiH shall send the activation request containg all information necessary for this activation. The receiving TSO shall confirm the activation request through the Balancing platform. If due to some technical issues the TSO is not able to confirm the activation through the Balancing platform, the activation shall be confirmed by phone.

NOSBiH may cancel the activation request sent to the BSP at least 12.5 minutes before the start of the activation.

If there is already activated mFRR bid, NOSBiH staff may use another request to change the activation power within the scope offered in the bid.

To conclude the activation NOSBiH shall send the TSO the request in a form of a telegram containing:

1. Unique number of the telegram and the time of its issuance,
2. The BSP receiving the request,
3. Unique number of the activated bid,
4. End time of the activation,
5. Name and Surname of the telegram's sender and recipient.

For each next (or selected) bid from the Merit order list it shall be given a new activation request, information on change in power of activation and on the end of mFRR activation.

If mFRR is activated for the needs of other system operators, that will be indicated in the activation request.

4.3 Calculation of mFRR

Service fee for provided upward and downward mFRR service shall consist of the reserved capacity fee and the fee for activated mFRR energy.

4.3.1 Compensation for Capacity

BSPs shall have the right to be compensated for capacity for each settlement period in which upward and downward mFRR capacity has been offered in the Daily Balancing Energy Market for the needs of NOSBiH.

The settlement period of balancing capacity is one 15-minute time interval.

Capacity fee in a settlement period shall be equal to the quarter of the product of nominated capacity and the contracted unit price of capacity (KM/MW/h) under individual agreements. If the nominated capacity is smaller than the contracted amount, it is considered that the BSP has failed to provide the contracted capacity under the agreement with higher price of capacity reserve.

Total capacity fee of the BSP shall be settled on a monthly basis as the sum of all fees in settlement periods in that month.

4.3.1.1 Penalties for Failure to Fulfill Obligations

If the BSP has failed to provide i.e. to nominate the contracted mFRR capacity, it shall pay to NOSBiH the penalty for the missing quantities for every period of non-provided capacity. The penalty amount is defined in item 4.3.1.2 of these Procedures.

The penalty for non-provided capacity for the BSP which contracted upward or downward mFRR capacity reserve shall be summed up on a monthly basis.

If the BSP which contracted upward or downward mFRR capacity reserve, upon NOSBiH request, has failed to provide mFRR service in line with the quality criteria defined in item 4.3.1.3, it shall be obligated to pay penalty. The penalty amount shall equal to the weekly compensation value of contracted mFRR capacity reserve.

Penalties on the BSP which contracted upward or downward mFRR capacity reserve and which are calculated in line with the quality criteria shall be summed up on a monhtly basis.

mFRR energy is registered and calculated to the BSP in line with item 4.3.2 without regard to the penalties in case of a failure to meet the obligations for mFRR capacity.

4.3.1.2 Penalties for Failure to Provide Capacity

Penalty amount for each non-provided contracted MW of upward i.e. downward mFRR capacity shall be equal to the higher price of the price caps for upward i.e. downward mFRR capacity, which is determined in an annual and monthly procurement for a specific month increased by coefficient $k_{PenTerCap} - 1$.

SERC shall in its decision determine coefficient $k_{PenTerCap}$. If coefficient $k_{PenTerCap}$has not been determined by SERC's decision, it is considered that its value is 1, i.e. that there are no penalties for non-provided mFRR capacity.

4.3.1.3 The quality of mFRR service

It is considered that upward i.e. downward mFRR capacity is provided if the capacity has been nominated in the Daily Balancing Energy Market.

Since mFRR balancing energy is not measured or calculated but is considered to be delivered, all missing/undelivered quantities shall become deviations of the BRP to which the BSP belongs.

Monitoring the quality of mFRR shall be done by monitoring the activation of contracted mFRR capacity reserve.

NOSBiH shall analyse activation of mFRR by comparing actual and planned generation of the structures which at a specific moment have been nominated for providing mFRR service. If this indicates that the BSP has activated less than 80% of required mFRR power within any imbalance settlement period in a day, it shall be considered that the service has not been adequatly provided and the BSP shall pay penalty in line with item 4.3.1.1.

4.3.2 Compensation for mFRR energy

Those BSPs whose structures are used for providing upward mFRR service shall be entitled to compensation for the delivered energy. The compensation amount shall be equal to the product of the delivered energy of mFRR and the price of energy for upward control which has been offered by the BSP in the balancing market activities.

Those BSPs whose structures are used for providing mFRR service shall pay the compensation for withdrawn energy. The compensation amount shall be equal to the product of withdrawn downward mFRR energy and the price for downward mFRR energy offered by the BSP in the balancing market activities.

If the BSP has offered negative price for downward mFRR energy, a direction of payment shall be changed and the BSP shall be entitled to compensation for withdrawn energy by the absolute value of the price offered by the BSP.

4.3.2.1 mFRR Energy

Energy of activated upward and downward mFRR shall be equal to the requested (required) energy as integral of the power of upward and downward mFRR which NOSBiH required from the BSP in an imbalance settlement period.

4.3.2.2 The price of mFRR energy

The price of energy for upward and downward mFRR shall be equal to the offered price for upward and downward mFRR, respectively.

5 Covering Losses in BiH Transmisson System

5.1 Estimation of Losses in BiH Transmission System

In order to carry out the procedure to purchase energy to cover losses, NOSBiH shall estimate the losses in the transmission system of BiH on the basis of the Balance sheet in the end of current year for 12 months in next year.

5.2 Procurement of Energy to Cover Losses

NOSBiH shall provide energy to cover losses in the transmission system by procuring energy through bids in a public procurement market. Energy for covering losses shall be procured on a monthly basis for annual, semi-annual, quarter or monthly procurement procedures depending on the estimated situation in the electricity market.

The right to participate in the public procurement procedure belongs to licensed suppliers in BiH, i.e. to market participants who own a valid electricity supply licence in BiH.

The criteria for selection of the most favourable bidder in the public procurement procedure shall be the lowest offered price for MWh of electricity.

NOSBiH shall conclude an agreement with the selected bidder and it shall be based on complete covering of electricity losses in BiH transmission system. An hourly derogation between planned and actual amount of losses shall present the imbalance of the bidder with whom the agreement for covering losses has been signed in a specific month.

NOSBiH shall deliver to the selected bidder estimated hourly amount of losses (planned losses) in day D-1 for day D. The planned losses calculated by NOSBiH shall present a framework of energy needed for covering losses and the bidder may correct these values if he considers them incorrect.

Transmission losses (actual losses) shall be calculated as the algebraic sum of all injected and withdrawn electricity amount for each metering points defined in the Metering Registry for the transmission system in BiH.

6 Elimination of Unintentional Deviations

Calculation and settlement of deviations of BiH LFC area shall be performed by NOSBiH with other transmission system operators of the Regional Group Continental Europe (RGCE) in accordance with Annex 3 of the Synchronous Area Framework Agreement (SAFA) concerning the calculation and settlement. This financial settlement between LFC areas (so called FSkar process) includes settlement of activated FCR energy, ramping period energy and unintentional deviations.

7 Q-V Support

Generating structures shall provide the ancillary service of Q-V support and maintain the voltage at generators' conection points within the defined limits and in accordance to the power chart.

The compensation for the ancillary service of Q-V support shall be charged to the service providers in accordance with the Tariff Pricing Methodology for services of electricity transmission, Independent System Operator and ancillary services which is adopted by SERC.

8 Ancillary Services Reports

NOSBiH shall be obligated to prepare Energy and Financial report on ancillary services on a daily and monthly basis for each BSP separately. Detailed information on delivered balancing services shall be available to the BSP through the balancing system.

8.1.1 Daily Reports on Ancillary Services

Daily report on ancillary services shall contain the following energy and financial standings of the BSP:

- Contracted capacity and the cost of aFRR capacity in 1-hour resolution for a specific day,
- Nominated scope in 1-hour resolution for a specific day,
- Quality of aFRR on an hourly basis,
- Actually delivered (realized) scope of regulation and appropriate expense on an hourly basis,
- Acitvated energy of aFRR-a on an hourly basis which is the basis for calculation of the compensation for energy,
- The price and amount of the compensation in case of unfulfillment (penalty),
- Total financial amounts of aFRR capacity and energy on a daily basis,

- Contracted upward mFRR capacity and contracted expense in 1-hour resolution for a specific day,
- Contracted dowward mFRR capacity and contracted expense in 1-hour resolution for a specific day,
- Delivered upward mFRR capacity which is the basis for calculating the capacity fee,
- Delivered downward mFRR capacity which is the basis for calculating the capacity fee,
- Lower capacity fee for upward mFRR capacity in case of inadequately provided service,
- Lower capacity fee for downward mFRR capacity in case of inadequately provided service,
- Activated upward mFRR energy on an hourly basis which is the basis for calculating the energy fee,
- Activated downward mFRR energy on an hourly basis which is the basis for calculating the energy fee.

NOSBiH shall deliver daily reports on ancillary services to the BSPs on a day D+1 for day D, i.e. on each working day for previous working day and for all previous non working days. The reports shall be submitted through the Balancing platform or email.

If NOSBiH faces any obstacle in the process of data gathering, it shall send the reports as soon as the data are available. The purpose of daily reports it so make timely control of ancillary services provided by BSPs. BSPs shall be obligated to inform NOSBiH on any irregularity perceived in daily reports. If NOSBiH accepts a suggestion regarding a daily report on ancillary services, it shall send a new daily report to the BSP.

8.1.2 Monthly Report on Ancillary Services

The monthly report shall consist of aggregated daily values reported in daily reports in a specific calendar month.

NOSBiH shall deliver a preliminary monthly report to the BSP for previous month until the 5 (fifth) day of each month at the latest. The reports shall be submitted through the Balancing platform or email.

The BSP shall verify accuracy of the calculation and the data in the report and it shall send to NOSBiH its positive or negative feedback until the 7 (seventh) day of each month. If the response is positive, the report shall be the ground for the invoicing process between NOSBiH and the BSP. If the response is negative, NOSBiH and the BSP shall harmonize their views in next two working days. After this procedure and until the 10 (tenth) day of a month at the latest, NOSBiH shall send a new report, which is final and binding, for the invoicing process.

If any fault is observed upon the delivery and payment of invoices, NOSBiH shall periodically, upon the agreement with the BSP, correct the calculation of the ancillary services per months according to which NOSBiH and the BSP shall make financial settlement. Due date for the corrections shall be the 4 (fourth) month after the specific month.

8.1.3 Publishing the Report on Ancillary Services

NOSBiH shall create a summary daily and monthly report on ancillary services and publish them on its website. These reports may not contain confidential financial information related to the BSP.

8.2 Invoicing and payment

NOSBiH and Providers shall submit invoices for payment by the 10 (tenth) day of a current month for previous month. The basis for the invoicing between NOSBiH and the BSP shall be the Report on Ancillary Services which NOSBiH submits to the BSP.