



METHODOLOGY

Baseline Load Calculation

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Table of Contents

1	Introduction	1
2	Definitions	2
3	Dispatchable Load Portfolio Baseline mFRR:	4
3.1	Selection of mFRR Baseline Load Calculation Methodology	5
3.2	Baseline mFRR Load Calculation Methodology	5
3.2.1	'Meter Before-Meter After' Method	5
3.2.2	High X of Y Method	6
3.2.2.1	Determination of Look-Back Window	6
3.2.2.2	Determination of Dispatchable Load Portfolio Window for weekdays	7
3.2.2.3	Determination of Dispatchable Load Portfolio Baseline Window for Saturdays, Sundays and public holidays	8
3.2.2.4	Initial Dispatchable Load Portfolio Baseline Calculation	9
3.2.2.5	Dispatchable Load Portfolio Baseline Adjustment	10
3.2.2.6	Calculation of the Dispatchable Load Portfolio Baseline	11
4	mFRR Dispatchable Load Portfolio Baseline for Uncontrolled RES Production Units	14
4.1	mFRR Baseline Load Calculation Methodology	14
4.1.1	'Meter Before-Meter After' Method	14
5	aFRR Baseline Load	16
5.1	Declaration Method	16
5.2	Initial aFRR Portfolio Baseline Check	16
5.3	Monthly aFRR Portfolio Baseline check	17

1 Introduction

This methodology aims to define in detail the Reference Load for Dispatchable Load Portfolios (otherwise known as Demand Response Baseline) and the Reference Load for Dispatchable RES Unit Portfolios from Uncontrolled Production, as well as the methods of their calculation, as appropriate. For Dispatchable Load Portfolios, the Reference Load is necessary for quantification of load fluctuations during a Demand Response Event, in order to calculate compensation for participants in Demand Response programs, as well as to assess their effectiveness. For the Dispatchable RES Unit Portfolios (Uncontrolled Production Units), the Reference Load Baseline is necessary to quantify changes in production after receipt of a Dispatch Order for activation of the Balancing Energy Offer and for calculation of the compensation due to participants, as well as for evaluation of their effectiveness.

2 Definitions

The definitions necessary for the purpose of calculating the Demand Response Baseline are given below:

1. **Public Holidays:** Public holidays are deemed to be the following 14 days each calendar year: New Year's Day, Epiphany, Clean Monday, Annunciation, Orthodox Good Friday, Orthodox Holy Saturday, Orthodox Easter Sunday, Orthodox Easter Monday, Labour Day, Orthodox Whit Monday, Assumption, Ochi Day, Christmas Day, Boxing Day.
2. **Initial Dispatchable Load Portfolio Baseline ("High X of Y" method):** An initial estimate of the electricity that would have been consumed by the consumer in the absence of a Demand Response Event prior to any adjustment.
3. **Corrected Dispatchable Load Portfolio Baseline ("High X of Y" method):** The constant quantity in MW that is added to or subtracted from the Initial Dispatchable Load Portfolio Baseline in order to calculate the Dispatchable Load Portfolio Baseline.
4. **Historical Look-Back Window ("High X of Y" method):** These are the days prior to the day of the Demand Response Event that are taken into account for the purpose of establishing the Dispatchable Load Portfolio Baseline Look-Back Window. The Look-Back Window is defined as the forty-five days preceding the day of the Demand Response Event.
5. **Intermittent RES Generation Units:** RES Units within the meaning of Law. 4414/2016, i.e. RES power generating units that are not of controlled production , in particular wind, photovoltaic and small hydroelectric power plants.
6. **Demand Response Event:** An activation of the Demand Response, i.e. the Dispatchable Load Portfolio. Each Demand Response Event lasts as long as the consecutive mFRR time periods during which the HETS Operator issues the respective Dispatch Instructions to activate a Demand Response.
7. **Dispatchable Load Portfolio Baseline:** A load which corresponds to the electricity that would have been consumed by the Dispatchable Load Portfolio if it had not received a Dispatch Instruction to activate a Balancing Energy Offer.
8. **Dispatchable Load Portfolio Baseline for Uncontrolled RES Production Units:** The production calculated by the HETS Operator, which corresponds to the electricity that would have been produced by the Uncontrolled Dispatchable RES Production Portfolio if it had not received a Dispatch Instruction to activate a Balancing Energy Offer.
9. **Cumulative RES Representation Body (RES Aggregator):** This has the meaning attributed to it under Article 2(case 22) of Law 4414/2016.
10. **Demand Response Aggregator:** This has the meaning attributed to it under Article 5(o) (para. 2) of Law 4425/2016.

11. **Dispatchable Load Portfolio:** A load portfolio, that includes one or more loads which are connected to a specific Bidding Zone and which, based on their technical capacity, offer Balancing Services to the HETS Operator. A Dispatchable Load Portfolio shall be represented by a Demand Response Aggregator. A Dispatchable Load Portfolio that contains only one load may be represented by a single Consumer. Each Pumped Storage Hydro Generating Unit shall be a distinct Dispatchable Load Portfolio and shall be represented by one Producer.
12. **Dispatchable RES Unit Portfolio:** The RES Units portfolio that includes one or more RES Units with Market Participation Obligation which are connected to a specific Bidding Zone and which, based on their technical capacity, offer Balancing Services to the HETS Operator. A Dispatchable RES Unit Portfolio shall be represented by one RES Producer or by one RES Aggregator.
13. **Dispatchable Load Portfolio Baseline Look-Back Window (“High X of Y” method):** The days which are selected for the Look-Back Window, and which are used to calculate the Dispatchable Load Portfolio Baseline.
14. **Adjustment Window (“High X of Y” method):** The 15-minute intervals that are selected to calculate the fixed quantity for Adjustment of the Dispatchable Load Portfolio Baseline.

3 Dispatchable Load Portfolio Baseline mFRR:

The participation of the Demand Response in the Balancing Market consists of an increase or decrease in consumption of the Dispatchable Load Portfolios following the respective issue of Dispatch Instructions. Accordingly, a reliable system for estimating the increase or decrease in consumption after a Demand Response Event is required. The estimated volume of electricity that would have been consumed from the Dispatchable Load Portfolio, in the event that the Demand Response Event had not occurred, constitutes the Dispatchable Load Portfolio Baseline.

An indicative Dispatchable Load Portfolio Baseline is presented in Figure 1, where the actual load is the measured consumption occurring during a Demand Response Event.

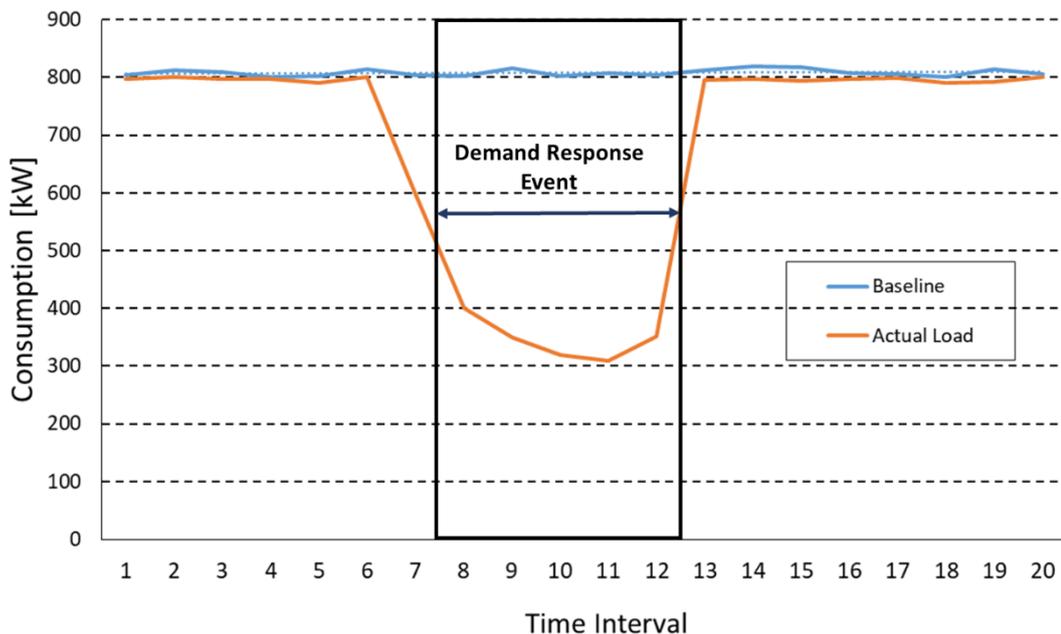


Figure 1 Dispatchable Load Portfolio Baseline

During a Demand Response Event, the Demand Response Aggregators will increase or decrease the consumption of the Dispatchable Load Portfolio they represent by responding to a Dispatch Order from the HETS Operator. Figure 2 shows the timeline of a Demand Response Event:

- From the start time of the Dispatch Order (Occurrence of Demand Response Event), until
- The end of the Demand Response Event, which is specified in the Dispatch Order from the HETS Operator, after which the Dispatchable Load Portfolio is restored to normal operation.

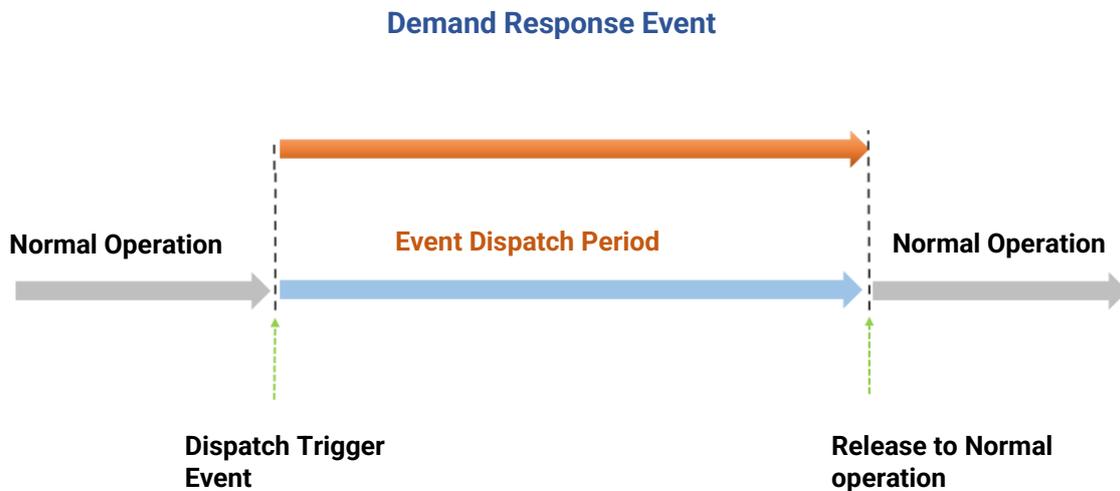


Figure 2 Demand Response Event Timeline

3.1 Selection of mFRR Baseline Load Calculation Methodology

For a Dispatchable Load Portfolio to participate in the Balancing Market, the Demand Response Aggregator has the right to choose one of the available methods for calculating the Dispatchable Load Portfolio Baseline described in the Chapter 3.2 hereof. The available methods for calculating Dispatchable Load Portfolio Baseline are the method internationally-known as the **'Meter before-Meter after'** and the **'High X of Y'** method.

Before registering a portfolio with the HETS Operator's Registry, the Demand Response Aggregator declares the method of its choice ('Meter Before-Meter After' or 'High X of Y') for the calculation of the Dispatchable Load Portfolio Baseline to the HETS Operator for each Dispatchable Load Portfolio they represent. The selected method of calculating mFRR Reference Load for month M can be changed, if the Demand Response Aggregator submits a respective application to change the baseline load calculation method. The relevant application must be submitted up to 15 working days before the end of the previous month, M-1. The new selected method is applied from the first day of month M.

3.2 Baseline mFRR Load Calculation Methodology

3.2.1 'Meter Before-Meter After' Method

Under the baseline load calculation method 'Meter Before-Meter After', in the case of issue of a Dispatch Order for the provision of upward or downward mFRR Balancing Energy or energy for purposes other than balancing (reduction or increase of load respectively), the baseline load is equivalent to the sum of the certified reduced metered quantities absorbed at the Transmission System/Distribution Network Boundary, for the entire Dispatchable Load Portfolio during the Imbalance Settlement Period **prior to the Demand Response Event.**

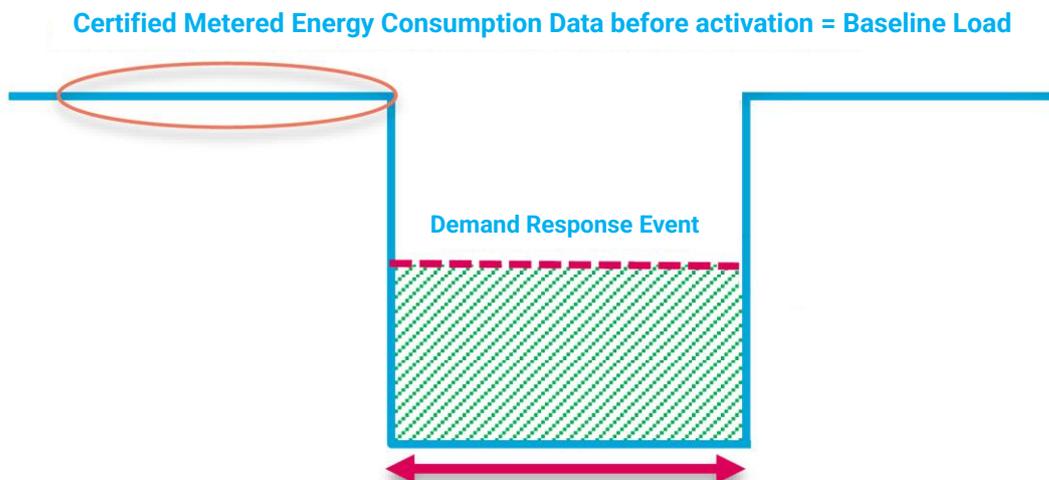


Figure 3 *Meter Before-Meter After Method*

3.2.2 High X of Y Method

Under the baseline load calculation method “High X of Y”, from the eligible days Y, X days with the highest consumption are selected and the Initial Dispatchable Load Portfolio Baseline is calculated on the basis of recent metered measurements of load consumption during those days. Furthermore, for the calculation of the highest consumption the *average method* is used, as shown below.

To calculate the Initial Dispatchable Load Portfolio Baseline on a weekday, the “High 5/10 method” is used, where the 5 (X) days with the highest average consumption in the hours corresponding to the duration of the Demand Response Event are chosen from the 10 (Y) most recent eligible weekdays.

To calculate the Initial Dispatchable Load Portfolio Baseline for Saturdays, Sundays or public holiday, the same method is used (High 2/3).

Where there is a Demand Response Event during the day, the Initial Dispatchable Load Portfolio Baseline is corrected based on the most recent consumption measurements preceding the Demand Response Event.

3.2.2.1 Determination of Look-Back Window

In order to determine the Dispatchable Load Portfolio Baseline Window, the Look-Back Window has to be identified first.

The Look-Back Window consists of the forty-five (45) most recent days preceding the day of a Demand Response Event. Then the Dispatchable Load Portfolio Baseline Window can be calculated separately for:

- Weekdays;
- Saturdays;
- Sundays and Public Holidays.

3.2.2.2 Determination of Dispatchable Load Portfolio Window for weekdays

The Dispatchable Load Portfolio Window is defined as the ten (10) most recent days within the Look-Back Window that are not excluded under the rules described below. The following days shall be excluded from the Baseline Window days for Demand Response Events that occur on a weekday:

- Days when Demand Response Events occur;
- Saturdays;
- Sundays and public holidays;
- Days when power outages or force majeure events occur.

In the event that, when identifying qualifying days within the Look-Back Window, the required number of ten (10) days cannot be established, but at least five (5) days or more have been identified, then the number of days actually identified (in excess of 5) shall be used instead of ten (10) days for the purpose of calculating the Initial Dispatchable Load Portfolio Baseline.

In the event that not even the necessary number of five days can be established, then the determination of the Initial Dispatchable Load Portfolio Baseline shall be made using days when Demand Response Events occurred in addition to qualifying days. In this case, days on which Demand Response Events with the highest average consumption occurred shall be selected until a total of five days has been identified.

Below is an example of Baseline Window calculation for weekdays. Table 1 shows the respective calendar and Table 2 shows the Dispatchable Load Portfolio Baseline Window of ten days for two calculation days – on 13/01 and 05/01 – as indicated in Table 1 in blue.

The calendar view illustrates the order of selection order of the ten days for the Baseline Window. As shown, the days that are rejected are the days with a Demand Response Event (grey), public holidays (green) and weekends (blue).

Table 1. Example of Look-back Window determination for weekdays

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
19-Dec	20-Dec	21-Dec	22-Dec	23-Dec	24-Dec	25-Dec
26-Dec	27-Dec	28-Dec	29-Dec	30-Dec	01-Jan	02-Jan
03-Jan	04-Jan	05-Jan	06-Jan	07-Jan	08-Jan	09-Jan
10-Jan	11-Jan	12-Jan	13-Jan			

Weekday	Demand Response Event (Calculation Day)	Weekend	Another day with a Demand Response Event	Public Holiday
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Table 2. Example of determination of Dispatchable Load Portfolio Window for weekdays

Calculation Day	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
13/01	11/01	10/01	07/01	03/01	30/12	29/12	28/12	27/12	23/12	22/12
5/01	03/01	30/12	29/12	28/12	27/12	23/12	22/12	21/12	20/12	19/12

3.2.2.3 Determination of Dispatchable Load Portfolio Baseline Window for Saturdays, Sundays and public holidays

When the calculation day is a Saturday, the Dispatchable Load Portfolio Baseline Window shall consist of the three most recent Saturdays. The following days shall be excluded from the Window:

- Days when Demand Response Events occur;
- Weekdays;
- Sundays and public holidays;
- Days when power outages or force majeure events occur.

When the calculation day is a Sunday or a public holiday, the Demand Response Baseline Window shall consist of the three most recent Sundays or public holidays. The following days shall be excluded from the Window:

- Days when Demand Response Events occur;
- Weekdays;
- Saturdays;
- Days when power outages or force majeure events occur.

In the event that during the check within the Look-back Window, three days cannot be established for calculation purposes, then two days will be used to calculate the Initial Dispatchable Load Portfolio Baseline.

Below is an example of Initial Dispatchable Load Portfolio Baseline Look-Back Window calculation for Saturday 02/02 (light blue). Table 3 shows the respective calendar and Table 4 shows the Dispatchable Load Portfolio Baseline Window of three days.

Table 3. Example of Look-back Window determination for Saturdays

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
07-Jan	08-Jan	09-Jan	10-Jan	11-Jan	12-Jan	13-Jan
14-Jan	15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan
21-Jan	22-Jan	23-Jan	24-Jan	25-Jan	26-Jan	27-Jan
28-Jan	29-Jan	30-Jan	31-Jan	01-Feb	02-Feb	

Weekday	Demand Response Event (Calculation Day)	Weekend
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Table 4. Example of determination of Dispatchable Load Portfolio Window for Saturdays

Demand Response Event (Calculation Day)	Day 1	Day 2	Day 3
02/02	26/01	19/01	12/01

3.2.2.4 Initial Dispatchable Load Portfolio Baseline Calculation

The Initial Dispatchable Load Portfolio Baseline is calculated for every 15-minute Imbalance Settlement Period on the day of the Demand Response Event. The Initial Dispatchable Load Portfolio Baseline may also be calculated for the day preceding the calculation day, if necessary in order to determine the Adjustment Window. To calculate the Initial Dispatchable Load Portfolio Baseline, the following procedure is followed:

1. For each of the days of the Demand Response Window (up to 10 days when the calculation day is for a weekday or up to 3 days when the calculation day is for Saturdays, Sundays or public holidays), the average consumption of the Dispatchable Load Portfolio belonging to the Demand Response Aggregator e , in Bidding Zone z , is calculated exclusively during the Imbalance Settlement Periods of the Demand Response Event.
2. In special cases where the Initial Dispatchable Load Portfolio Baseline must also be calculated for the day preceding that of the Demand Response Event (due to extension of the Adjustment Window), then Step 1 is performed by calculating average consumption exclusively during Imbalance Settlement Periods for which the Adjustment Window extends to the previous day.
3. The days within the Initial Dispatchable Load Portfolio Baseline Window are ranked in descending order based on the aforementioned average measurements.
4. The five days with the highest averages are selected when the calculation day is a weekday or two days when the calculation day is a Saturday, Sunday or public holiday.
5. For each Imbalance Settlement Period t of the calculation day, the Initial Dispatchable Load Portfolio Baseline in MW is calculated as the average consumption of the respective Imbalance Settlement Period t in the days selected as per the previous step.
6. In the event of days with the same average consumption, those that are closer to the calculation day shall be selected.

Below is an illustrative example for a Demand Response Event that lasts 1 hour (15:00 - 16:00). Initially, the daily average of consumption for the ten days corresponding to the Baseline Window for weekdays is calculated, with regard to the time period over which the Demand Response Event lasted (15:00 - 16:00). Table 5 (sixth column) shows the average consumption in each of the ten days for the duration of the Demand Response Event. The days are ranked on the basis of their average consumption (Table

5, seventh column). Lastly, the five (5) days with the highest consumption are selected, as can be seen in Table 6.

The Initial Dispatchable Load Portfolio Baseline is calculated for each hour of the Demand Response Event day as the corresponding 5-minute interval average for the aforementioned 5 days, as indicated in Table 6. For example, the Initial Dispatchable Load Portfolio Baseline for 15:00 (corresponding to the Imbalance Settlement Period 15:00-15:15) is calculated as the average of the measurements at 15:00 on each of the five days selected.

Table 5. The 10 (Y) highest days from which the 5 (X) highest days are to be selected in order to calculate the Dispatchable Load Portfolio Baseline (weekdays)

Day	15:00 [MW]	15:15 [MW]	15:30 [MW]	15:45 [MW]	Average [MW]	Rank
Day 1	6.3	7.7	6.2	7.3	6.88	1
Day 2	6.2	7.3	7.5	6.1	6.78	2
Day 3	7.8	7.1	6.0	4.5	6.35	3
Day 4	4.9	6.9	6.6	5.8	6.05	4
Day 5	4.9	6.7	5.0	7.0	5.90	6
Day 6	5.8	7.8	5.0	4.2	5.70	7
Day 7	5.3	7.3	6.6	4.5	5.93	5
Day 8	5.0	4.4	6.3	6.7	5.60	8
Day 9	6.5	4.1	4.3	5.3	5.05	10
Day 10	4.3	6.5	5.9	4.8	5.38	9

Table 6. The 5 (Y) highest days for the calculation of the Dispatchable Load Portfolio Baseline (weekdays)

Day	15:00 [MW]	15:15 [MW]	15:30 [MW]	15:45 [MW]	Average [MW]	Rank
Day 1	6.3	7.7	6.2	7.3	6.88	1
Day 2	6.2	7.3	7.5	6.1	6.78	2
Day 3	7.8	7.1	6.0	4.5	6.35	3
Day 4	4.9	6.9	6.6	5.8	6.05	4
Day 7	5.3	7.3	6.6	4.5	5.93	5
Average	6.10	7.26	6.58	5.64	6.40	

3.2.2.5 Dispatchable Load Portfolio Baseline Adjustment

Because conditions on the day of the Demand Response Event can often be different from the conditions in the previous days used to calculate the Initial Dispatchable Load Portfolio Baseline, this value must be adjusted, on the basis of metering data in the mFRR period preceding the Demand Response Event. The method followed is that of the Additive Adjustment Method.

Specifically, the adjustment is made on the basis of the period preceding the Demand Response Event, referred to as the Adjustment Window. The Adjustment Window for

the Initial Dispatchable Load Portfolio Baseline has a duration of 3 hours and ends at the time when the Dispatch Order from the Demand Response Aggregator commences, as shown in Figure 4 (box with green border). By default, the Adjustment Window may be extended to the day preceding the allocation from that of the Demand Response Event.

In the event that a Demand Response Event occurs during the aforementioned Adjustment Window, the most recent three hours prior to the Demand Response Event when consumption was recorded shall be taken as Adjustment Window.

The procedure to be followed is set out below:

1. The Adjustment Window shall be determined.
2. The average meter readings for each Imbalance Settlement Period falling within the Adjustment Window shall be calculated.
3. The average of the loads forming the Initial Dispatchable Load Portfolio Baseline for the Imbalance Settlement Periods in the Adjustment Window shall be calculated, as indicated in section 0.
4. The Baseline Adjustment shall be calculated as equal to the quantity calculated at point (2) less the quantity calculated at point (3). The quantity can be either positive or negative.
5. The Dispatchable Load Portfolio Baseline is calculated as the algebraic sum of the Initial Dispatchable Load Portfolio Baseline and the Adjusted Dispatchable Load Portfolio Baseline. The Dispatchable Load Portfolio Baseline calculated as above may not be less than zero.

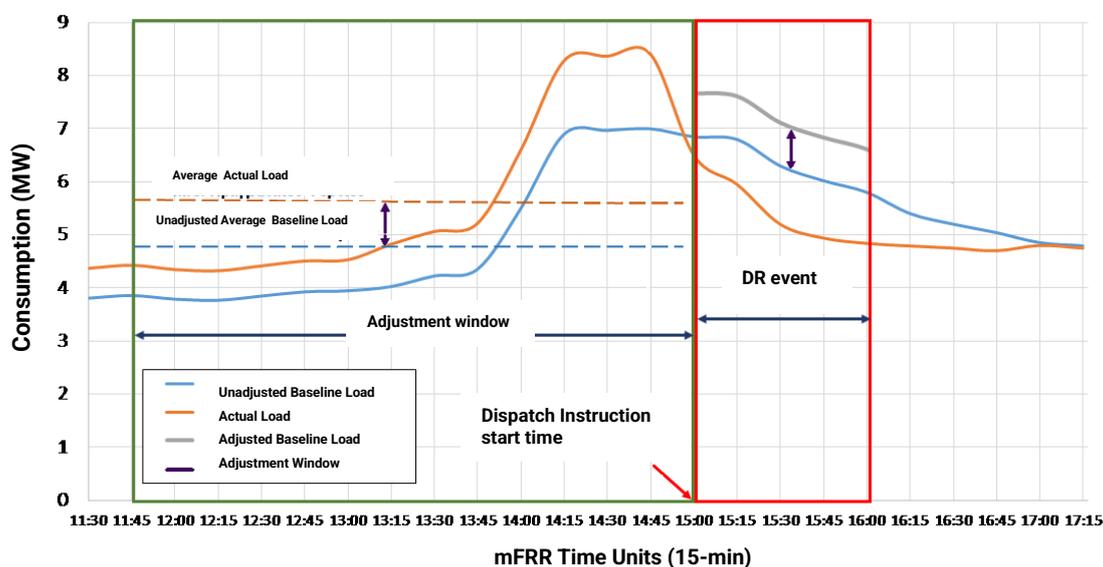


Figure 4 Example of adjustment to the Initial Dispatchable Load Portfolio Baseline

3.2.2.6 Calculation of the Dispatchable Load Portfolio Baseline

The Dispatchable Load Portfolio Baseline is calculated only for mFRR time units with a Demand Response Event as the algebraic sum of the Initial Dispatchable Load

Portfolio Baseline and the Adjusted Dispatchable Load Portfolio Baseline. The Dispatchable Load Portfolio Baseline calculated as above may not be less than zero.

Calculation of the Adjusted Dispatchable Load Portfolio Baseline is described by the following mathematical relationships (1) – (3).

$e \in I$	Dispatchable Load Portfolio
$t \in T$	The Imbalance Settlement Period in one Dispatch Day.
$d_1 \in D_1$	The X number of days with the highest average consumption which have been selected for the calculation of the Initial Dispatchable Load Portfolio Baseline.
$d_2 \in D_2$	The day for which the Initial Dispatchable Load Portfolio Baseline is calculated.
N	The number of days (X) for calculation of the Dispatchable Load Portfolio Baseline.
K	The number of Imbalance Settlement Periods in the Adjustment Window.
$z \in Z$	The Bidding Zones to which the Demand Response Aggregators' Dispatch Load Portfolios belong.
$p_{z,e}^{t,d_1}$	The metered consumption in MW for the Dispatchable Load Portfolio of the Demand Response Aggregator e , during Imbalance Settlement Period t of Dispatch Day d_1 , in Bidding Zone z .
$bl_{z,e,T^{str}(T_{adj}^{str})}^{t,d_2,init}$	The Initial Dispatchable Load Portfolio Baseline in MW calculated for the Dispatchable Load Portfolio of Demand Response Aggregator e , during Imbalance Settlement Period t of Dispatch Day d_2 , in Bidding Zone z and its calculation is related to the Demand Response Event (Adjustment Window) with start time $T^{str}(T_{adj}^{str})$.
$adj_{z,e}^{T^{str},d_2}$	The Adjustment of the Dispatchable Load Portfolio Baseline in MW for the Dispatchable Load Portfolio of Demand Response Aggregator e , which relates to the Demand Response Event with start time T^{str} , on Dispatch Day d_2 , in Bidding Zone z .
$bl_{z,e}^{t,d_2}$	The Dispatchable Load Portfolio Baseline in MW for the Dispatchable Load Portfolio of Demand Response Aggregator e , during the mFRR market time unit t of Dispatch Day d_2 , in Bidding Zone z .
T^{str}	The start time of a Demand Response Event.
T^{end}	The end time of a Demand Response Event.
T_{adj}^{str}	The start time of an Adjustment Window.
T_{adj}^{end}	The end time of an Adjustment Window.

The Initial Dispatchable Load Portfolio Baseline, $bl_{z,e,T^{str}(T_{adj}^{str})}^{t,d_2,init}$, is calculated from ratio (1) as the average of the respective Imbalance Settlement Period, t , of X days (5 days with the highest average when the calculation day is a weekday, or 2 days when it is a Saturday, Sunday or public holiday).

$$bl_{z,e,T^{str}(T_{adj}^{str})}^{t,d_2,init} = \frac{\sum_{d_1 \in D_1} (p_{z,e}^{t,d_1})}{N} \quad (1)$$

$e \in I, \quad z \in Z, t \in T, d_1 \in D_1, d_2 \in D_2$

The Adjusted Dispatchable Load Portfolio Baseline is calculated from ratio (2) as the difference between the average value of the metered consumption and the average value of the Initial Dispatchable Load Portfolio Baseline during the Adjustment Window,

$$adj_{z,e}^{T^{str},d_2} = \frac{\sum_{t=T_{adj}^{str}}^{T_{adj}^{end}} (p_{z,e}^{t,d_2})}{K} - \frac{\sum_{t=T_{adj}^{str}}^{T_{adj}^{end}} (bl_{z,e,T^{str}(T_{adj}^{str})}^{t,d_2,init})}{K} \quad (2)$$

$i \in I, \quad z \in Z, d_2 \in D_2$

while it is noted that the variable d_2 of ratio (2) may also refer to the day preceding dispatch day D_2 (in the case of extension of the Adjustment Window to the previous calendar day).

The Initial Dispatchable Load Portfolio Baseline is finally calculated using ratio (3):

$$bl_{z,e}^{t,d_2} = MAX \left\{ bl_{z,e,T^{str}}^{t,d_2,init} + adj_{z,e}^{T^{str},d_2}, 0 \right\} \quad (3)$$

$e \in I, z \in Z, t \in [T^{str}, T^{end}], d_2 \in D_2$

4 mFRR Dispatchable Load Portfolio Baseline for Intermittent RES Generation Units

The Dispatchable Load Portfolio Baseline for Intermittent RES Generation Units is defined as the electricity that would have been produced from the Portfolio of Dispatchable Intermittent RES Generation Units in the event that it had not received a Dispatch Instruction activating a mFRR Balancing Energy Offer from the HETS Operator.

4.1 mFRR Baseline Load Calculation Methodology

4.1.1 'Meter Before-Meter After' Method

To calculate the Baseline Load under the Baseline Load Calculation Method 'Meter Before-Meter After', the certified 15-minute metered measurements **before and** the certified 15-minute measurements **after** one or more consecutive Dispatch Instructions activating mFRR Offers (upward or downward) sent to a Dispatchable Portfolio of Intermittent RES Generation Units.

Specifically, in the event of issue of a Dispatch Instruction for the provision of upward or downward Balancing Energy via mFRR or energy for purposes other than balancing, the Baseline Load shall be equivalent to the average of:

- (a) the sum of the certified metered injection measurements for the entire Dispatchable Portfolio of Intermittent RES Generation Units during the Imbalance Settlement Period preceding the Imbalance Settlement Period to which the Dispatch Instruction relates and
- (b) the sum of the certified metered injection measurements for the entire Dispatchable Portfolio of Intermittent RES Generation Units during the Imbalance Settlement Period following the Imbalance Settlement Period to which the Dispatch Instruction relates.

In the case of Dispatch Instructions issued for consecutive Imbalance Settlement Periods, the Baseline Load is based on the sum the certified metered injection measurements for the entire Portfolio during the Imbalance Settlement Period preceding the first Dispatch Instruction and the sum of the certified metered injection measurements for the entire Portfolio during the Imbalance Settlement Period following the last Dispatch Instruction.

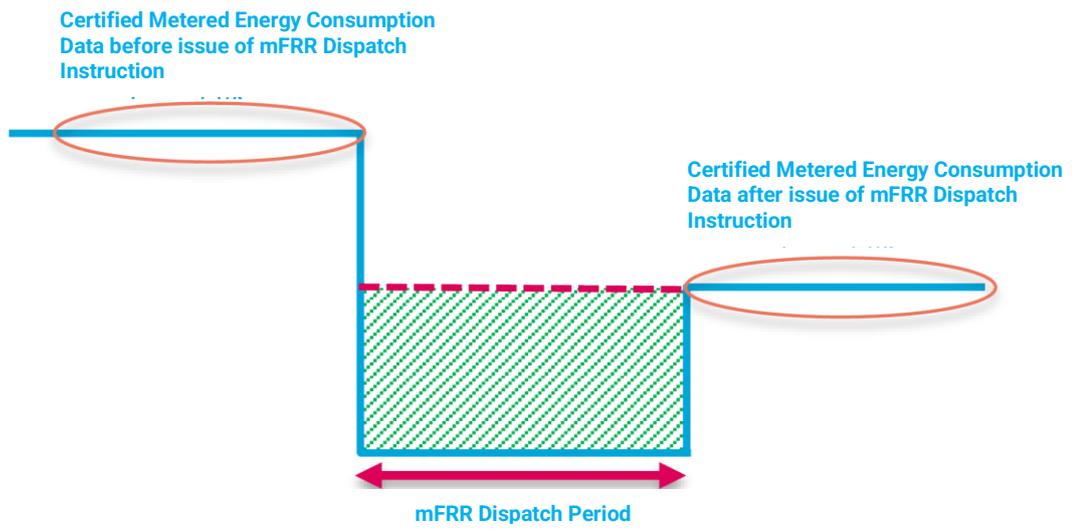


Figure 5. *'Meter Before-Meter After' Method*

5 aFRR Baseline Load

The method presented in this section is used to determine the activated aFRR Balancing Energy for the Dispatchable Load Portfolios and the Dispatchable Portfolio of Intermittent RES Generation Units. The aFRR Baseline Load of a Portfolio is defined as the electricity that would have been produced/consumed by the Portfolio in the event that it had not received a Dispatch Instruction for the activation of an aFRR Balancing Energy Offer from the HETS Operator.

5.1 Declaration Method

The aFRR Baseline Load is calculated by the Aggregator for each cycle of the aFRR process, i.e. every four (4) seconds, and is sent by the Aggregator to the HETS Operator via a remote terminal unit (RTU) one (1) minute before each cycle of the aFRR process. For example, at 14:00:00 (hh:mm:ss) the Aggregator sends the portfolio's production/consumption in MW for the period 14:01:00 – 14:01:04. Next, at 14:00:04 (hh:mm:ss) the Aggregator sends the portfolio's production/consumption in MW for the period 14:01:04 – 14:01:08 and so on.

The Aggregators that have successfully completed the prequalification tests for the aFRR procedure are always obliged to send the aFRR Baseline Load to the HETS Operator, in accordance with the above, regardless of whether they have submitted an Energy or Balancing Capacity Offer and regardless of whether they have been awarded aFRR Balancing Capacity for the specific period of time.

5.2 Initial aFRR Portfolio Baseline Check

In order for a Portfolio to acquire the right to participate in the aFRR process, the initial check of the aFRR Baseline Load, in accordance with the provisions of this section, must have been successfully completed in advance. The initial control check of the aFRR Baseline Load is carried out for all facilities making up the Portfolio, and lasts for 24 consecutive hours of Dispatch Day D.

During the 24-hour check, the Aggregator is obliged to send the aFRR Baseline Load data via a remote terminal unit (RTU) to the HETS Operator every 4 seconds, 1 minute before each cycle of the aFRR process commences. The Aggregator shall ensure that on the Portfolio control check day D of the Portfolio, the submitted aFRR Baseline Load is equal to at least 50% of the Maximum Contribution to aFRR of the Portfolio in accordance with its Registered Characteristics.

Upon completion of the control check day, the HETS Operator shall verify whether the deviation of the declared Baseline Load from metered activity meets the compliance criterion described below. Metered measurements from the Supervisory Control and Data Retrieval System (SCADA) are used to monitor the Baseline Load. For the day D control check, the following steps are followed:

- For each period t of 4sec, the deviation DEV_t , shall be calculated as follows:

$$DEV_t = EBL_t - SQ_t$$

- For the total of 24 hours, the average Baseline Load RBL_D is calculated as follows:

$$RBL_D = \frac{\sum_{t \in D} |EBL_t|}{T}$$

- For the total of 24 hours, the quality control QF_D , index is calculated from the following:

$$QF_D = 1 - \frac{\sqrt{\frac{\sum_{t \in D} DEV_t^2}{T}}}{\max(RBL_D, 0, 1)}$$

Where

EBL_t : the Baseline Load as declared by the Aggregator

SQ_t : metering measurement of the Portfolio by the Supervisory Control and Data Retrieval System (SCADA)

T : the number of 4sec periods during the 24 hours for which the control check lasts

It should be clarified that in the course of the control check, any periods of time during which offers for mFRR balancing energy were activated from the Portfolio are excluded.

Checks of the aFRR Baseline Load are considered satisfactory if the quality control index is equivalent to at least 95%, that is:

$$QF_D \geq 95\%$$

The HETS Operator shall inform the competent Aggregator of the outcome of the check. In the event that the test does not meet requirements, the HETS Operator shall set a new audit date in consultation with the Aggregator for when a period of at least one (1) month has elapsed since the initial test.

5.3 Monthly aFRR Portfolio Baseline check

The HETS Operator shall check the accuracy of the aFRR Baseline Load declarations sent by the Aggregator for each Portfolio. The calculations shall be carried out monthly in the month following the baseline month. For the conduct of the monthly checks per Portfolio, the measurements of the Supervisory Control and Data Recovery System (SCADA) are used and the following steps are applied:

- For each period t of 4sec, the deviation DEV_t , shall be calculated as follows:

$$DEV_t = EBL_t - SQ_t$$

- For each day D of month M the average Baseline Load RBL_D is calculated as follows:

$$RBL_D = \frac{\sum_{t \in D} |EBL_t|}{T}$$

- For each day D of the month M , the quality control QF_D , index is calculated, as follows:

$$QF_D = 1 - \frac{\sqrt{\frac{\sum_{t \in D} DEV_t^2}{T}}}{\max(RBL_D, 0, 1)}$$

- For the total number of days of month M, the quality control index is calculated QF_M

$$QF_M = \frac{\sum_{D \in M} QF_D}{N}$$

Where

EBL_t : the Baseline Load as sent by the Aggregator

SQ_t : metering measurement of the Portfolio by the Supervisory Control and Data Retrieval System (SCADA)

T : the number of 4sec periods during day D of the month M

N : the number of days in the month M

It is clarified that during the control check, any periods of time during which an offer for a mFRR and/or aFRR balancing energy was activated from the Portfolio are excluded. Checks of the aFRR Baseline Load are considered satisfactory if the quality control index is equivalent to at least 95% each month, that is

$$QF_M \geq 95\%$$

The HETS Operator shall inform the competent Aggregator of the outcome of the check.

In the event that a Portfolio fails to comply with the monthly check of the Baseline Load for three months out of a rolling period of six (6) months, it shall be deprived of the right to participate in the aFRR procedure. In the above case, the HETS Operator shall notify the competent Aggregator of the termination date of the Portfolio's participation in the aFRR procedure. In order for the Portfolio to rejoin the aFRR process, the Aggregator must repeat the initial aFRR Baseline Load verification, in accordance with the provisions of section 5.2, after the period of one (1) month has elapsed from the date of termination of the Aggregator's participation in the aFRR process. For initial control checks to be conducted again, the respective Aggregator must pay 50% of the registration fee as foreseen for the Portfolio it represents.