

Available regulation capacity publication

Publication on elia.be website

Summary	This document describes the data & hypotheses on which the “available regulation capacity and price” publication is based. The added values for market players and for Elia as well as the more specific features of the publication are described here.	
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1 Introduction

Balance Responsible Parties are responsible to balance their portfolio of injection and load. To stimulate active and/or passive participation to the real-time balancing market Elia uses financial incentives (imbalance prices) and publishes estimates and near real-time info about the available and used balancing reserves it has at its disposal.

2 Relevance for market players

Elia aims to continuously improve the way the electricity market works in a transparent and non-discriminatory fashion. The enhancements in the balancing publications are part of this continuous improvement for more transparency as means to improve the way the electricity market works.

3 Presentation of the ARC publications

3.1. Aggregated available regulation capacity

The publication related to the aggregated available balancing capacity consists of three parts and each part contains a data table and a corresponding graph. The first part concerns the available regulation volumes, the second part shows the corresponding marginal price for each product and the third part shows the marginal price per volume range.

The structure of the "available regulation capacity" table is as follows, the rows show the quarter hours of the selected or current day and the columns show the available volume for different products Elia has to its disposal to balance the electrical zone.

The table and graph presenting the **available volume per product** are organized in the following way:

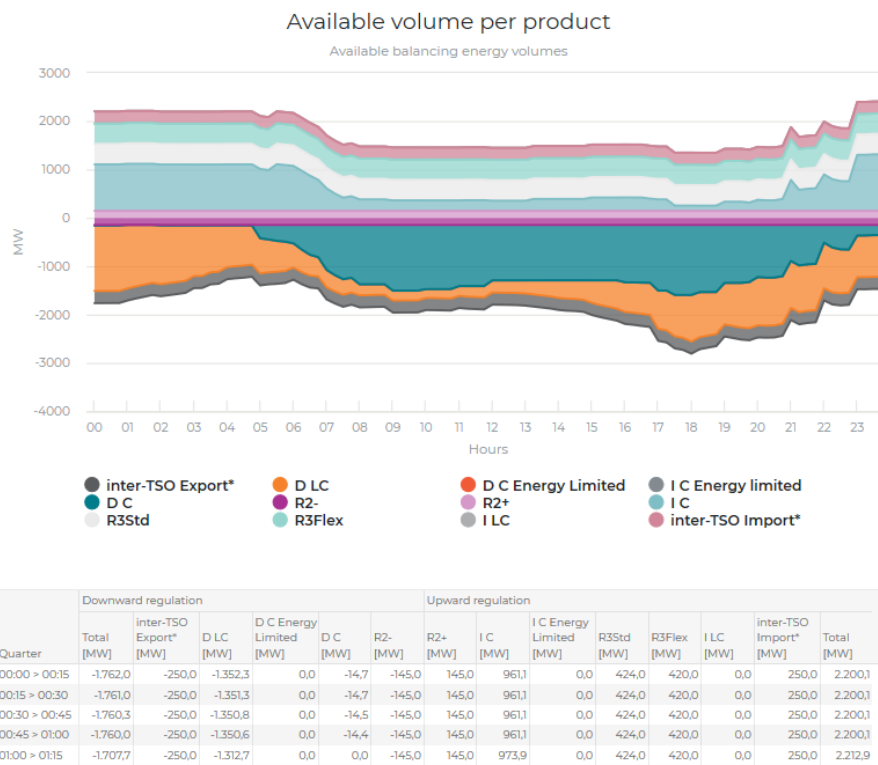


Figure 1: Graph and table representing the available regulation volume per product

The table and graph presenting the **marginal price of the available regulation volume by product** are organized in the following way:

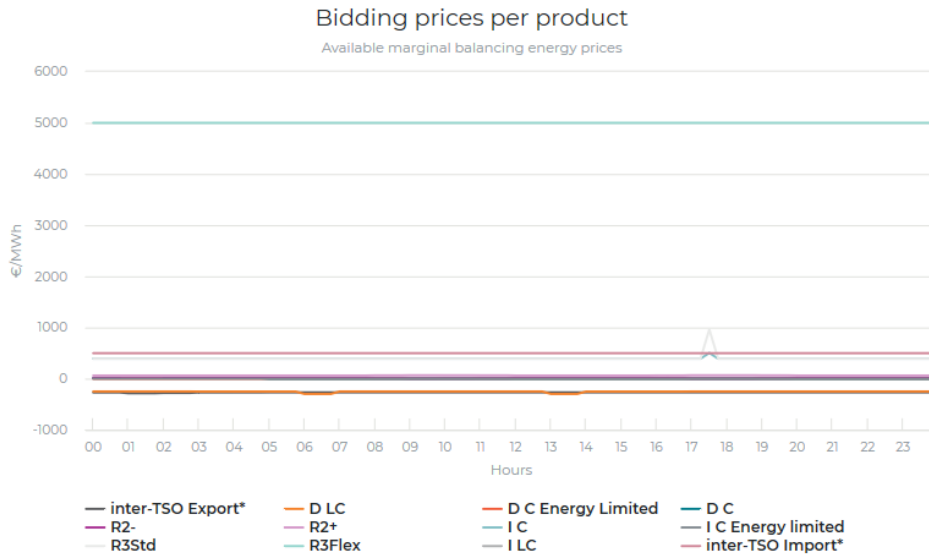


Figure 2: Graph representing the marginal price of the available regulation capacity by product

Quarter	Marginal prices (€/MWh) for activation of											
	inter-TSO Export* [€/MWh]	D LC [€/MWh]	D C Energy Limited [€/MWh]	D C [€/MWh]	R2- [€/MWh]	R2+ [€/MWh]	I C [€/MWh]	I C Energy Limited [€/MWh]	R3Std [€/MWh]	R3Flex [€/MWh]	I LC [€/MWh]	inter-TSO Import* [€/MWh]
00:00 > 00:15	-270,00	-250,00	0,00	10,74	10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
00:15 > 00:30	-270,00	-250,00	0,00	10,74	10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
00:30 > 00:45	-270,00	-250,00	0,00	10,74	10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
00:45 > 01:00	-270,00	-250,00	0,00	10,74	10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
01:00 > 01:15	-284,90	-250,00	0,00		10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
01:15 > 01:30	-284,90	-250,00	0,00		10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
01:30 > 01:45	-284,90	-250,00	0,00		10,74	60,74	391,50	0,00	391,50	5.000,00		498,00
01:45 > 02:00	-284,90	-250,00	0,00		10,74	60,74	391,50	0,00	391,50	5.000,00		498,00

Figure 3: Table representing the marginal price of the available volume by product

The graph and data table presenting the **marginal price of the available regulation capacity per volume level** is organized in the following way:

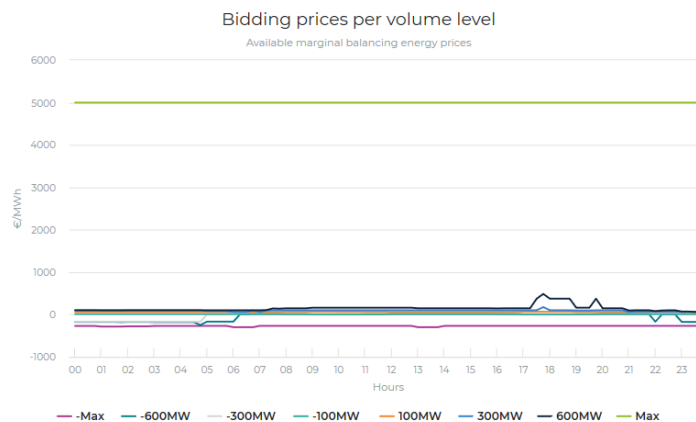


Figure 4: Graph representing marginal price of the available regulation volume by activation range

Quarter	Marginal prices (€/MWh) for activation of													
	-Max	-1000 MW	-900 MW	-800 MW	-700 MW	-600 MW	-500 MW	-400 MW	-300 MW	-200 MW	-100 MW	100 MW	200 MW	300 M
00:00 > 00:15	-270,00	-248,00	-219,70	-180,00	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
00:15 > 00:30	-270,00	-248,00	-219,70	-180,00	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
00:30 > 00:45	-270,00	-248,00	-219,70	-180,00	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
00:45 > 01:00	-270,00	-248,00	-219,70	-180,00	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
01:00 > 01:15	-284,90	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	94
01:15 > 01:30	-284,90	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	94
01:30 > 01:45	-284,90	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	94
01:45 > 02:00	-284,90	-248,00	-248,00	-219,70	-180,00	-180,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	94
02:00 > 02:15	-279,00	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
02:15 > 02:30	-279,00	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
02:30 > 02:45	-279,00	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
02:45 > 03:00	-279,00	-248,00	-248,00	-219,70	-180,00	-175,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
03:00 > 03:15	-269,73	-250,00	-248,00	-248,00	-180,00	-180,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
03:15 > 03:30	-269,73	-250,00	-248,00	-248,00	-180,00	-180,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100
03:30 > 03:45	-269,73	-250,00	-250,00	-248,00	-180,00	-180,00	-175,00	-168,00	-168,00	-110,00	10,74	60,74	81,23	100

Figure 5: Table representing marginal price of the available regulation volume by activation range

3.2. Individual balancing energy bids

Quarter	-Max	-1000 MW	-900 MW	-800 MW	-700 MW	-600 MW	-500 MW	-400 MW	-300 MW	-200 MW	-100 MW	100 MW	200 MW	300 M
09:15 > 09:30	-268,05	-250,00	0,00	0,00	3,61	66,11	391,50	0,00	391,50	5.000,00				498,00
09:30 > 09:45	-268,05	-250,00	0,00	0,00	3,61	66,11	391,50	0,00	391,50	5.000,00				498,00
09:45 > 10:00	-268,05	-250,00	0,00	0,00	3,61	66,11	391,50	0,00	391,50	5.000,00				498,00
10:00 > 10:15	-268,05	-250,00	0,00	0,00	4,53	65,55	391,50	0,00	391,50	5.000,00				498,00
10:15 > 10:30	-268,05	-250,00	0,00	0,00	4,53	65,55	391,50	0,00	391,50	5.000,00				498,00
10:30 > 10:45	-268,05	-250,00	0,00	0,00	4,53	65,55	391,50	0,00	391,50	5.000,00				498,00
10:45 > 11:00	-268,05	-250,00	0,00	0,00	4,53	65,55	391,50	0,00	391,50	5.000,00				498,00

EN : Balancing Energy Bids Publication

In the link below you will find two reports listing anonymized volumes and prices of energy bids in line with our 'Available Regulation Capacity (ARC)' publications. More information about these reports is to be found in the document 'Hypotheses used to calculate the available volumes and prices'.

[Incremental ARC Merit Order](#)
[Decremental ARC Merit Order](#)

Disclaimer

The information published here should not be regarded as an advance simulation of the actual volumes activated or the actual prices applied, since additional grid, technical and/or safety constraints may arise that could not have been predicted beforehand. The information published here is subject to the following limitations:

- ARPs must provide accurate day-ahead and intraday schedules if the published information is to be accurate. No actual injection measurements are taken into account. Deviations from the nomination schedule are the sole responsibility of the ARP and are managed through the imbalance tariff.
- Proper use of IDPCRs to report intraday changes or FOs is vital for ensuring that the estimated available balancing margin reflects the actual situation as closely as possible;

As of 18/12/2019, the merit order list of individual balancing energy bids is available in the page Data Dowload in Elia’s website (cfr section 3.3).

Category

Load
 Interconnection
 Generation
 Balancing
 Congestion Management

Period

2019 ▾

Border and direction

N/A ▾

File name	Last update
ARC_IncrementMeritOrder_2019_12.csv	
ARC_IncrementMeritOrder_2019_12.xlsx	

These files named Incremental and Decremental ARC Merit Order respectively are aligned with Aggregated available regulation capacity publications (cfr section 3.1).

The information provided in the ARC Merit Order files is the following:

Column	Description
--------	-------------

Quarter	The quarter hour corresponding to the delivery of the balancing energy bid
Order	This give an indication of the order of activation 1. Activation of R2 bids 2. Activation of I/D C and R3 Std 3. Activation of I/D LC 4. Activation of R3 flex (only for Incremental Merit Order)
Reserve	Indicates if an aFRR or mFRR reserve
Product	The corresponding balancing product
Bid Volume	The bid volume in MW available for activation
Bid Price	The bid price in EUR/MWh
Start Price	The start price in EUR/MWh, this value is zero for technical units running
Bid + Start Price	The sum of bid price and start price columns. This price is the one applied to the first quarter hour of a bid activation. Column Order bases on this column to sort bids.

3.3. Export of the publication

The page **Data Download** on Elia's site (www.elia.be) allows downloading the different publications. The reports that contain the info of the "available regulation volume & price" can be retrieved by selecting the category balancing and choosing the desired report from the drop-down list. In the list following three items correspond to the publication:

- Available energy volumes (15/10/ 2013 -...)
- Available energy prices per product (15/10/ 2013 -...)
- Available energy prices per volume level (15/10 2013 -...)
- Detailed available regulation capacity for delivery periods as of 18/12/2019

DATA DOWNLOAD PAGE

All data available from this page are time tagged using CET / CEST time.

Category

- Load
 Interconnection
 Generation
 Balancing

Border and direction

N/A ▾

Data to export

Available balancing energy volumes per product (1/10/2013 ->) ▾

The data can be downloaded in Excel or CSV format and downloads are for a period of several months of the same year.

3.4. B2B XML service

In order to improve the usability of the published data, Elia has set up a web service to provide the published information in the form of an XML message on a regular basis.

For more information about the B2B XML-service [click here](#).

3.5. Timing of the Publication

This chapter describes when this publication is generated, and when it is updated.

Creation

The publication of data of day D is published in D-1 at 18H00 on the basis of the nomination programs & bids submitted by the concerned Parties.

Update

The general behaviour of the publication is the following: the values of **all quarter hours of the day** are **refreshed every quarter hour**. The delay between an update of the context and an update of the ARC publication is, in general, a few minutes (ex: an IDPCR, modifying the nomination program of a production unit, thereby modifying the available free bids volume on the unit, will be reflected on the ARC publications a few minutes after the IDPCR is received by the systems of Elia).

The publication of data of day D is updated when the following events occur:

- The index NG D-1 which was not available at the time of creation becomes available. This index is used in price calculations. intraday changes on the marginal price of the available reserves are thus possible.
- A Party sends in an IDPCR that changes the data used for the calculations and for the day D of the publication. These intraday changes can take place even after 6:00 p.m. in day D.
- An R3NR bid is modified by a Party. These changes can happen until qh-45min
- An R3NR bid which contains a limit in activable consecutive quarter hours is activated

Note: The publication is not changed when any activation is recorded or when the load shedding are modified by use of import. The publication is only an estimation of the available reserves. The real-time activation is the subject of another publication namely "Used regulation volume".

4 Features of the Aggregated Available Regulation Capacity publications

4.1. Which data is used?

The calculations for the available regulation capacity are based on the information originating from the different D-1 nomination programs adapted with the intraday program change sent in by the concerned Parties, taking into account the different technical (Pmax, Pmin, Ramping rate) and contractual limitations.

4.2. How is the available regulation capacity calculated?

4.2.1. Calculation of volume R2 (columns "R2-" & "R2+")

This chapter concerns the calculation of the content for the columns R2- and R2 +.

Only the Power Units who have a valid R2 nomination right for the day on which the estimate will be published are selected for the calculation.

In D-1 different Parties with R2 contract send in offers for their participation in the secondary reserve of the next day. ELIA selects a volume from the Secondary Reserve offers on the basis of business rules. This selection is made for each quarter hour.

The content of the column R2- is obtained by summing the R2 downward volumes selected on the different Power Unit of Parties participating in R2 and for each quarter hour:

$$R2_{-qh} = \sum_{PU}^{ARPR2} R2_{-PU,qh}$$

The content of the column R2+ is obtained by summing the R2 upward volumes selected on the different Power Unit of Parties participating in R2 and for each quarter hour:

$$R2_{+qh} = \sum_{PU}^{ARPR2} R2_{+PU,qh}$$

Remark: The results obtained for the column R2- and R2+ could change in Intraday. This would be the case in the event of a Forced Outage of a Power Unit on which R2 was nominated, or if a Party having offered R2 modifies its R3 Standard Nomination

For more info about the secondary reserve [click here](#)

4.2.2. Calculation of volume CIPU Coordinable (columns "D C" and "I C")

This chapter concerns the calculation of the content for the columns D C and I C.

The coordinability level of a Power Plant is determined in the CIPU-contract. A Power Plant can be Coordinable, Limited Coordinable, or Not Coordinable.

Only the Power Units who have a valid CIPU right for the day on which the estimate will be published and are Coordinable are selected for the calculation. Those who are Limited Coordinable (LC) and Not Coordinable (NC) are not candidates.

For each Power Plant that is considered a candidate the upward and downward volume for the delivery of the different reserves (R1, R2 and R3) is determined on the basis of D-1 nominations.

Remark: it must be highlighted that the hydraulic production units are excluded from the calculations & publications related to the volume CIPU Coordinable.

The available I volume for a quarter hour and a Power Plant is determined as follows:

$$I_{PP,qh} = \text{Min}[\text{Max}[0, (P_{maxPP,qh} - P_{PP,qh} - R1 Up_{PP,qh} - R2 Up_{PP,qh} - R3_{PP,qh})], (15 \times RRUp_{Config PP})]$$

Where

$P_{PP,qh}$ The program nominated as in intraday for the Power Plant PP in its active configuration during the quarter hour qh.

$R1 Up_{PP,qh}$ Primary upward reserve nominated for the Power Plant PP during the quarter hour qh.

$R2 Up_{PP,qh}$ Secondary upward reserve selected for the Power Plant PP during the quarter hour qh.

$R3_{PP,qh}$ Tertiary upward Reserve nominated for the Power Plant PP during the quarter hour qh.

$P_{max_{PP,qh}}$	Maximum power for the Power Plant PP in the active configuration during the quarter hour qh.
$RR Up_{Config,PP}$	The contractual upward ramping rate of the Power Plant PP in its active configuration during the quarter hour qh.

The contents of the column I C is obtained by summing the I calculated for each candidate Power Plant Coordinable and for each quarter hour:

$$I_{qh} = \sum_{PP}^{ARP_{CIPU}} I_{PP,qh}$$

The available D volume for a quarter hour and a Power Plant is determined as follows:

$$D_{PP,qh} = \text{Min} \left[\text{Max} \left[0, (P_{PP,qh} - \text{Abs}(R1 \text{ Down}_{PP,qh}) - \text{Abs}(R2 \text{ Down}_{PP,qh})) - P_{min_{PP,qh}} \right], (15 \times RR \text{ Down}_{Config PP}) \right]$$

Where

$P_{PP,qh}$	The program nominated as in intraday for the Power Plant PP in its active configuration during the quarter hour qh.
$R1 \text{ Down}_{PP,qh}$	Primary downward reserve nominated for the Power Plant PP during the quarter hour qh.
$R2 \text{ Down}_{PP,qh}$	Secondary downward reserve selected for the Power Plant PP during the quarter hour qh.
$P_{min_{PP,qh}}$	Minimum power for the Power Plant PP in the active configuration during the quarter hour qh.
$RR \text{ Down}_{Config,PP}$	The contractual downward ramping rate of the Power Plant PP in its active configuration during the quarter hour qh.

The contents of the column D C is obtained by summing the D calculated for each candidate Power Plant Coordinable and for each quarter hour:

$$D_{qh} = \sum_{PP}^{ARP_{CIPU}} D_{PP,qh}$$

For more info about the CIPU contract [click here](#)

4.2.3. Calculation of volume Non-CIPU Coordinable (columns "D C Energy Limited" and "I C Energy Limited")

This chapter concerns the calculation of the content for the columns D C Energy Limited and I C Energy Limited.

This category corresponds currently to the balancing product Non Reserved Tertiary Control by Non-CIPU technical Units ("R3NR"), which was historically also known as "Bidladder"

The R3NR volume in increment is obtained by summing the volume in increment of each Bid calculated by the ARC application for each quarter hour:

$$R3NR I_{qh} = \sum_{Bid}^{SupplierBidLadder} R3NR I_{Bid,qh}$$

Where

$R3NR I_{Bid,qh}$ Volume of an R3NR Incremental bid submitted by a Party owning an R3NR contract for delivery during the quarter hour qh

From July 1st, 2017 (start of the R3NR product) this volume is displayed in the column I C Energy Limited.

The R3NR volume in decrement is obtained by summing the volume in decrement of each Bid calculated by the ARC application for each quarter hour:

$$R3NR D_{qh} = \sum_{Bid}^{SupplierBidLadder} R3NR D_{Bid,qh}$$

Where

$R3NR I_{Bid,qh}$ Volume of an R3NR Decremental bid submitted by a Party owning an R3NR contract for delivery during the quarter hour qh

From July 1, 2017 (start of the R3NR) this volume is displayed in the column D C Energy Limited.

4.2.4. Calculation of volume R3 Standard (Column "R3Std")

The volume R3 Standard is the sum of the volumes R3 CIPU standard and R3 Non-CIPU Standard, described below.

Remark: The results obtained for the column R3 could change in Intraday. This would be the case in the event of a Forced Outage of a Power Unit on which R3 Standard was nominated, or if a Party having offered R3 Standard modifies its R3 Standard Nomination

A. Calculation of volume R3 CIPU Standard

Only the Power Units who have a valid R3 nomination right for the day on which the estimate will be published are selected for the calculation of R3 CIPU Standard.

In D-1 different Parties with an R3 contract send in the nominations for their participation in the Tertiary Reserve Standard of the next day. ELIA controls these nominations on the basis of business rules. The nominations are made for each quarter hour of the day.

The volume of the R3 Std CIPU is obtained by summing the R3 Std CIPU volumes nominated and checked on the different Power Unit of Parties participating in R3 CIPU and for each quarter hour:

$$R3 Std CIPU_{qh} = \sum_{PU}^{ARP_{R3 Std CIPU}} R3 Std CIPU_{PU,qh}$$

Where

$R3 Std CIPU_{PU,qh}$ Volume of the R3 Standard Nomination submitted for the power unit PU during the delivery quarter hour qh

For more info about the tertiary reserve [click here](#)

B. Calculation of volume R3 Non-CIPU Standard

In D-1 the Parties nominate their R3 Std Non-CIPU bids via the application BMAP. Per R3 Std Non-CIPU bid, the Party must nominate the volume (MW) per quarter hour (qh).

The volume of R3 Std Non-CIPU is obtained by summing all R3 Std Non-CIPU volumes, from the accepted bids:

$$R3\ Std\ Non\ CIPU_{qh} = \sum_{BSP_{R3\ Non\ CIPU}}^{Contract_{R3\ Non\ CIPU}} Bid_Volume_{,qh}$$

Where

$Bid_Volume_{,qh}$ Volume of the R3 Non-CIPU Standard bid submitted by the Party for delivery during quarter hour qh

4.2.5. Calculation of volume R3 Flex (Column "R3Flex")

The volume R3 Flex is the sum of the volumes R3 CIPU Flex and R3 Non-CIPU Flex, described below.

Remark: The results obtained for the column R3 could change in Intraday. This would be the case in the event of a Forced Outage of a Power Unit on which R3 Flex was nominated, or if a Party having offered R3 Flex modifies its R3 Flex Nomination

A. Calculation of volume R3 CIPU Flex

Only the Power Units who have a valid R3 nomination right for the day on which the estimate will be published are selected for the calculation of R3 CIPU Flex.

In D-1 different Parties with an R3 contract send in the nominations for their participation in the Tertiary Reserve Flex of the next day. ELIA controls these nominations on the basis of business rules. The nominations are made for each quarter hour of the day.

The volume of the R3 Flex CIPU is obtained by summing the R3 Flex CIPU volumes nominated and checked on the different Power Unit of Parties participating in R3 CIPU and for each quarter hour:

$$R3\ Flex\ CIPU_{qh} = \sum_{PU\ not\ excluded}^{ARP_{R3\ CIPU}} R3\ Flex\ CIPU_{PU,qh}$$

Where

$R3\ Flex\ CIPU_{PU,qh}$ Volume of the R3 Flex Nomination submitted for the power unit PU during the delivery quarter hour qh

For more info about the tertiary reserve [click here](#)

B. Calculation of volume R3 Non-CIPU Flex

In D-1 the Parties nominate their R3 Std Non-CIPU bids via the application BMAP. Per R3 Flex Non-CIPU bid, the Party must nominate the volume (MW) per quarter hour (qh).

The volume of R3 Flex Non-CIPU is obtained by summing all R3 Flex Non-CIPU volumes, from the accepted bids:

$$R3 \text{ Flex Non CIPU}_{qh} = \sum_{BSP_{R3 \text{ Non CIPU}}}^{Contract_{R3 \text{ Non CIPU}}} Bid_Volume_{,qh}$$

Where

Bid_Volume_{,qh} Volume of the R3 Non-CIPU Flex bid submitted by the Party for delivery during quarter hour qh

4.2.6. Calculation of volume CIPU Limited Coordinable (columns "D LC" and "I LC")

This chapter concerns the calculation of the content for the columns D LC and I LC.

Power plants that are described as Limited Coordinable (LC) within the CIPU-contract are power plants for which it is impossible or very difficult to adhere to the nomination and/or activation specifications as stipulated in the CIPU-contract due technical and/or operational reasons

LC power plants can still be called upon to execute balancing bids but only if the regulating volume available on coordinable power plants was insufficient to restore the balance and after bilateral consultation between the Producer and Elia.

LC power plants are for example:

- Power plants for which it is difficult to determine a volume/price in D-1 on a quarterly basis because the fuel-mix is not known or because the price is too volatile.
- Power plants that can't send in bids every day because they don't dispose of the necessary IT-tools or personnel.
- Units which are not able to react on a quarterly basis.
- Units with specific activation limitations (e.g. number of activations per day, long start-up time, minimum activation length, etc...)

Calculations of I and D for Power Plant Limited Coordinable are identical to those made for Power Plants Coordinable. The only difference is to consider the activation price as an additional condition to select the candidates.

For more info about the CIPU contract [click here](#)

4.2.7. Calculation of volume Inter-TSO (column "Inter-TSO")

This chapter concerns the calculation of the content of the column Inter-TSO Import and Inter-TSO Export.

Inter-TSO is an urgency contract between Elia and its neighbouring TSO's. The actual availability depends on the involved TSO's own grid situation and willingness. The availability of this service can never be assured in D-1.

The volume Inter-TSO Export and Inter-TSO Import is not obtained by a calculation; it is a value corresponding to the contracted volume for this reserve, and this value is a fixed parameter (currently -250 MW for export and 250 MW for import).

For more info about the Inter-TSO urgency contract [click here](#)

4.2.8. Old products

The current layout of the ARC tables is applied since 01/01/2018. If you consult the tables for dates prior to 01/01/2018, you will see other columns, corresponding to the products which were then in use.

This chapter contains the description of these columns.

A. Calculation of volume ICH

Remark: this column is not present anymore in ARC since 01/01/2018 because the corresponding product has disappeared. If you consult the table for dates before 01/01/2018, the column will be visible.

ICH is a tertiary upward reserve delivered by clients directly connected to the Elia grid who have sheddable load.

Only the Access Points of clients who have a valid ICH right for the day on which the estimate will be published are selected for the calculation of the ICH volume.

The calculation of available volume ICH is done at first for each contract candidate by applying following formula:

$$ICH_{Contrat,qh} = \text{Max} \left[0; \left(\sum_{AP}^{Contrat} Nom_{AP,qh} \right) - SL_{Contrat,TP} \right]$$

Where

$Nom_{AP,qh}$ The nomination of an Access Point for a quarter hour qh (when this nomination does not exist it is replaced by the value 0).

$SL_{Contrat,TP}$ The Shedding Limit of the contract for the tariff period corresponding to quarter hour qh.

The content of the column ICH is obtained by summing ICH available volume calculated for each contract (not excluded) candidate and for each quarter hour:

$$ICH_{qh} = \sum_{Contrat \text{ not excluded}} ICH_{Contrat,qh}$$

The ICH contract stipulates a maximum number of activations per year. Once a contract reaches the maximum number of activations the contract is excluded from the calculation for available ICH volume.

Remark: The ICH contract stipulates several other limitations linked to the activation of ICH, like e.g. maximum activation duration of 4 hours. These limitations are not into taken account when calculating the available volume for ICH.

For more info about sheddable customers [click here](#)

B. Calculation of volume R3 Dynamic Profile ("R3DP")

This chapter concerns the calculation of the content of the column R3DP.

Remark: this column is not present anymore in ARC since 01/01/2017 because the corresponding product has disappeared. If you consult the table for dates before 01/01/2017, the column will be visible.

Only the Access Points of clients who have a valid R3DP right for the day on which the estimate will be published are selected for the calculation of the R3DP volume.

To calculate the total R3DP volume, the different contractual values are summed. The volume displayed in the column will depend on the tariff period of the quarter hour.

Remark: The R3DP contract stipulates several other limitations linked to the activation. These limitations are not taken into account when calculating the available volume for R3DP.

C. Calculation of volume R3

This chapter concerns the calculation of the content for the column R3.

Remark: this column is not visible anymore since 01/01/2017.

Only the Power Units who have a valid R3 nomination right for the day on which the estimate will be published are selected for the calculation.

In D-1 different Parties with a contract R3 send in the nominations for their participation in the Tertiary reserve of the next day. ELIA controls these nominations on the basis of business rules. The nominations are made for each quarter hour of the day.

The content of the column R3 is obtained by summing the R3 volumes nominated and checked on the different Power Unit of Parties participating in R3 and for each quarter hour:

$$R3_{qh} = \sum_{PU}^{ARP_{R3}} R3_{PU,qh}$$

Remark: The results obtained for the column R3 do not change in Intraday

For more info about the tertiary reserve [click here](#)

4.3. How is the marginal price of the available regulation capacity determined?

The marginal price is the highest price for every extra MW upward volume and the lowest price for every extra MW downward volume.

4.3.1. The price for R2 (columns "R2-" & "R2+")

The price for the upward and downward secondary reserve for each quarter is calculated by weighting the prices of the D-1 offers with the selected volumes.

4.3.2. The price for CIPU Coordinable (columns "IC" & "DC"),

The prices for each quarter hour are based on the intraday prices sent during the procedure Nomination or via IDPCR. Since 01/12/2018, "start-up costs" are included, when applicable, in the CIPU Coordinable, price. The rules regarding the calculation of the start-up costs are described in the [R3 2018 Design Note](#).

Remark: the start-up costs are applied in ARC only on the current quarter hour (in order to avoid over-estimating the balancing prices for all the quarter hours of a day, since the start-up costs only apply for the 1st quarter hour of an activation). An example of the behaviour of ARC with regards to start-up costs can be found in section 4.4, p 17.

4.3.3. The price for Non-CIPU Coordinable (columns "D C Energy Limited" and "I C Energy Limited")

The prices for each quarter are based on the Bids submitted by the Parties.

4.3.4. The price for R3 Standard (Column "R3Std")

The prices for R3 Standard are established based on the prices for R3 CIPU Standard and R3 Non-CIPU Standard.

A. The price for R3 CIPU Standard

The prices for each quarter hour are based on the intraday prices sent during the procedure Nomination or via IDPCR. Since 01/12/2018, "start-up costs" are included, when applicable, in the R3 CIPU Standard, price. The rules regarding the calculation of the start-up costs are described in the [R3 2018 Design Note](#).

Remark: the start-up costs are applied in ARC only on the current quarter hour (in order to avoid over- estimating the balancing prices for all the quarter hours of a day, since the start-up costs only apply for the 1st quarter hour of an activation). An example of the behaviour of ARC with regards to start-up costs can be found in section 4.4, p 17.

B. The price for R3 Non-CIPU Standard

The prices for each quarter are based on the Bids submitted by the Parties.

Remark: R3 Non-CIPU Standard have no activation price until 01/12/2018.

4.3.5. Calculation of volume R3 Flex (Column "R3Flex")

A. The price for R3 CIPU Flex

The prices for each quarter hour are based on the intraday prices sent during the procedure Nomination or via IDPCR. Since 01/12/2018, "start-up costs" are included, when applicable, in the R3 CIPU Flex, price. The rules regarding the calculation of the start-up costs are described in the [R3 2018 Design Note](#).

Remark: the start-up costs are applied in ARC only on the current quarter hour (in order to avoid over- estimating the balancing prices for all the quarter hours of a day, since the start-up costs only apply for the 1st quarter hour of an activation). An example of the behaviour of ARC with regards to start-up costs can be found in section 4.4, p 17.

B. The price for R3 Non-CIPU Flex

The prices for each quarter are based on the Bids submitted by the Parties.

Remark: R3 Non-CIPU Flex have no activation price until 01/12/2018.

4.3.6. The price for CIPU Limited Coordinable (columns "D LC" and "I LC")

The prices for each quarter hour are based on the intraday prices sent during the procedure Nomination or via IDPCR. Since 01/12/2018, "start-up costs" are included, when applicable, in the CIPU Coordinable, CIPU Limited Coordinable, and R3 CIPU price. The rules regarding the calculation of the start-up costs are described in the [R3 2018 Design Note](#).

Remark: the start-up costs are applied in ARC only on the current quarter hour (in order to avoid over-estimating the balancing prices for all the quarter hours of a day, since the start-up costs only apply for the 1st quarter hour of an activation). An example of the behaviour of ARC with regards to start-up costs can be found in section 4.4, p 17.

4.3.7. The price for Inter-TSO (column "Inter-TSO")

The price for TSO is based on the neighbouring country's power exchange prices. The import inter-TSO is always valued at highest incremental price and the export inter-TSO is always valued at the lowest decremental price.

4.3.8. The price per activation range ("third ARC table")

The ARC table showing the activation price per activation range (also referred to as "third table of the ARC publication") displays the estimated activation price considering a certain NRV (Net Regulation Volume). In order to build this overview, the ARC publication takes into account the applicable merit order, i.e. the order in which Elia must activate the products.

For an **upward** activation, the order of activation is the following:

1. R2 volume upward
2. I C volume + I C Energy Limited + volume of R3 Std CIPU and Non-CIPU
3. Volume of R3 Flex CIPU and Non-CIPU
4. I L C volume
5. Volume Inter-TSO Import

For a **downward** activation, the order of activation is the following:

1. R2 volume downward
2. D C volume + D C Energy Limited
3. D L C volume
4. Volume Inter-TSO Export

Within a given priority level, the volumes are ranked following their activation price (cheapest first).

4.3.9. Old products

A. The price for ICH

The price for each quarter is based on the Belpex price.

B. The price for R3 Dynamic Profile ("R3DP")

R3 Dynamic Profile has no activation price.

C. The price for R3

The price is calculated following the same rules as R3 CIPU in the current publications.

4.4. Example of start-up costs publication in ARC

Since 01/12/2018, "start-up costs" are included, when applicable, in the CIPU Coordinable, CIPU Limited Coordinable, R3 CIPU Standard, price. The rules regarding the calculation of the start-up costs are described in the [R3 2018 Design Note](#). The start-up costs are applied in ARC only on the current quarter hour (in order to avoid over-estimating the balancing prices for all the quarter hours of a day, since the start-up costs only apply for the 1st quarter hour of an activation).

Figure 6 & Figure 7 below illustrate how the start-up costs impact only the current quarter hour.

On Figure 6, the screenshot corresponds to the ARC publication at 16h43, and the start-up costs are applied on the quarter hour 16h30 – 16h45, suggested by a higher maximal price of IC and R3 standard during that quarter hour.

Marginal prices (€/MWh) for activation of												
Quarter	inter-TSO Export*	D LC	D C Energy Limited	D C	R2-	R2+	I C	I C Energy Limited	R3Std	R3Flex	I LC	inter-TSO Import*
16:00 > 16:15	-217.91	-251.50	0.00	-99.00	20.07	88.55	383.51	0.00	473.18	5000.00	114.27	588.80
16:15 > 16:30	-217.91	-251.50	0.00	-99.00	20.07	88.55	383.51	0.00	473.18	5000.00	114.27	588.80
16:30 > 16:45	-217.91	-251.50	0.00	-99.00	13.18	89.52	948.71	0.00	948.71	5000.00	114.27	588.80
16:45 > 17:00	-217.91	-251.50	0.00	-99.00	13.18	89.52	383.51	0.00	473.18	5000.00	114.27	588.80
17:00 > 17:15	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80
17:15 > 17:30	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80
17:30 > 17:45	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80

Marginal prices (€/MWh) for activation of																		
Quarter	-Max	-800 MW	-700 MW	-600 MW	-500 MW	-400 MW	-300 MW	-200 MW	-100 MW	100 MW	200 MW	300 MW	400 MW	500 MW	600 MW	700 MW	800 MW	Max
16:00 > 16:15	-251.50	20.07	20.07	20.07	20.07	20.07	20.07	20.07	20.07	88.55	99.11	153.12	192.72	245.60	455.00	473.18	5000.00	5000.00
16:15 > 16:30	-251.50	20.07	20.07	20.07	20.07	20.07	20.07	20.07	20.07	88.55	153.12	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
16:30 > 16:45	-251.50	13.18	13.18	13.18	13.18	13.18	13.18	13.18	13.18	89.52	231.97	232.58	296.03	450.94	566.11	948.71	5000.00	5000.00
16:45 > 17:00	-251.50	13.18	13.18	13.18	13.18	13.18	13.18	13.18	13.18	89.52	153.12	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
17:00 > 17:15	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	99.11	153.12	192.72	245.60	455.00	473.18	5000.00	5000.00
17:15 > 17:30	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	148.71	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
17:30 > 17:45	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	148.71	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00

Figure 6 – Screenshot of ARC at 16h43

On Figure 7 below, the screenshot corresponds to the ARC publication at 16h52, and the start-up costs are applied on quarter hour 16h45 – 17h00, suggested by a higher maximal price of IC and R3 standard during that quarter hour.

Remark: Note that the prices for the quarter hour 16h30-16h45 are lower than the prices published at 16h43 for the same quarter hour. This is due to the fact that start-up costs are no longer applied on that quarter hour, since it is not anymore the current quarter hour.

Marginal prices (€/MWh) for activation of												
Quarter	inter-TSO Export*	D LC	D C Energy Limited	D C	R2-	R2+	I C	I C Energy Limited	R3Std	R3Flex	I LC	inter-TSO Import*
16:00 > 16:15	-217.91	-251.50	0.00	-99.00	20.07	88.55	383.51	0.00	473.18	5000.00	114.27	588.80
16:15 > 16:30	-217.91	-251.50	0.00	-99.00	20.07	88.55	383.51	0.00	473.18	5000.00	114.27	588.80
16:30 > 16:45	-217.91	-251.50	0.00	-99.00	13.18	89.52	383.51	0.00	473.18	5000.00	114.27	588.80
16:45 > 17:00	-217.91	-251.50	0.00	-99.00	13.18	89.52	948.71	0.00	948.71	5000.00	114.27	588.80
17:00 > 17:15	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80
17:15 > 17:30	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80
17:30 > 17:45	-211.29	-219.70	0.00	-99.00	6.29	90.50	383.51	0.00	473.18	5000.00	114.27	588.80

Marginal prices (€/MWh) for activation of																		
Quarter	-Max	-800 MW	-700 MW	-600 MW	-500 MW	-400 MW	-300 MW	-200 MW	-100 MW	100 MW	200 MW	300 MW	400 MW	500 MW	600 MW	700 MW	800 MW	Max
16:00 > 16:15	-251.50	20.07	20.07	20.07	20.07	20.07	20.07	20.07	20.07	88.55	99.11	153.12	192.72	245.60	455.00	473.18	5000.00	5000.00
16:15 > 16:30	-251.50	20.07	20.07	20.07	20.07	20.07	20.07	20.07	20.07	88.55	153.12	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
16:30 > 16:45	-251.50	13.18	13.18	13.18	13.18	13.18	13.18	13.18	13.18	89.52	153.12	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
16:45 > 17:00	-251.50	13.18	13.18	13.18	13.18	13.18	13.18	13.18	13.18	89.52	231.97	232.58	296.03	450.94	566.11	948.71	5000.00	5000.00
17:00 > 17:15	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	99.11	153.12	192.72	245.60	455.00	473.18	5000.00	5000.00
17:15 > 17:30	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	148.71	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00
17:30 > 17:45	-219.70	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29	90.50	148.71	153.12	192.72	380.21	455.00	473.18	5000.00	5000.00

Figure 7 – Screenshot of ARC at 16h52

4.5. What are the limitations of the new publication?

The published values are still an **estimation** based on the different nominations –day ahead and intraday programs- introduced by the concerned Parties. **Therefore accurate day ahead and intraday programs from Parties are key for this publication.** No real injection measurements are taken into account. Deviations from the nominations program in reality are the sole responsibility of the concerned Party and are regulated through the imbalance tariff.

Calculated volume and availability of the different reserves (R1, R2 and R3) are subject to re-evaluation in intraday. The calculated volumes in D-1 are however considered available during day D. Non-adequate delivery of the reserves in day D is regulated through ex-post activation controls with possible penalties.

Any issue having an impact on intraday operations (e.g. intraday FO) which cannot be registered via an IDPCR is not taken into account in the calculation of the available regulation volume and the corresponding prices.

Good use of the IDPCR's to report intraday changes or FO's is of crucial importance to guarantee an estimated available regulation margin that is as close as possible to the reality.

5 Contact information

Should you require assistance or more info, support is available via email at balancing.publications@elia.be

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