

Centrica

Flexibele productie valoriseren

June 2023

STRICTLY CONFIDENTIAL

2030 Demands Greater Flexibility



+4 GW

Onshore wind needs to grow at least 2x



+8 GW – 16 GW

Offshore wind needs to grow at least 2x, aiming for 4x



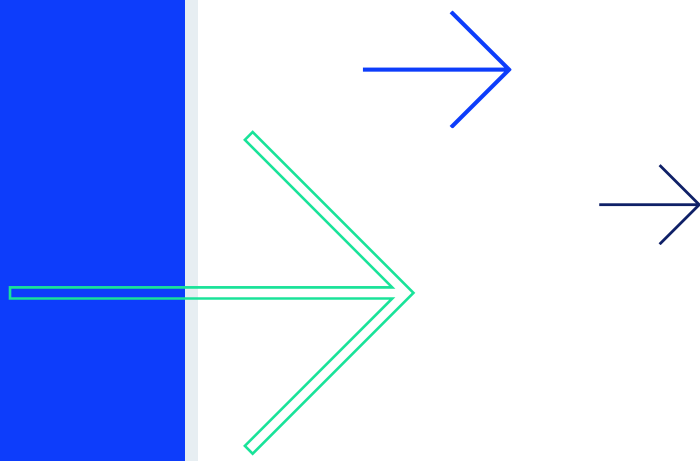
+15 GW

Solar needs to grow at least 4x

Growing volumes of intermittent renewable generation increases the need for ancillary services.

Agenda

- Who is Centrica Energy Trading?
- Why Flexibility
- Market Opportunities
- Case Studies
- Route-to-Market
- Q&A



Energy Movers by Nature

Centrica plc

Centrica plc is a leading energy services and solutions provider founded on a 200-year heritage of serving people.

We are the UK's biggest retailer of zero carbon electricity, serving around 10 million customers across the UK, Ireland and Continental Europe through brands such as British Gas, Bord Gáis Energy, Centrica Business Solutions and **Centrica Energy Trading**.

Centrica plc is a listed company traded on the London Stock Exchange (CNA:LN) and is BBB rated by S&P.

19,738

Employees Worldwide

10m

Residential Customers

CDP A-

Ranking on climate change

Retail (outside EU)

Infrastructure



Trading & Optimisation

The big picture

Centrica Energy Trading is a leading provider of energy risk management and optimisation services to businesses, in addition to managing commodity risk and providing wholesale market access for the Centrica plc.

We trade physical as well as financial energy products and operate 24/7/365.

We trade Gas, LNG, Power and Green Certificates and connect energy producers, suppliers and off-takers in the wholesale energy markets.

REstore was acquired by Centrica PLC in 2017. The **Optimisation expertise**, IPs & patents, algorithms issued from this acquisition are now fully merged into Centrica Energy Trading.

15.6 GW	Power Assets under Management
11.7 GW	Renewables generation & storage under management
24	European Power & Gas Trading Markets
8.4M	Power & Gas trades last year
+700	Energy experts (FTEs)
8	Locations

Serving the green energy transition, over the last 15 years we've developed a **24/7/365** operational platform for renewable energy trading and built a diversified portfolio of **flexible assets** across Europe that continues to grow.

15.6

GW Capacity

11.7

GW Wind & Solar Capacity

4.8

GW Flexible Assets

-  Onshore Wind
-  Offshore Wind
-  Solar
-  Battery
-  Electrolysers / PtX



We operate the most advanced cross-European virtual, renewable Power Plant with an aggregated portfolio of flexible load and batteries, enabling more secure revenues and shielding flexibility value from penalties.

4.8GW

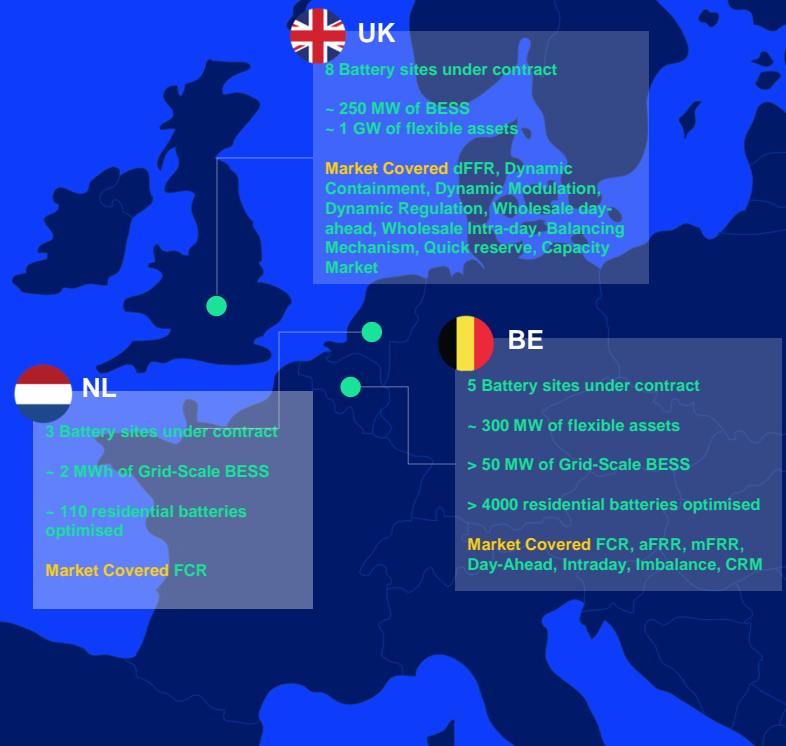
of flexibility available to the grid from our industrial and commercial customers

>300MW

portfolio of battery storage assets optimised by Centrica in the UK and EU, including grid scale and residential BESS

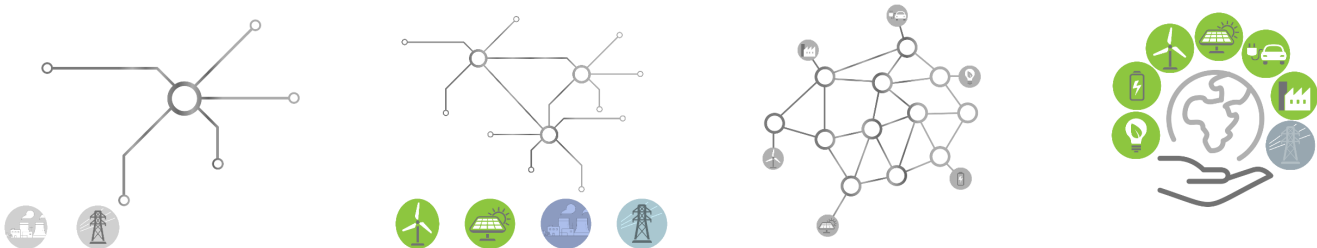
~300MW

of flexible assets participating into our Belgium Virtual Power Plant (VPP), including grid scale and residential BESS as well as industrial loads



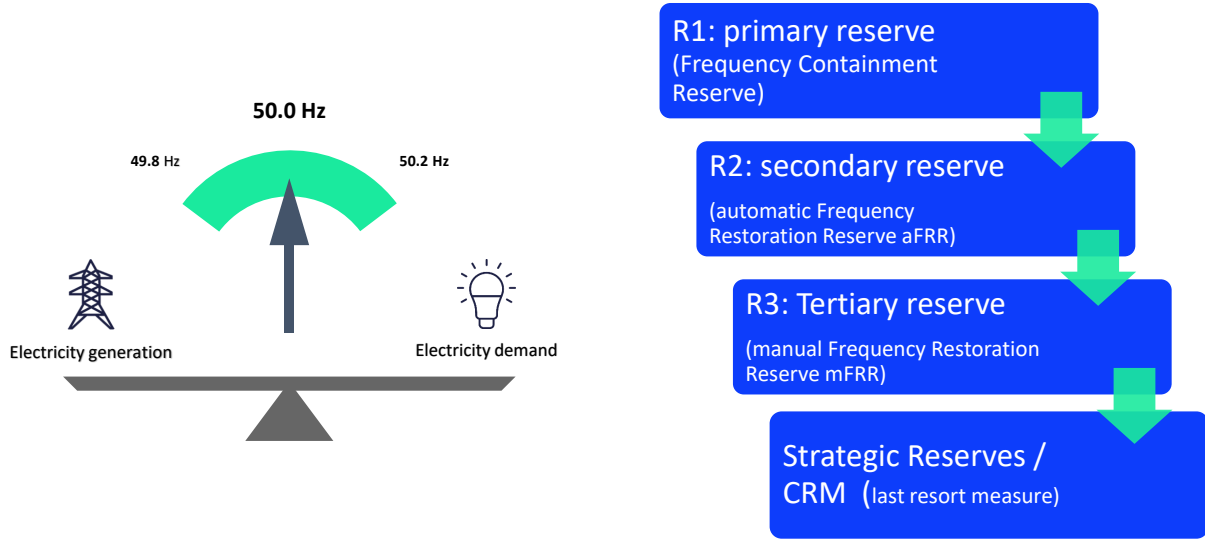
Why Flexibility

- Increasing amount of **renewable energy** strongly drives the need for additional balancing capacity on the grid.
- Extra **EBITA** by delivering services to the grid.
- Possible to combine this revenue model with **other support mechanisms** (certificates).
- Possible to **tailor the delivered service** to the specific operating conditions.



How does it work?

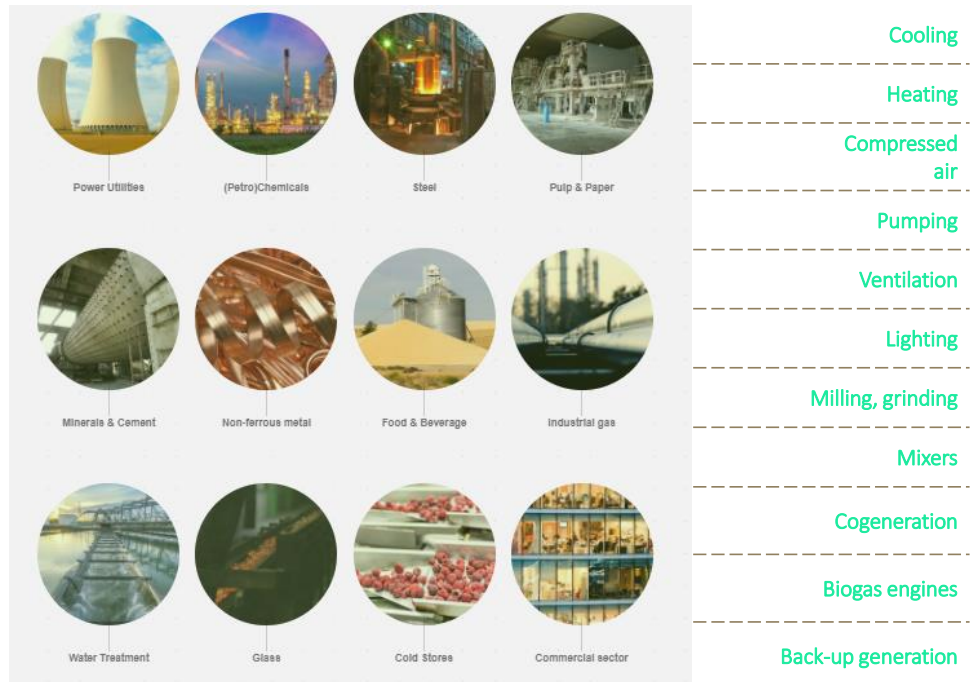
Programs from Elia



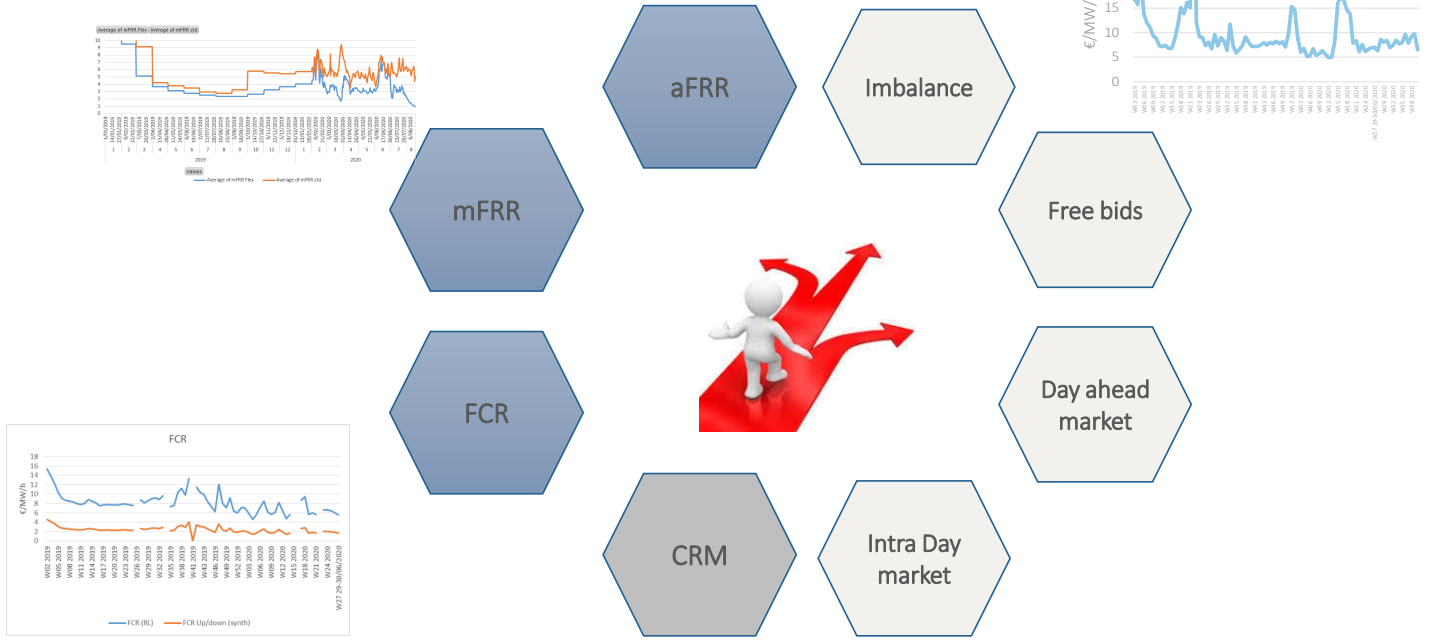
Powering business advantage

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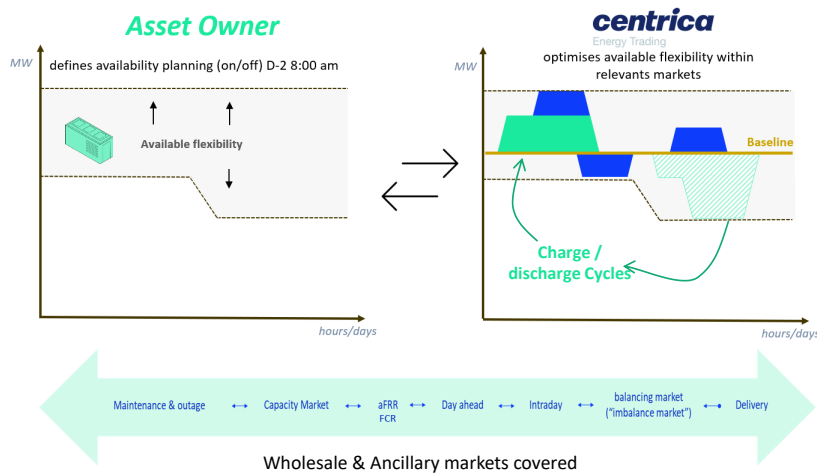
Flexibility can be found in a lot of sectors and on a variety of different processes.



What is the correct market for my asset?

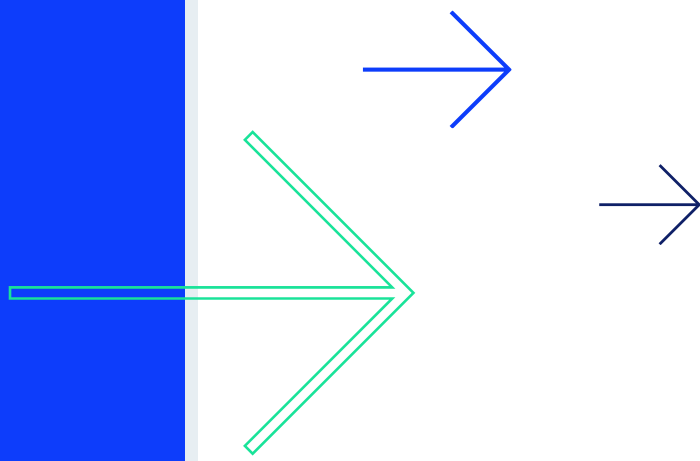


Centrica offers multimarket optimisation services to asset owners in Belgium



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Structure of Flexibility payments

How does the TSO (Elia) Remunerate Flexibility?

Capacity remuneration [€/MW/h]
 Price paid by Elia to reserve capacity, irrelevant whether this capacity is activated or not (standby fee).

Activation remuneration [€/MWh]
 Price paid by Elia to activate
 - [Set by client](#)
 - Contains all marginal costs related to activation

Tendering Period	CCTU	Capacity Product	Total Awarded Volume (MW)	Average Price (€/Mw/h)	Marginal Price (€/Mw/h)	Total Offered Volume	Individual Capacity Bids
03/05/2021	05/05/2021 00:00 - 00:00	aFRR Downward	131	46.08	46.08	311	Individual bids
03/05/2021	05/05/2021 00:00 - 00:00	aFRR Upward	142	24.68	24.68	322	Individual bids
04/05/2021	05/05/2021 00:00 - 04:00	aFRR Downward	14	23.54	72.12	55	Individual bids
04/05/2021	05/05/2021 00:00 - 04:00	aFRR Upward	3	9.11	12.5	11	Individual bids
04/05/2021	05/05/2021 04:00 - 08:00	aFRR Downward	14	15.85	36.12	55	Individual bids
04/05/2021	05/05/2021 04:00 - 08:00	aFRR Upward	3	13.03	14	11	Individual bids
04/05/2021	05/05/2021 08:00 - 12:00	aFRR Downward	14	14.7	20	55	Individual bids
04/05/2021	05/05/2021 08:00 - 12:00	aFRR Upward	3	15.12	15.12	11	Individual bids
04/05/2021	05/05/2021 12:00 - 16:00	aFRR Downward	14	46.65	99.88	55	Individual bids
04/05/2021	05/05/2021 12:00 - 16:00	aFRR Upward	3	8.22	12.5	11	Individual bids
04/05/2021	05/05/2021 16:00 - 20:00	aFRR Downward	14	22	44.75	55	Individual bids
04/05/2021	05/05/2021 16:00 - 20:00	aFRR Upward	3	16.21	16.62	11	Individual bids
04/05/2021	05/05/2021 20:00 - 00:00	aFRR Downward	14	11.11	12.5	55	Individual bids
04/05/2021	05/05/2021 20:00 - 00:00	aFRR Upward	3	20.92	28.25	11	Individual bids

<https://www.elia.be/en/grid-data/balancing/capacity-auction-results>

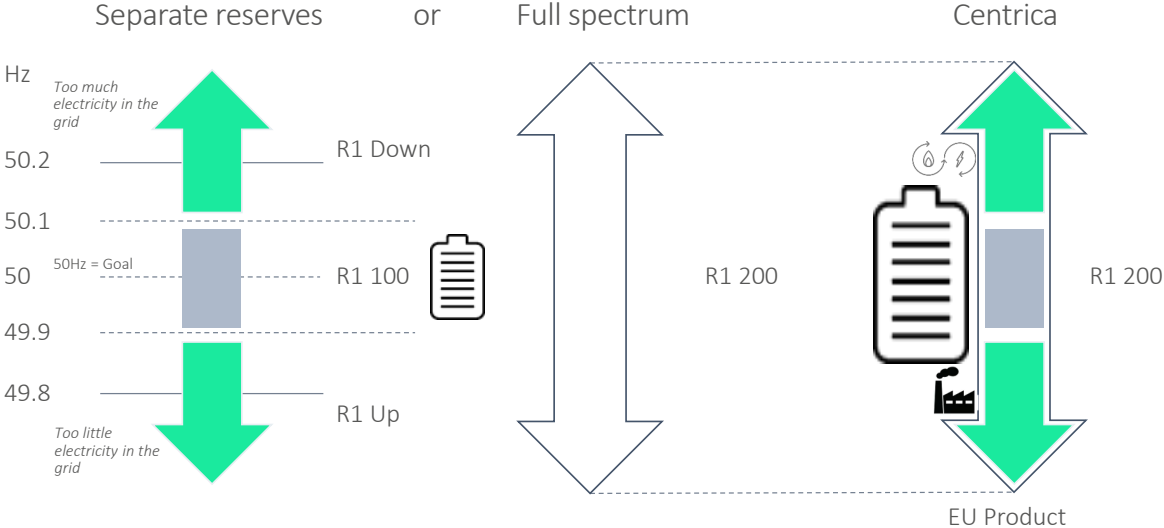
Program	Capacity Fee (€/MW/y)	Activation Fee (€/MW/y)
FCR	✓	✗
aFRR	✓	✓
mFRR	✓	✓

* Not considering Free Bids

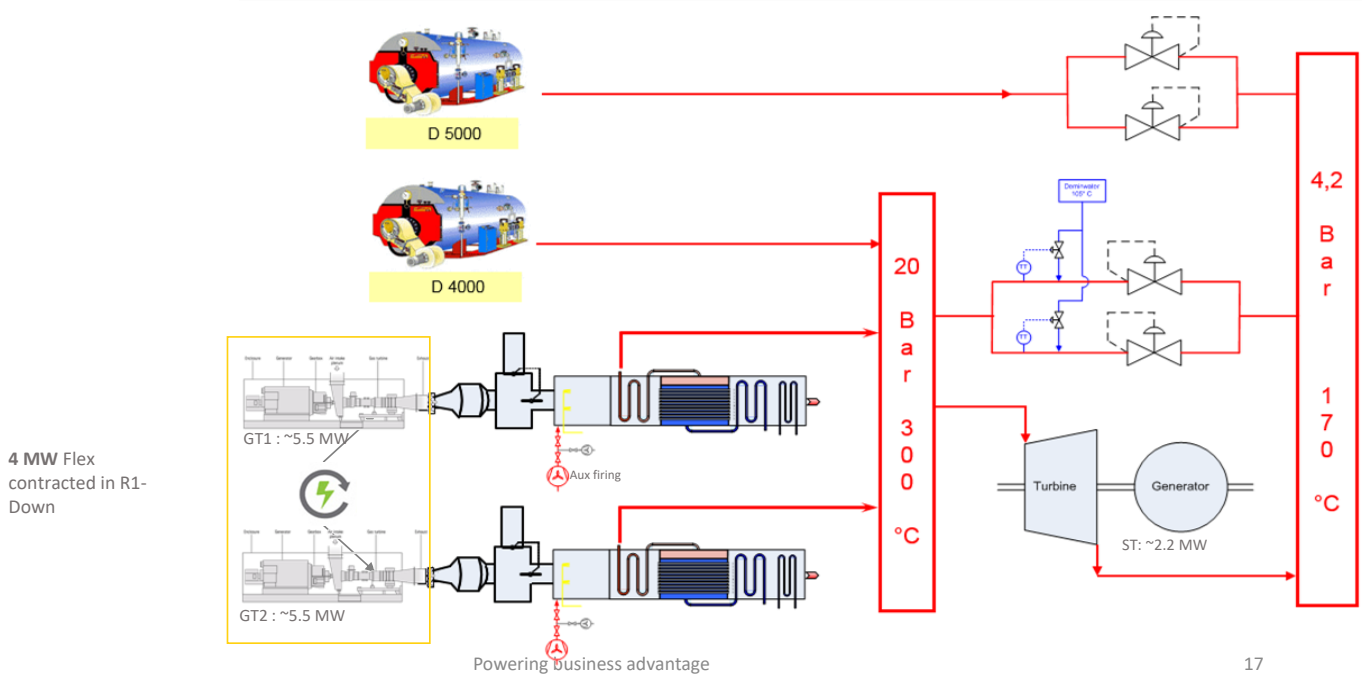
Primary reserve FCR: Synthetic portfolio

Centrica PATENTED!

Centrica offers synthetic R1 - 200



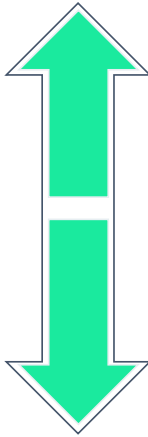
FCR Example: FCR-Down activations performed by 2 gas turbines: 2 x 5,5 MW



Secondary Reserve - aFRR

automatic Frequency Restoration Reserve

Increase generation
or
Decrease Consumption

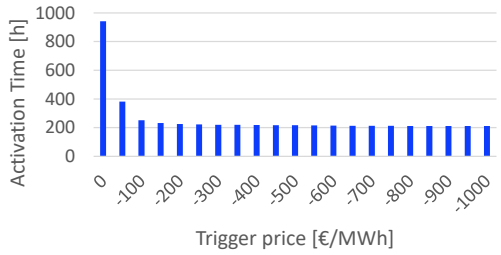


CHP with a partial loaded running regime are a suitable aFRR-UP asset

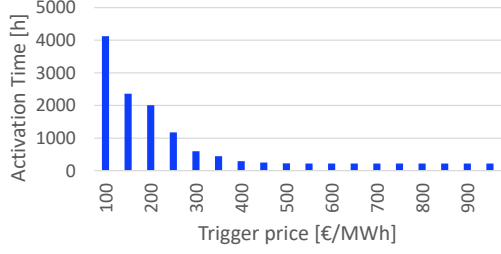
CHP with a continuous running regime are a suitable aFRR-DN assets

Decrease generation
or
Increase Consumption

aFRR Down - Activated hours



aFRR UP - Activated hours

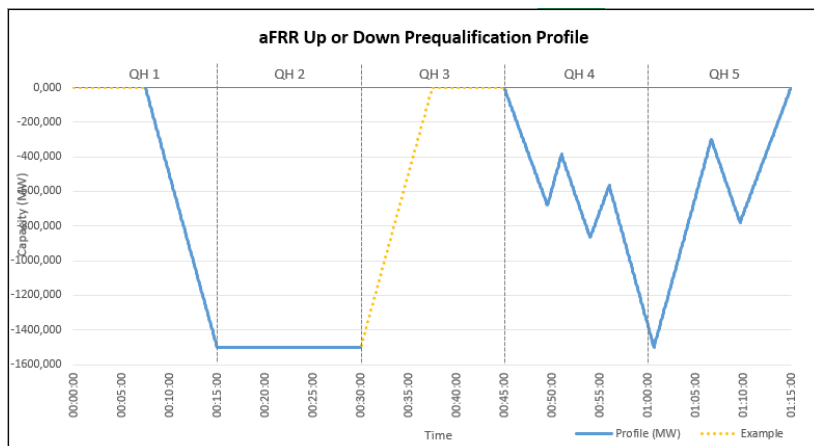


What will be expected of the CHP in aFRR?

aFRR Elia Description: "Fast reserves activated automatically and on a continuous basis to handle sudden disruptions in the area managed by Elia"

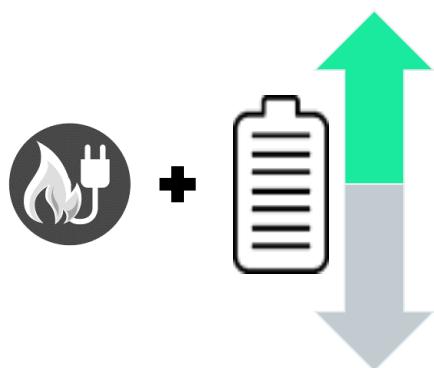
Main Elia Requirements

- aFRR Down = Decrease of generation
- aFRR UP= Increase of generation
- Max reaction time is 7.5 min (this will move to 5min in the future)
- Max duration: 4h
 - usually around 1300 activations of 12 minutes → 200-300h/year
- Signal following
 - TSO via Centrica will provide a setpoint every 4sec
 - Max margin on following the signal is +- 7.5%
- Daily procurement in 4-hour blocks



Elia Prequalification profile for 1.5 MW flex

aFRR battery supporting (up)



Expected (historical analysis full year)	R2 battery supporting	R2 standalone Up/Down
Avg historical duration (min)	15	12
Avg Nbr activations/ year	TBD	~1300
Reaction time (min)	10 min	7.5 min (linear reaction)
Applicable situation	Idle CHP	CHP running partial load

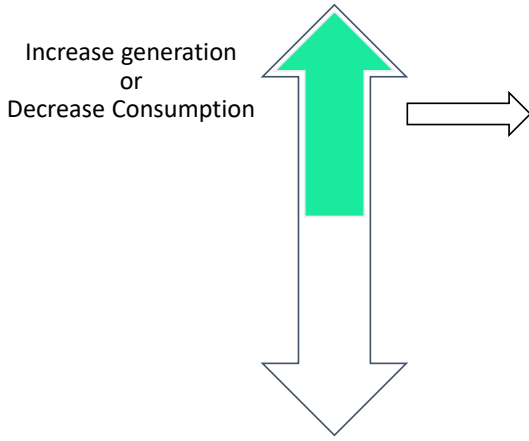


Centrica allows CHP's and other assets to act as a supporting asset in aFRR
This strongly limits the amount of activations incurred and allows for idle CHP's to participate

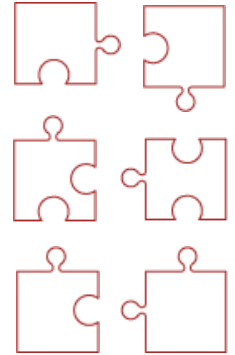
Tertiary Reserve (R3) - mFRR

manual Frequency Restoration Reserve

mFRR Basic statistics	
Reaction time	15 min
Number of activations	2 – 5 /year
Max duration	38h

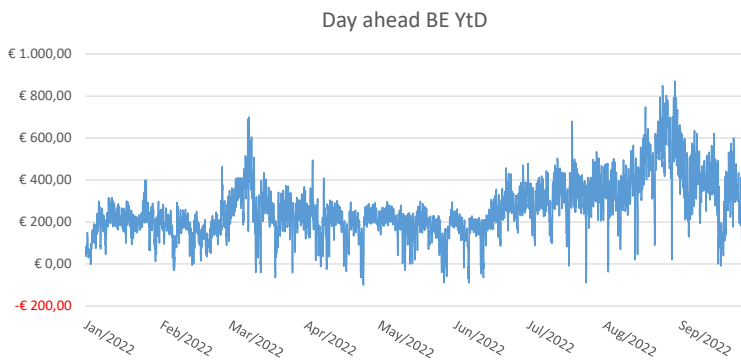


CHP's Standing Idle are ideal Candidates for mFRR

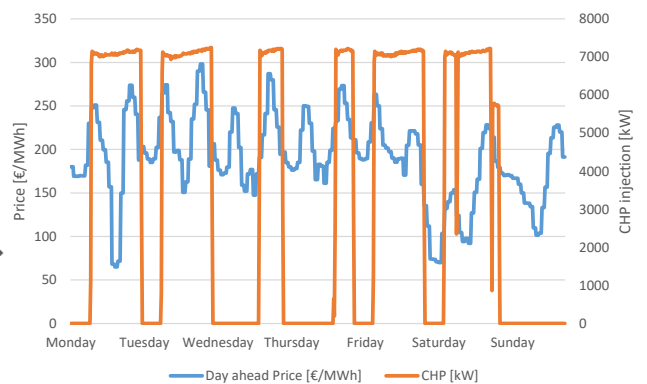
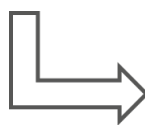


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Day ahead optimization Insights

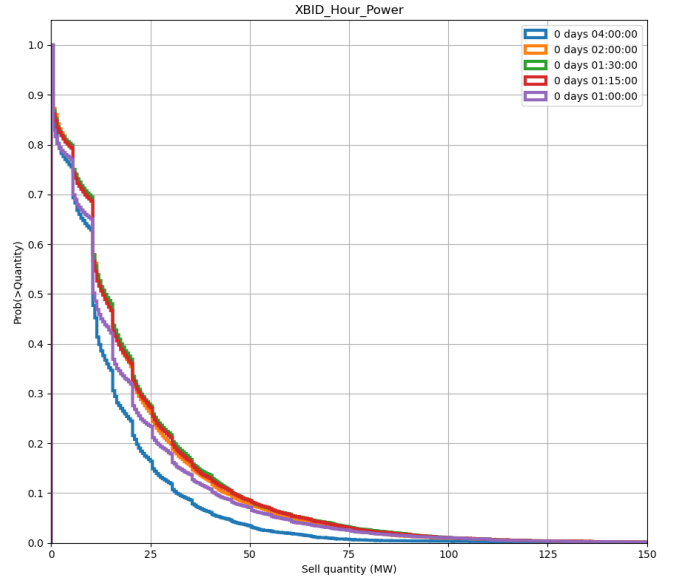
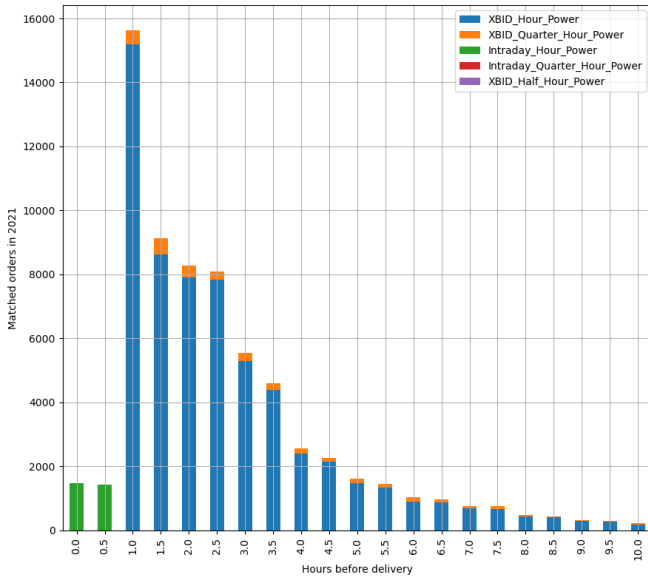


- Market clearing @ D-1: 12h00
- Flexibility in down stream process?
- Value depends on predictability



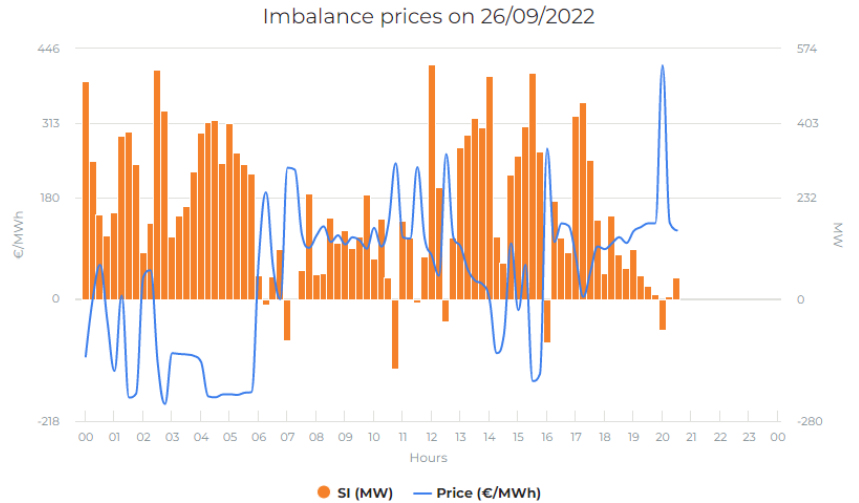
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Intraday Insights



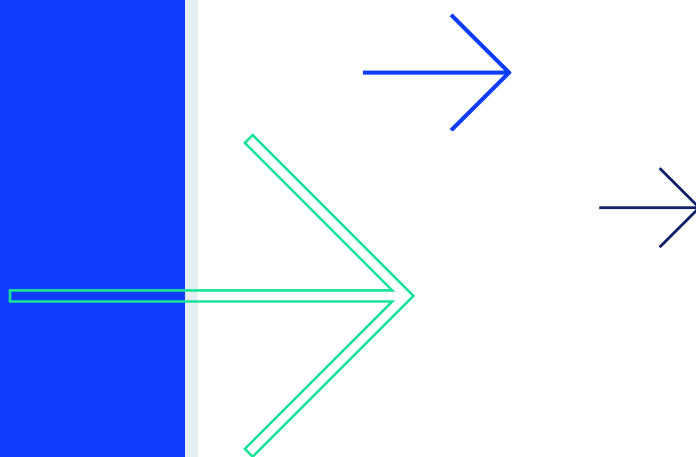
Imbalance Insights

- Volatile
- Settlement values published ex-post
- Value depends on predictability

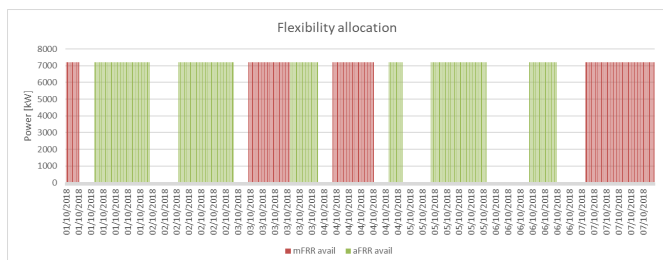
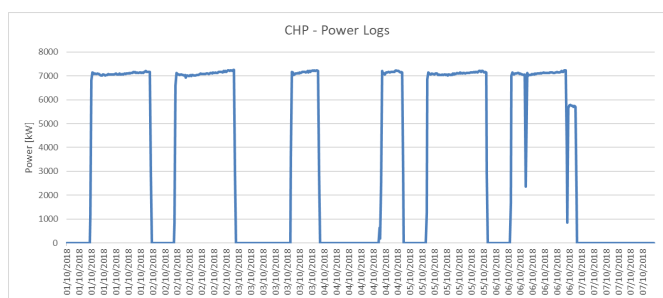


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Case study: aFRR down + mFRR



Assumptions

- 30% of Pnom flexible in DN Direction
- Flat average price
- Perfect nomination of the flex for each reserve
- Perfect delivery of all activations

7MW CHP – Capacity Fee		
	mFRR	aFRR DN
#CCTU's (hours)	12 (48)	17 (68)
Capacity [MW]	7	2.1
Price [€/MWh]	6	26
Weekly Gross revenue [€]	2016	3713
Yearly Gross revenue [€]	104 800	193 100

7MW CHP – Activation Fee		
	mFRR DN	aFRR
Total activated energy [MWh]	21	510
Energy Price [€/MWh]	200	40
Yearly Gross revenue [€]	4 200	20 400

7MW CHP – Total Revenues		
	mFRR DN	aFRR
Total Revenues	109 000	213 500

Grid support with CHP summary

Key questions:

- CHP:
 - Type?
 - Pmax?
 - Pmin?
 - Running schedule?
- Process:
 - Back-up? Buffer?
- Site:
 - Imbalance exposed?
 - Energy supplier?
 - Green certificates?



CHP-mode of operation	Market				
	FCR DN	aFRR up	aFRR DN	aFRR sup	mFRR
Idle	Black	Light Green	Black	Light Green	Light Green
Partial load (Pmin)	Black	Light Green	Black	Light Green	Light Green
Max load (Pmax)	Light Green	Black	Light Green	Black	Black

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Route-to-market

Contract Signature	<ul style="list-style-type: none"> • Flex-analysis • Date signature contract • Project planning 	5 days
Admin process	<ul style="list-style-type: none"> • Supplier GUD + DSO Mandate <ul style="list-style-type: none"> • Check valid Access & BRP contract • Net Flexibility Study & Customer Contract Check request +results • SDP-F request: sent to DSO • CP User Designation 	1,5 Months
Technical validation	<ul style="list-style-type: none"> • Submeter technical info check + metering data • Pool update and proposal to DSO • Endpoints set-up in RTCP notification + acceptance 	2 weeks
Testing	<ul style="list-style-type: none"> • Baseline test: <ul style="list-style-type: none"> • set asset + algo config • Data flow check, message are constructed / sent to Elia platform • Prequalification test set up + execution with Fluvius/elia 	1,5 month
Process Validation	<ul style="list-style-type: none"> • Delivery points become effective (<i>no later than 5 WD following the notification of acceptance</i>) • Final checks and validation (tech check, Ops check, RtM check, elia check Biple) 	1 week
Go live	<ul style="list-style-type: none"> • Bid preparation: add to tender & add to energy bids • Monitor go-live • Go into market : first bid submitted 	3 days



Contact

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