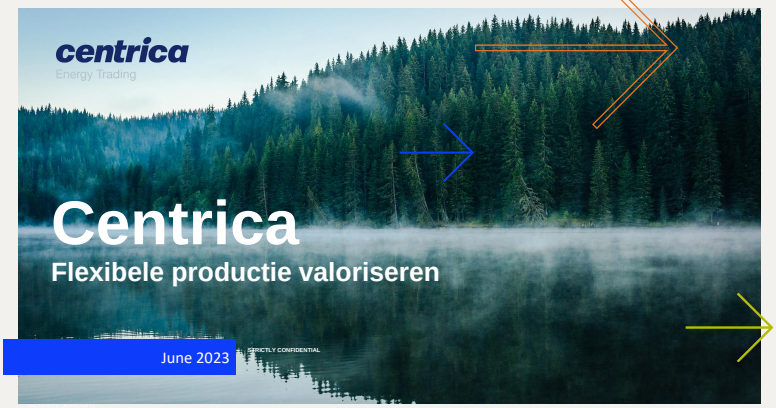



# Centrica

## Flexibele productie valoriseren

June 2023





## 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



## 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








## 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.

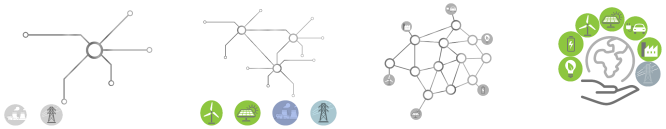
**4.8GW** of flexibility available to the grid from our industrial and commercial customers

**>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

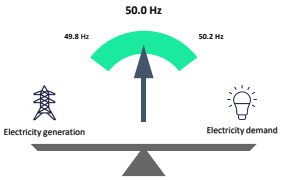
- Increasing amount of **renewable energy** strongly drives the need for additional balancing capacity on the grid.
- Extra **EBITA** by delivering services to the grid.
- Possible to combine this revenue model with **other support mechanisms** (certificates).
- Possible to **tailor the delivered service**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





# How does it work?

Programs from Elia




R1: primary reserve (Frequency Containment Reserve)

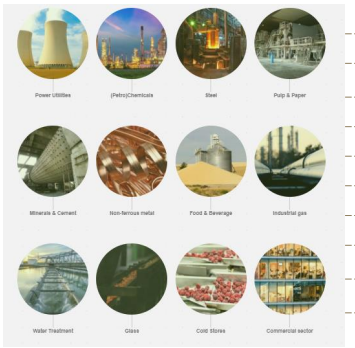
R2: secondary reserve (automatic Frequency Restoration Reserve aFRR)

R3: Tertiary reserve (manual Frequency Restoration Reserve mFRR)

Strategic Reserves / CRM (last resort measure)



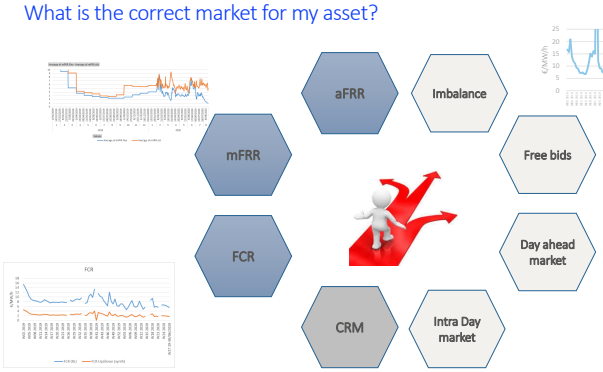
Flexibility can be found in a lot of sectors and on a variety of different processes.




- Cooling
- Heating
- Compressed air
- Pumping
- Ventilation
- Lighting
- Milling, grinding
- Mixers
- Cogeneration
- Biogas engines
- Back-up generation



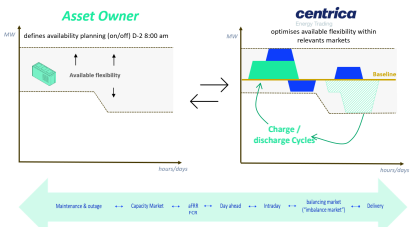
## What is the correct market for my asset?








# Centrica offers multimarket optimisation services to asset owners in Belgium




Wholesale & Ancillary markets covered

# Agenda

- Who is Centrica Energy Trading?
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## Structure of Flexibility payments

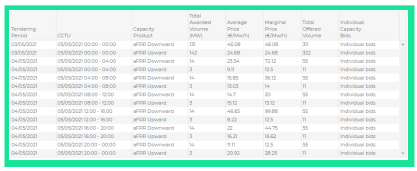
### How does the TSO (Elia) Remunerate Flexibility?

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

Activation renumeration [€/MWh]
Price payed by Elia to activate
- Set by client
- Contains all marginal costs related to activation

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

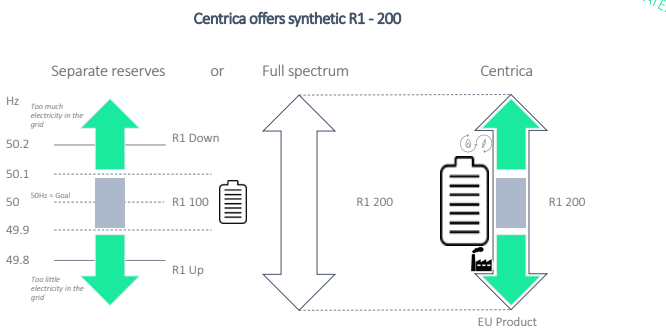
* Not considering Free Bids



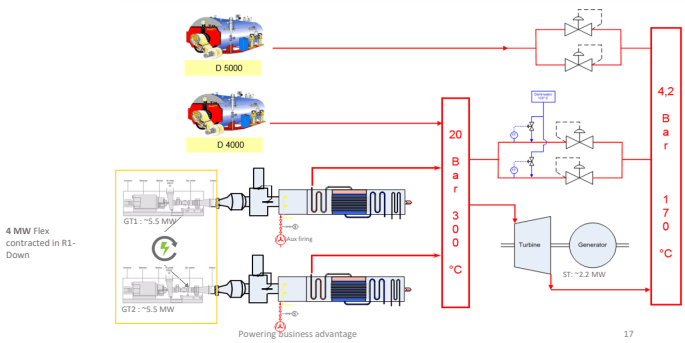
https://www.elia.be/en/grid-data/balancing/capacity-auction-results

## Primary reserve FCR: Synthetic portfolio

Centrica PATENTED!




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






## Secondary Reserve - aFRR

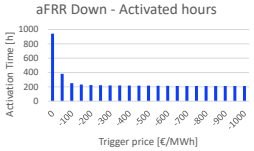
automatic Frequency Restoration Reserve

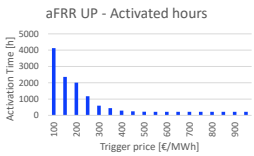
Increase generation
or
Decrease Consumption

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

Decrease generation
or
Increase Consumption

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



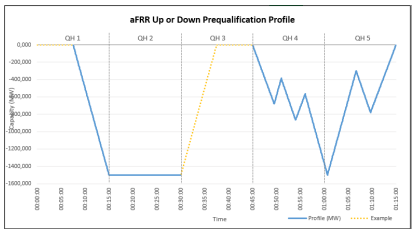



# What will be expected of the CHP in aFRR?

*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**

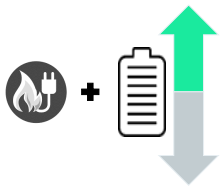
- aFRR Down = Decrease of generation
- aFRR UP= Increase of generation
- Max reaction time is 7.5 min (this will move to 5min in the future)
- Max duration: 4h
  - usually around 1300 activations of 12 minutes → 200-300h/year
- Signal following
  - TSO via Centrica will provide a setpoint every 4sec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



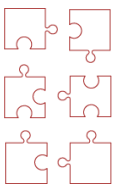
# Tertiary Reserve (R3) - mFRR

manual Frequency Restoration Reserve

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

Increase generation
or
Decrease Consumption

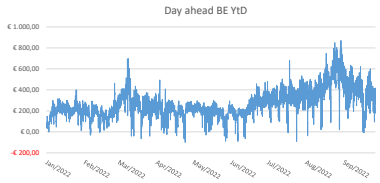
CHP's Standing Idle are ideal Candidates for mFRR



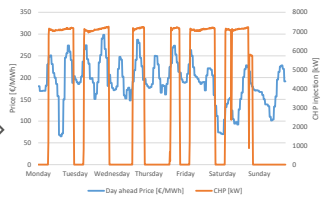


# Day ahead optimization

## Insights



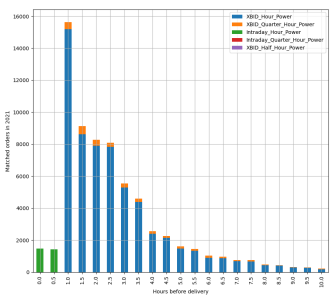

- **Market clearing @ D-1: 12h00**
- **Flexibility in down stream process?**
- **Value depends on predictability**

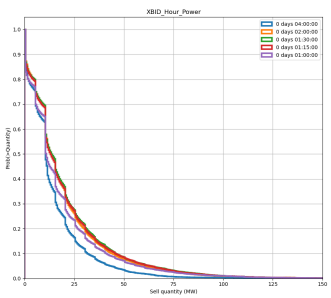





# Intraday

## Insights



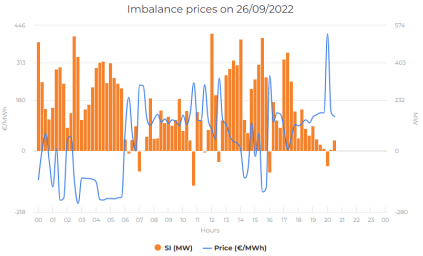






# Imbalance

## Insights

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



# Agenda

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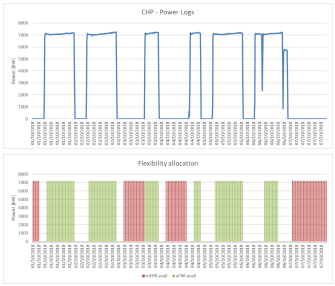
## Case study: aFRR down + mFRR




**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 [€/MW/h] | 6 | 26 |
| Weekly Gross revenue [€] | 2016 | 3713 |
| Yearly Gross revenu [€] | 104 800 | 193 100 |

| 7MW CHP – Activation Fee | | |
|---|---|---|
| | mFRR DN | aFRR |
| Total activated energy [MWh] | 21 | 510 |
| Energy Price [€/MWh] | 200 | 40 |
| Yearly Gross revenu [€] | 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?

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



## Route-to-market

| | | |
|---|---|---|
| Contract Signature | • Flex-analysis<br>• Date signature contract<br>• Project planning | 5 days |
| Admin process | • Supplier GUD + DSO Mandate<br>  • Check valid Access & BRP contract<br>  • Net Flexibility Study & Customer Contract Check request +results<br>• SDP-F request: sent to DSO<br>• CP User Designation | 1,5 Months |
| Technical validation | • Submeter technical info check + metering data<br>• Pool update and proposal to DSO<br>• Endpoints set-up in RTCP notification + acceptance | 2 weeks |
| Testing | • Baseline test:<br>  • set asset + algo config<br>  • Data flow check, message are constructed / sent to Elia platform<br>• Prequalification test set up + execution with Fluvius/elia | 1,5 month |
| Process Validation | • Delivery points become effective (*no later than 5 WD following the notification of acceptance)*<br>• Final checks and validation (tech check, Ops check, RtM check, elia check Biple) | 1 week |
| Go live | • Bid preparation: add to tender & add to energy bids<br>• Monitor go-live<br>• Go into market : first bid submitted | 3 days |

4 MONTHS

Powering business advantage





# Contact

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