

evolve

Energy Management Solutions

Brighter. Farther.

RCI Holding

At RCI Holding, our unwavering commitment since establishment in 2000 is clear: we're dedicated to empowering communities for a sustainable future. From headquarters in Bucharest, Romania, and subsidiary offices in Athens, Greece, and Chisinau, Moldova, we extend our reach across 14 countries in Central and Eastern Europe, as well as the UAE.

Our expertise spans Energy, Engineering, Financial Services, and cutting-edge Technology Solutions. Central to our approach is a diverse portfolio of specialized companies covering the entire spectrum of project cycle and business consulting. From Advisory Services and Technical Consulting to Engineering, Sustainability, Governance (ESG) Services, Regulatory Consulting, and IT&C Consulting, we deliver comprehensive solutions tailored to the unique needs of each client.



62
Million Euro
Total Turnover

41
Million Euro Turnover
from Professional
Services

14
Countries
of Presence

17.5
Billion CAPEX
of Projects Managed

100%
Year to Year
Growth

400+
Projects Under
Implementation

150
Full Time
Employees

250
Project Based
Experts

14
Million Euro
Professional Insurance
Per Incident

1,000+
Clients

EVOLVE | Part of the RCI holding

Energy



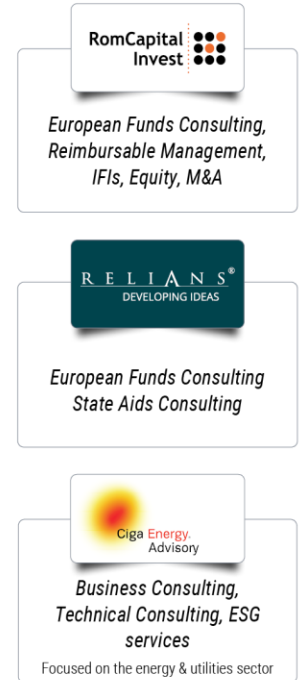
Engineering



Technology

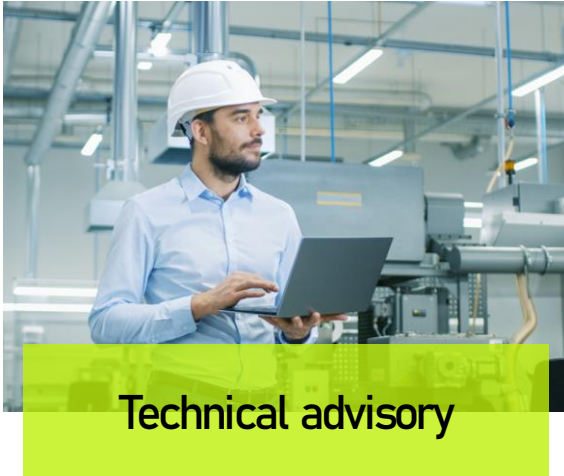


Financial



EVOLVE Services

Technical DD in RES projects totaling more than 1.6GW and BESS financial modeling in projects totaling more than 1.8GWh



- Grid connection due diligence - Solution Study/ATR/connection contracts: PVPP, WPP or hybrid projects above **1.6GW**
- Market entry strategy for power generators & storage capacities: using proprietary financial BESS model in projects above **1.8GWh**
- Regulatory framework & energy markets



- Aggregation license no. 2479/22.04.2024 - full and integrated services:
 - Forecasting, Market access (forward, spot and balancing), Dispatching, Balancing
- Flexibility for DSO:
 - Congestion management
 - Voltage regulation
- Microgrid Management - energy communities



- Implementation of Energy Management Solutions (EMS)
- Identification of energy efficiency solutions + Corporate PPA
- Advisory for end-users in the selection of electricity and gas suppliers

Regulatory framework – new developments

New Connection Regulation:

- New rules starting with **August 2024**
- Mandatory financial guarantee, in favor of the network operator, in the amount of 5% of the connection fee
- The possibility of extending, with the agreement of the network operator, by a maximum of 12 months the deadline for obtaining the building permit
- Redo power calculations at commissioning: new rules prevent "line skipping" concerns and ensure stable ATR conditions by also allowing for temporary use of available capacity by faster investors with potential limitations/disconnections if/once earlier projects are commissioned
- Capacity allocation mechanism: auction based **starting 2026**

CfD – Contracts for Differences:

- Two auctions (2024 and 2025), financed from the Modernization Fund (3 bln EUR), for 15 years
- Total auctioned capacity 5.000 MW: 1.500 MW in 2024, 3.500 MW in 2025
- First auction 2024: 500 MW PV + 1000 MW Wind:
 - Deadline: 18 November (submission of the technical and financial documentation)
 - Estimated date of awarding: 16 December
 - Contract signing: 20 January 2025
 - Maximum capacity: 125 MW for PV, 250 MW for Wind

New balancing rules:

- Introducing the elastic demand mechanism in the balancing market
- Changing the rules regarding the testing period of new power plants
- Limiting the price paid for the electricity in the testing period

EVOLVE – BESS model



SCOPE

- A. To determine the optimum power/capacity of BESS as a function of, as appropriate:
 - A. The size of the RES in which it is co-located
 - B. The size of the system service market (mainly aFRR)

The model determines the size of the BESS where the IRR/NPV are maximum

- B. Determination of the revenue stack and profitability of BESS where its power/capacity are predetermined



GRID CONNECTION TYPE

- A. Stand alone - directly into the grid
- B. Co-located in a PVPP (photovoltaic power plant)
- C. Co-located in a WPP (wind power plant)
- D. Co-located in a HPP (hybrid power plant - solar & wind)
- E. Co-located in a gas fired power plant
- F. Co-located with final consumer, who also has a PVPP for self-consumption
- G. Co-located at final consumer, who has a PVPP and gas engines for self-consumption



ENTRY DATA

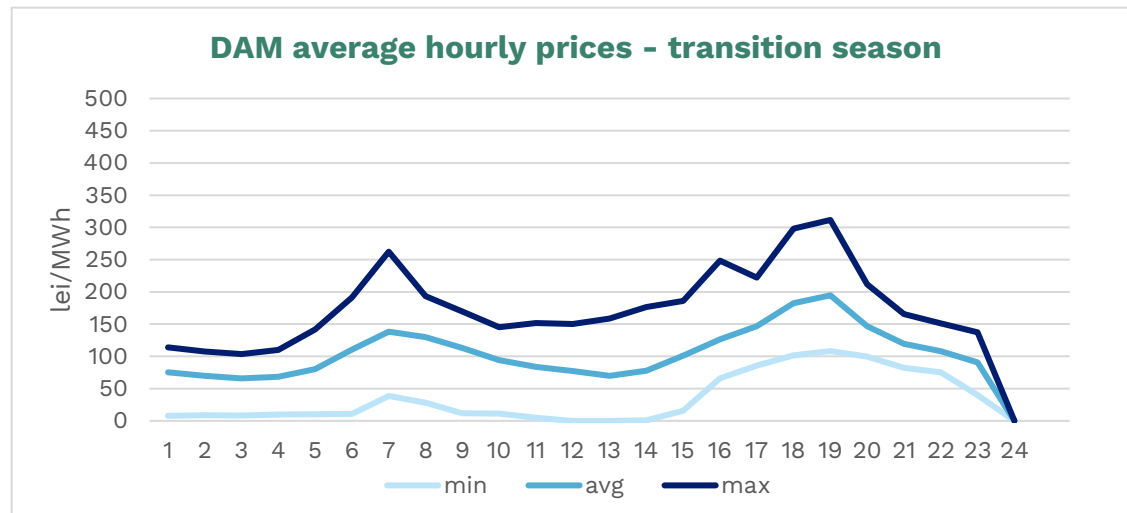
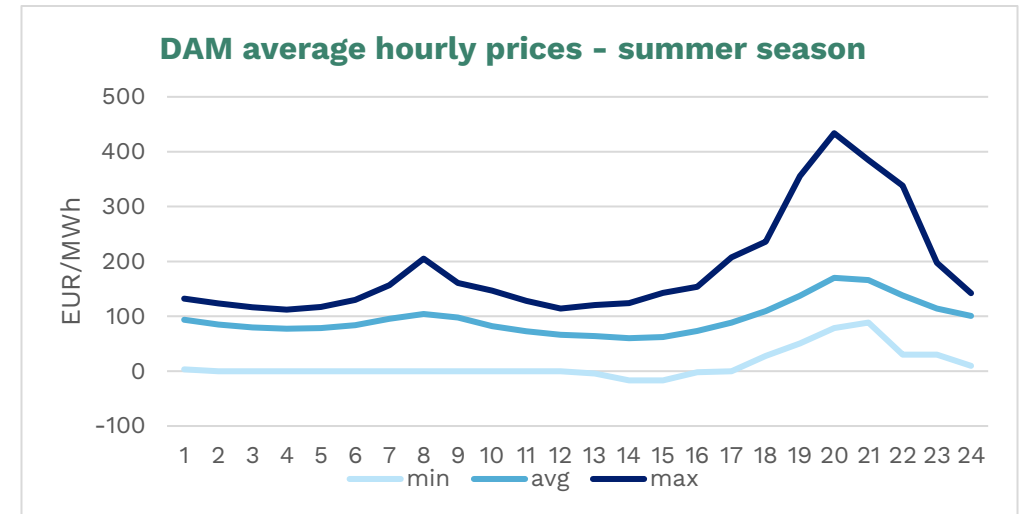
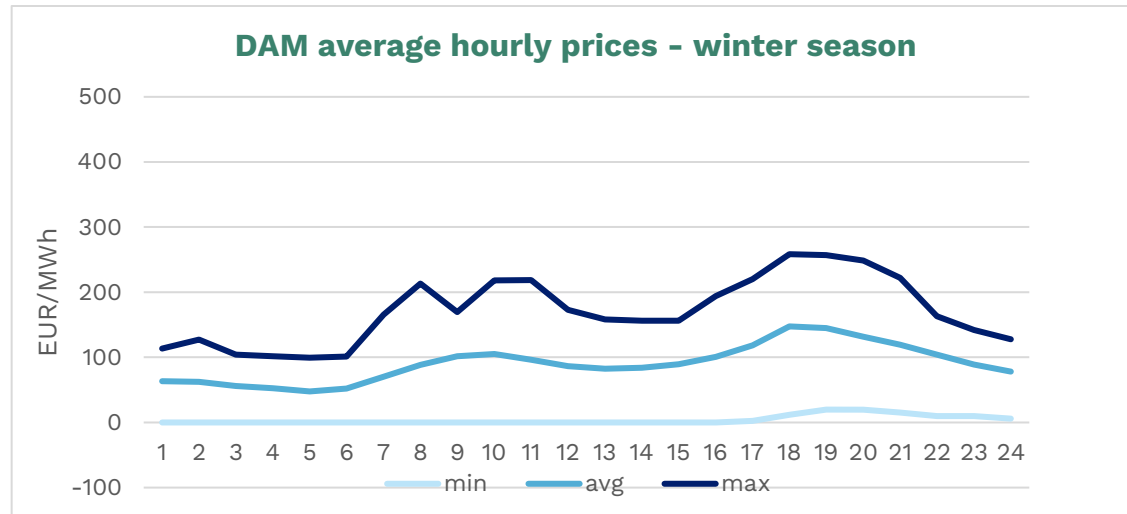
- A. CAPEX
- B. OPEX
- C. Seasonality: summer (June-September), winter (November-March). transition (April, May, October)
- D. Analysis period
- E. Funding sources:
 - i. Grant
 - ii. Own sources
 - iii. Attracted sources



REVENUE STACK

- A. Arbitrage - transactions in DAM/IM when the difference between the maximum and minimum price is greater than the cost of storage
- B. Imbalance offsetting (peak-shaving) - ensures in each settlement period the condition that actual generation equals nominated generation
- C. Ancillary services – power-frequency regulation (FCR, aFRR, mFRR)

DAM - seasonal average hourly prices - 01.06.2023-31.05.2024



FINDINGS

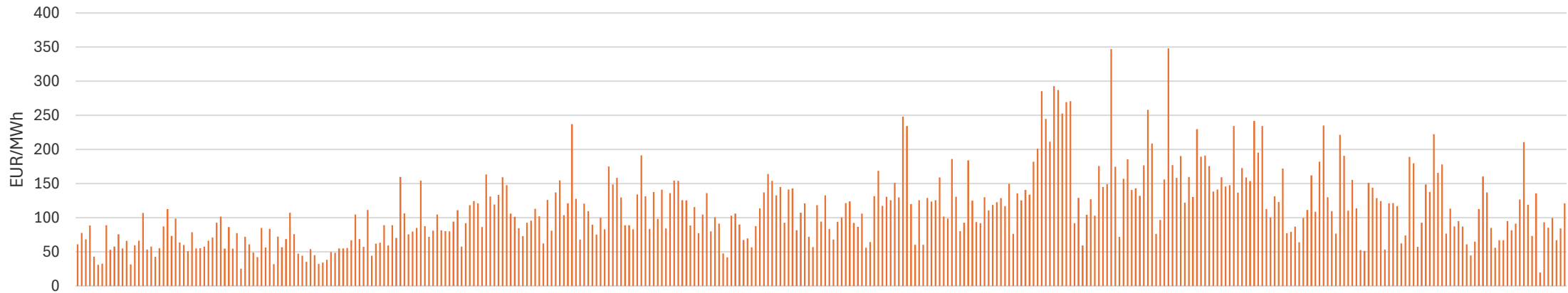


- The highest spread is in the summer season (> 320 EUR/MWh)
- Morning and evening peaks are well defined in the transition season
- Negative prices between 12:00-16:00 hours in the summer season

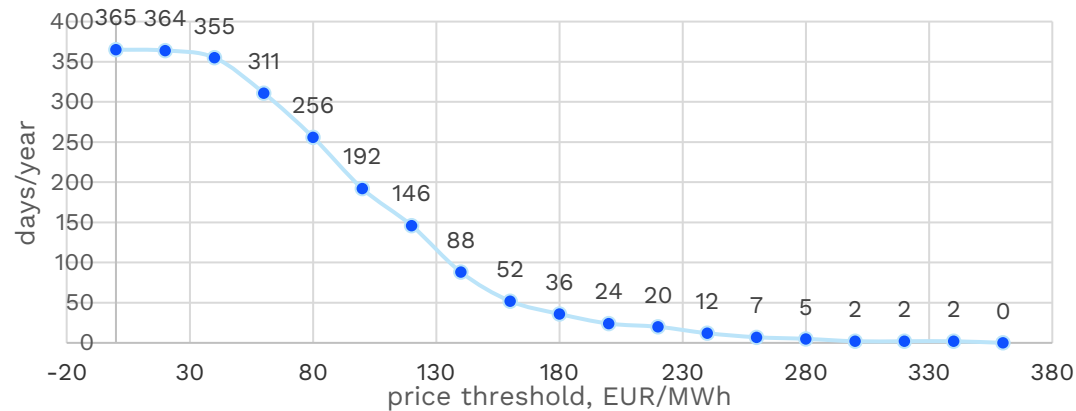
Arbitrage

At a storage cost of 80-120 EUR/MWh the estimated annual revenue is 20-25kEUR/MWh installed

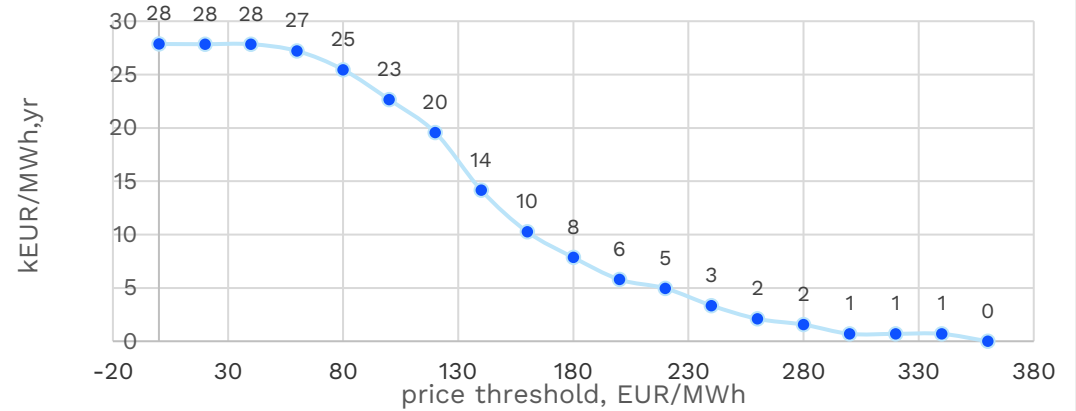
Daily DAM price spread, 1.06.2023-31.05.2024



Days/year with DAM price spread above given threshold

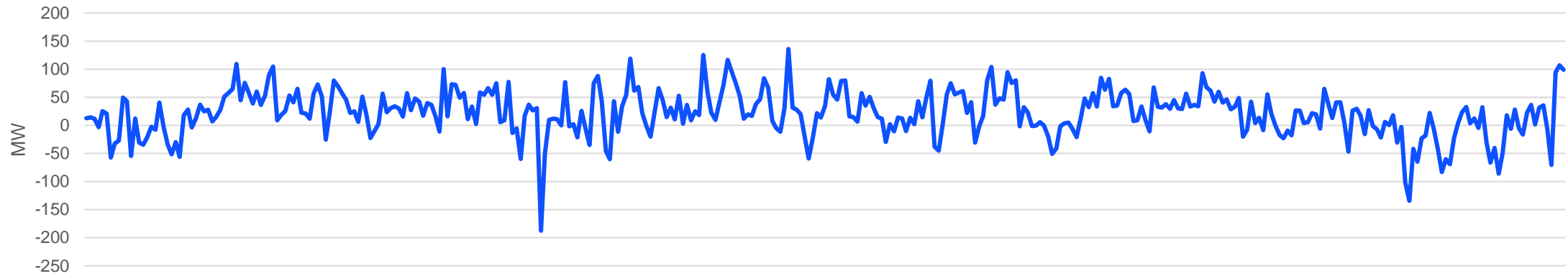


Total annual income from daily DAM price spread above given threshold

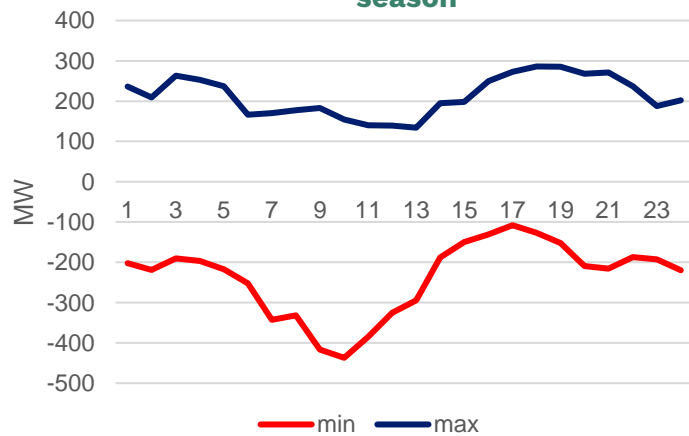


Balancing market - annual balancing power requirements

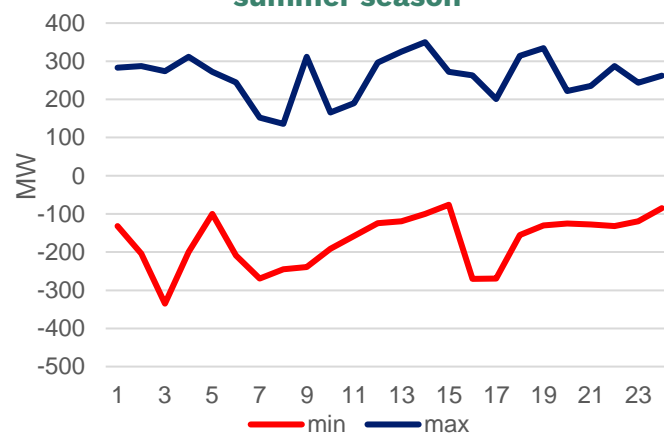
Daily average system imbalance, 1.06.2023-31.05.2024



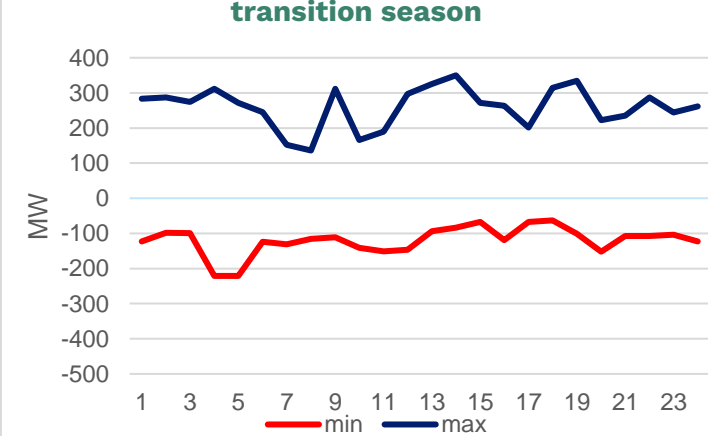
BM average hourly imbalance - winter season



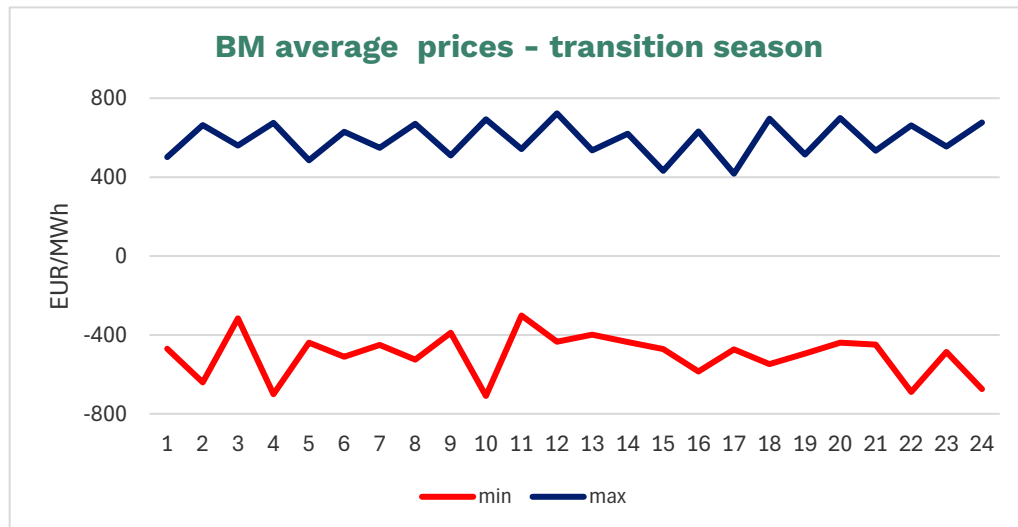
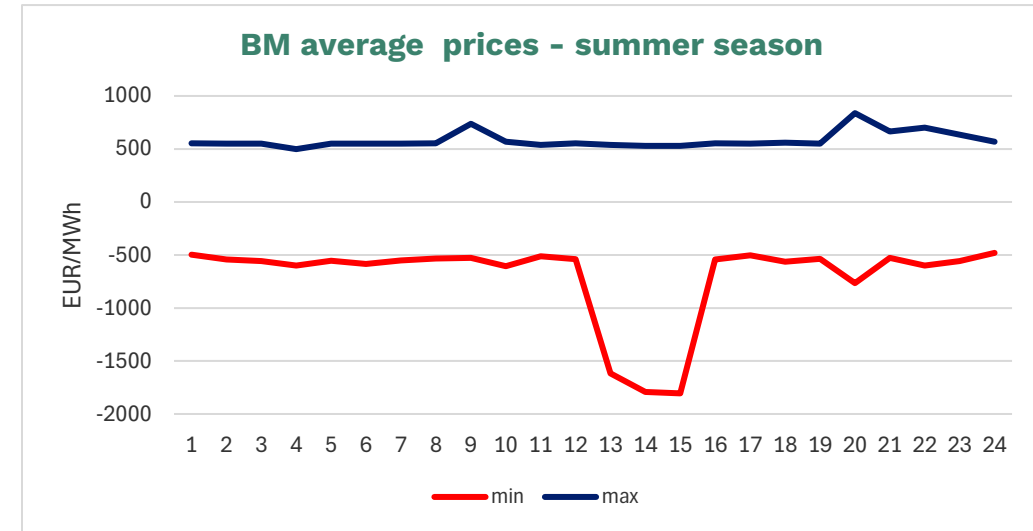
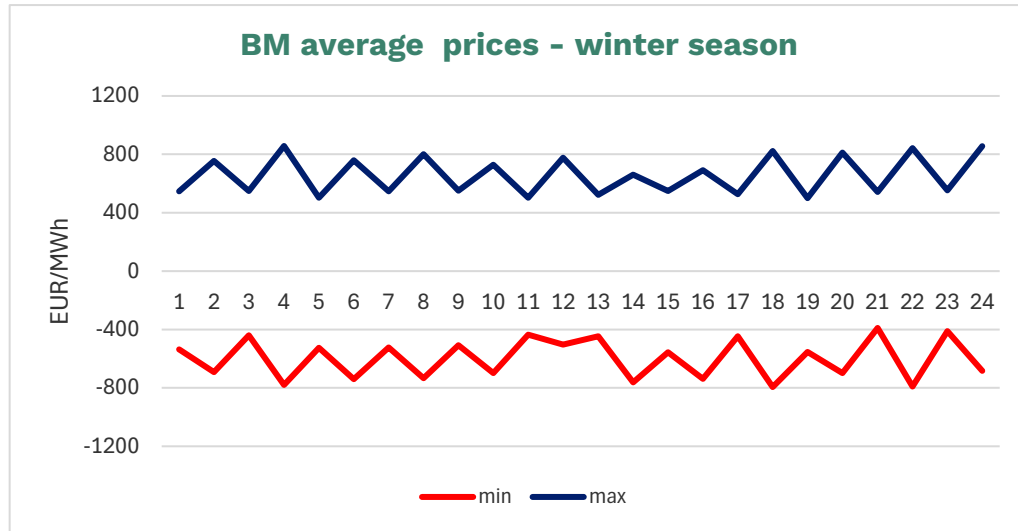
BM average hourly imbalance - summer season



BM average hourly imbalance - transition season



Average prices imbalances 01.06.2023–31.05.2024



FINDINGS

- Average daily imbalances range from -190MW (deficit) to +135MW (surplus)
- Changing the resolution to hourly and averaging by seasons we observe the imbalances varying between -440MW (deficit) and 350MW (surplus)
- The "single imbalance price" mechanism is easily observed in winter and transition seasons respectively; in summer we have atypical minimum prices in the 12:00-16:00 hours interval (surplus with significant negative price)

Offsetting RES imbalances

Different BESS unit revenues depending on RES technology but in average 15kEUR/MWh installed



WPP 300MW

- Analysis period: calendar year
- Total energy produced: 619GWh
- Deficit: 68GWh (average 11%, maximum 176MW)
- Surplus: 173GWh (average 28%, maximum 226MW)
- Total balancing costs: EUR 3,049,561
- Specific balancing cost: **4.92EUR/MWh generated**

Unit revenue per MWh installed

- Analysis period: calendar year
- BESS characteristics: 100MW/200MWh
- Deficit: 68GWh
- Surplus: 173GWh
- Total energy required for balancing: 241GWh
- Total balancing revenues: 3.049.561 EUR
- **Specific balancing revenue: 15kEUR/MWh installed**



PVPP 100MW

- Analysis period: calendar year
- Total energy produced: 136GWh
- Deficit: 28GWh (average 20%, maximum 32MW)
- Surplus: 15GWh (average 11%, maximum 26MW)
- Total balancing costs: 840.446EUR
- Specific balancing cost: **6.17 EUR/MWh generated**

Unit revenue per MWh installed

- Analysis period: calendar year
- BESS characteristics: 30MW/60MWh
- Deficit: 28GWh
- Surplus: 15GWh
- Total energy required for balancing: 43GWh
- Total balancing revenues: 840.446 EUR
- **Specific balancing revenue: 14kEUR/MWh installed**

System services - unit revenue 75kEUR per MWh installed

BESS requirements - system services market

[MW]	Installed power				Power required for system services			
	2023	2025	2030	2050	2023	2025	2030	2050
wind	3,000	3,300	6.120	17.120	400	400	800	2.300
solar	1,400	4,700	9.200	18.200	100	300	700	1.300
total	4,400	8,000	15.320	35.320	500	700	1.500	3.600
gas	2,500	3,912	6.852	6.852	150	200	400	400
hydro	6.500	6,577	6.804	6.804	350	400	570	570

[MW]	2030	2050
BESS - available power band	530	2.630
BESS - minimum installed power at @80%DoD	660	3.290
BESS - minimum installed power at @90%DoD	590	2.920

Zone	Reserve supplier type	Cost limit [EUR/MWh]	Competitors
1	Hydro	0-30	Hydro units
2	BESS	30-80	Hydro units RES (aFRR-/mFRR- only) BESS
3	BESS/gas interference	80-120+	Hydro units RES (aFRR-/mFRR- only) BESS Gas units

Income from system services

BESS 30MW/60MWh

- Analysis period: calendar year
- Reservation revenues: 2,6MEUR, of which:
 - aFRR+: 2.3MEUR
 - aFRR-: 0.3MEUR
- Activation income: 2.5MEUR, of which:
 - aFRR+: 2.1MEUR
 - aFRR-: 0.4MEUR
- Total income: 5.1MEUR
- **Annual unit revenue: 85kEUR/MWh installed**

BESS 100MW/200MWh

- Analysis period: calendar year
- Reservation revenues: 7.3MEUR, of which:
 - aFRR+: 5.6MEUR
 - aFRR-: 1.7MEUR
- Activation income: 7.3MEUR, of which:
 - aFRR+: 5.6MEUR
 - aFRR-: 1.7MEUR
- Total income: 14.6MEUR
- **Annual unit revenue: 73kEUR/MWh installed**

Conclusions

1. The need for system services will increase in proportion to the installed RES capacities over the 2030-2050 horizon.
2. BESS to be considered with multiple revenue sources (system services, imbalance compensation, arbitrage).
3. Annual revenue per MWh installed varies by type of use:
 - System services: (70 ÷ 85) kEUR/MWh
 - Imbalance off-setting: 15kEUR/MWh
 - Arbitrage: (20 ÷ 25) kEUR/MWh
4. Main competitor in the system services market: Hidroelectrica.
5. Competition increases as more and more BESS will be installed; hybridization of RES parks will limit the need for system services as imbalance compensation will be done at source





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