Navigating Electricity Market Design of Greece: Challenges and Reform Initiatives

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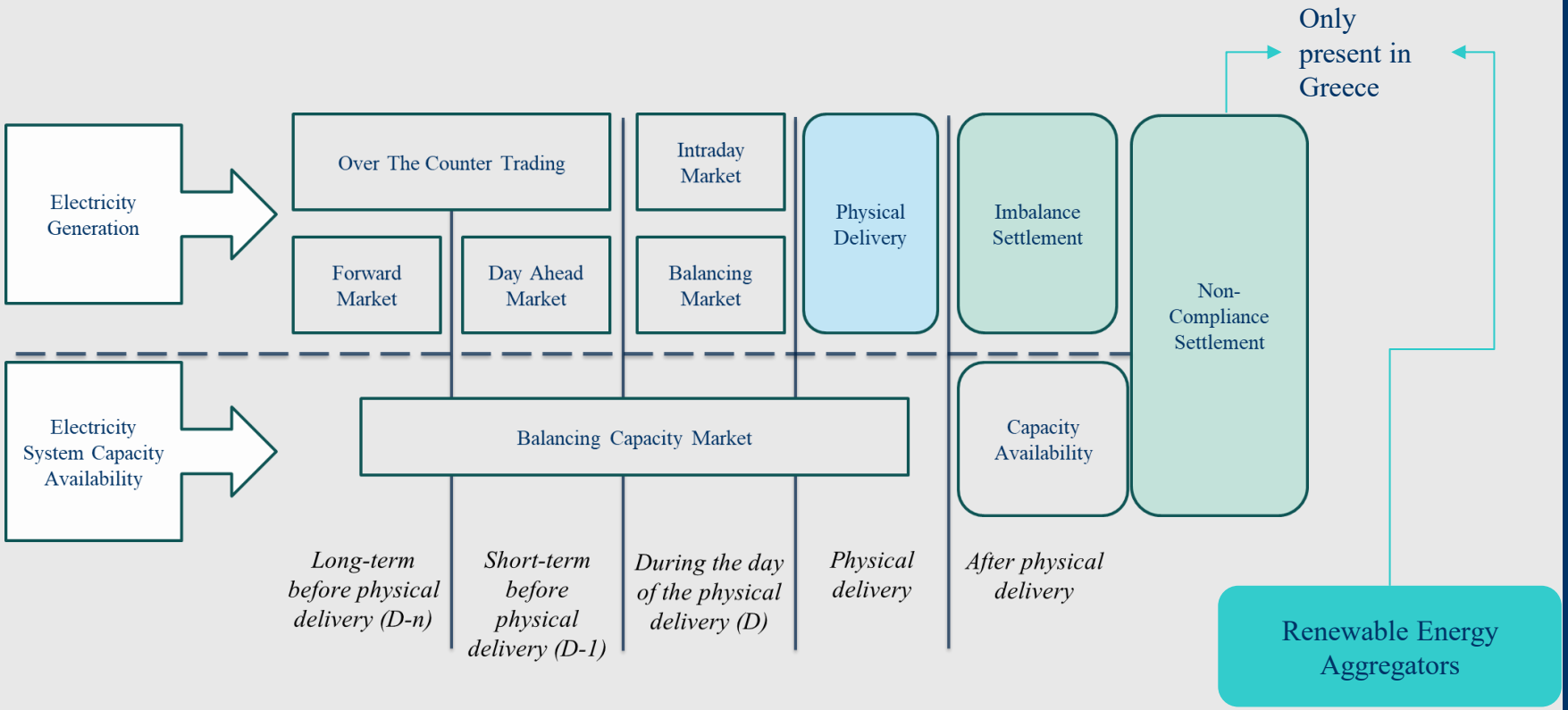
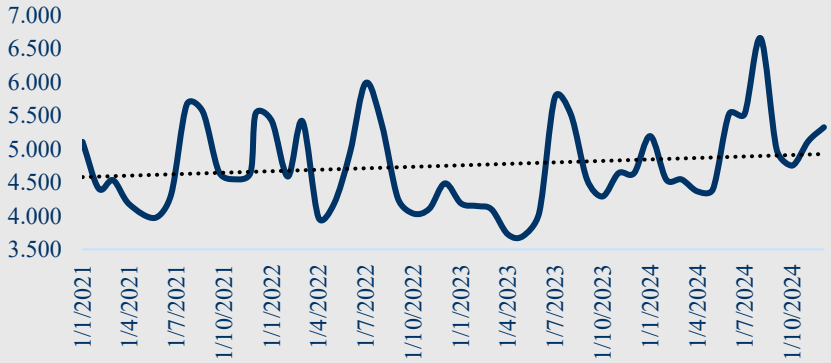


Day Ahead Market (DAM)

Traded Volumes in DAM (MWh), 2021-2024



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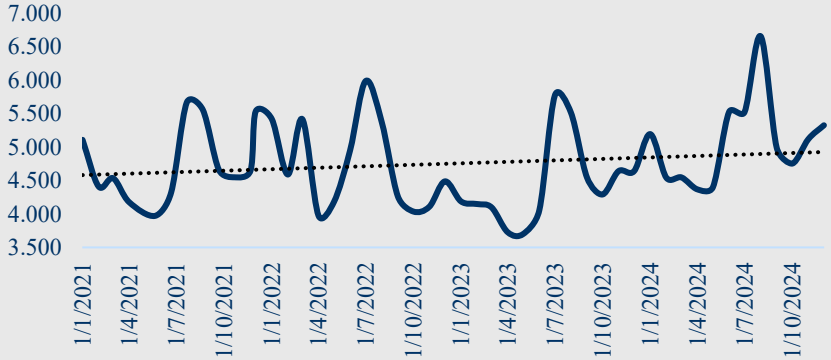
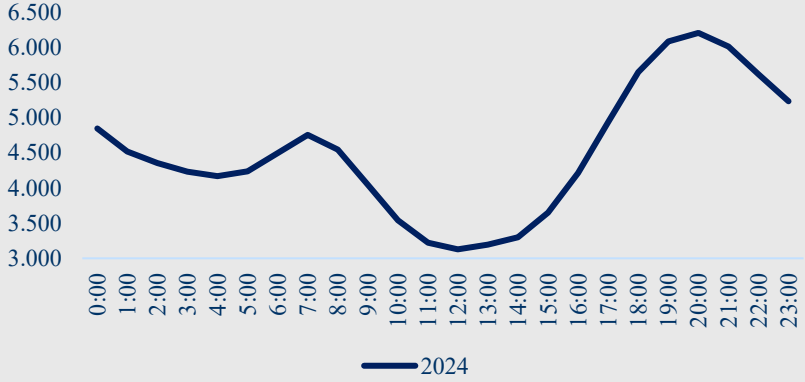


Average Hourly Demand in Greece (MWh), 2024



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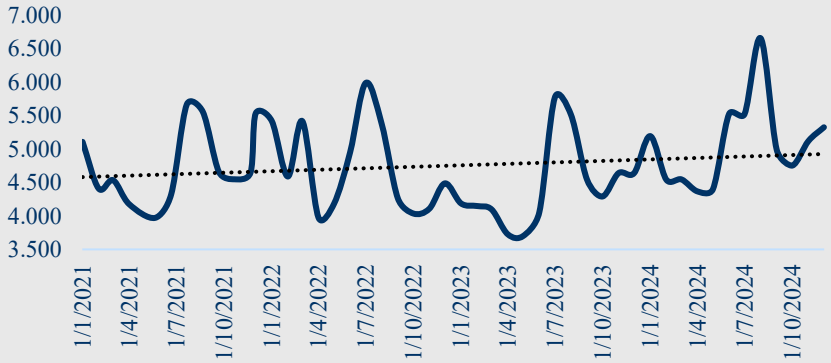
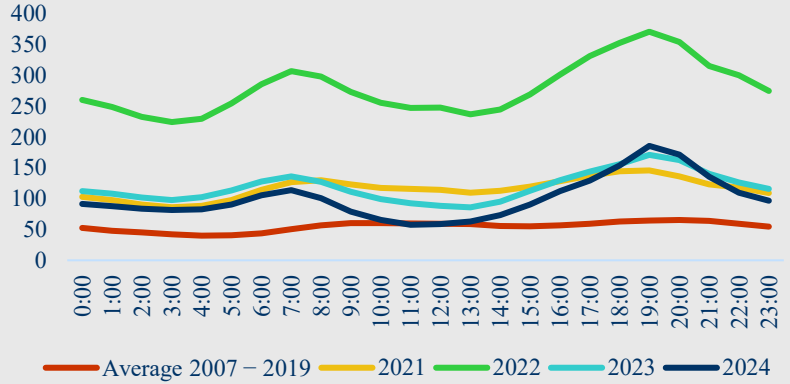


Average Hourly Prices in DAM (€/MWh), 2007-2024



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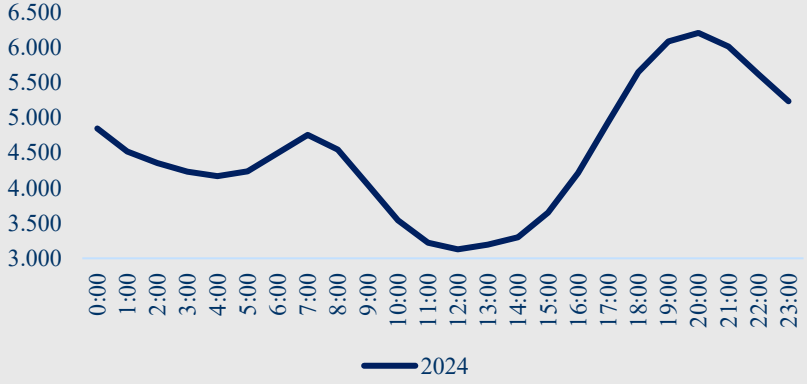

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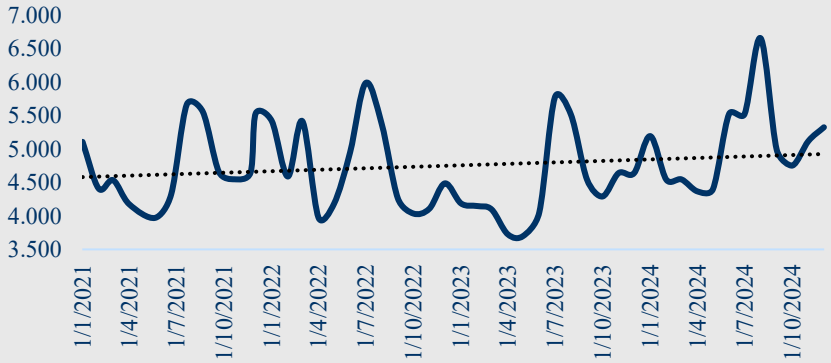

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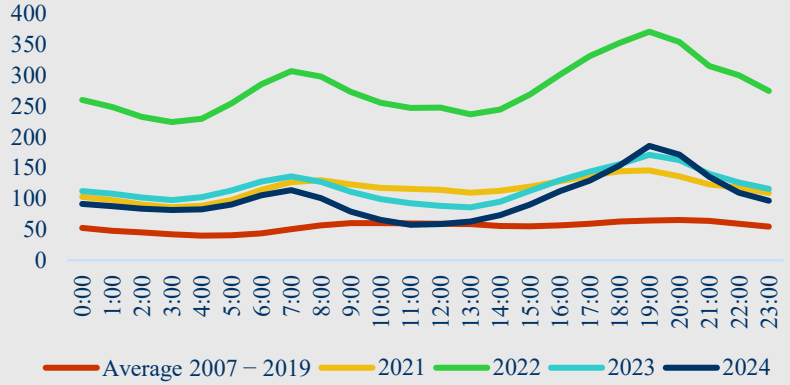

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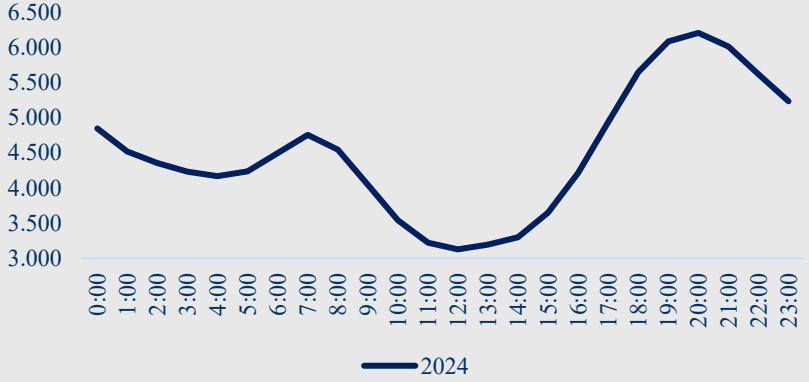
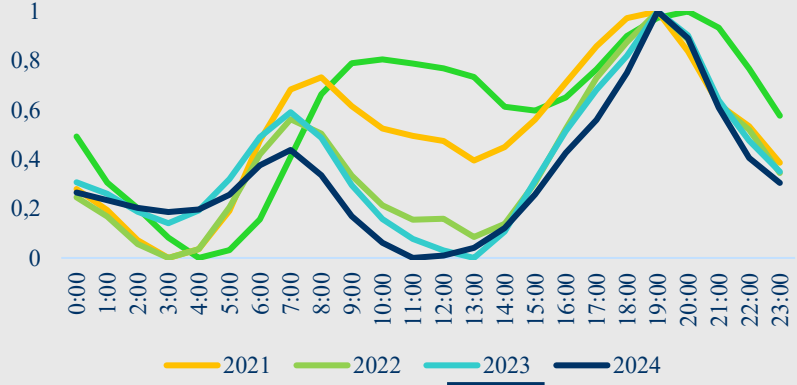
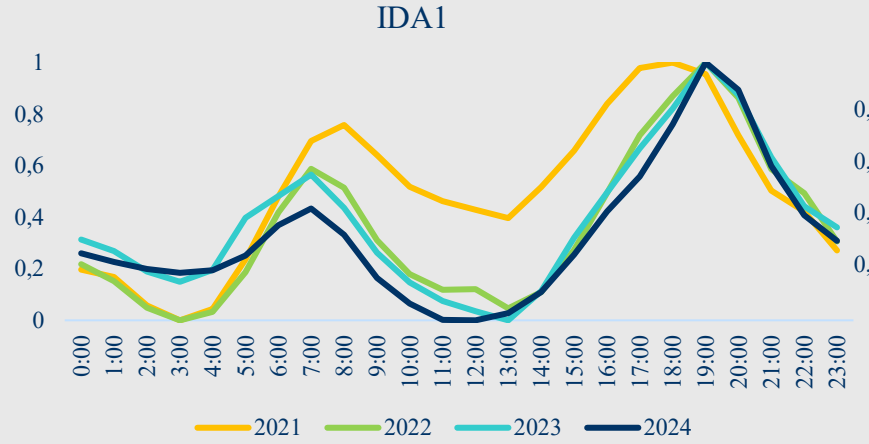


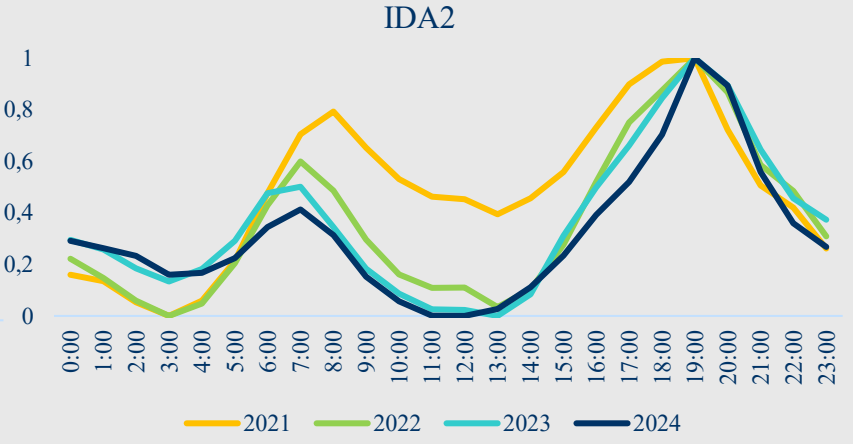
Hourly DAM Price Volatility, 2021-2024

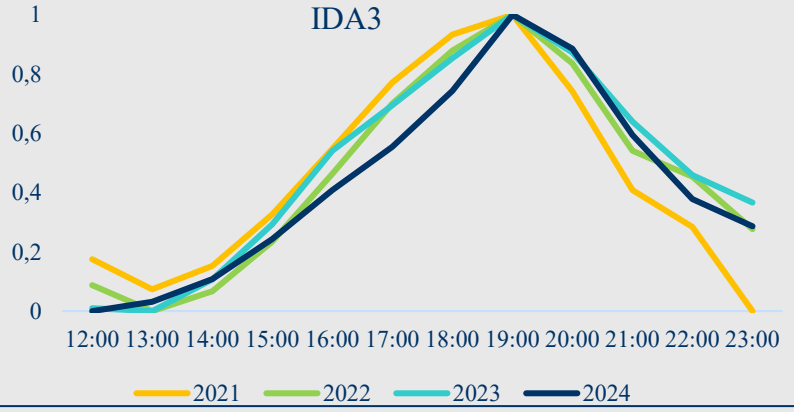


Intraday Markets

Price Volatility of IDAs, 2021-2024

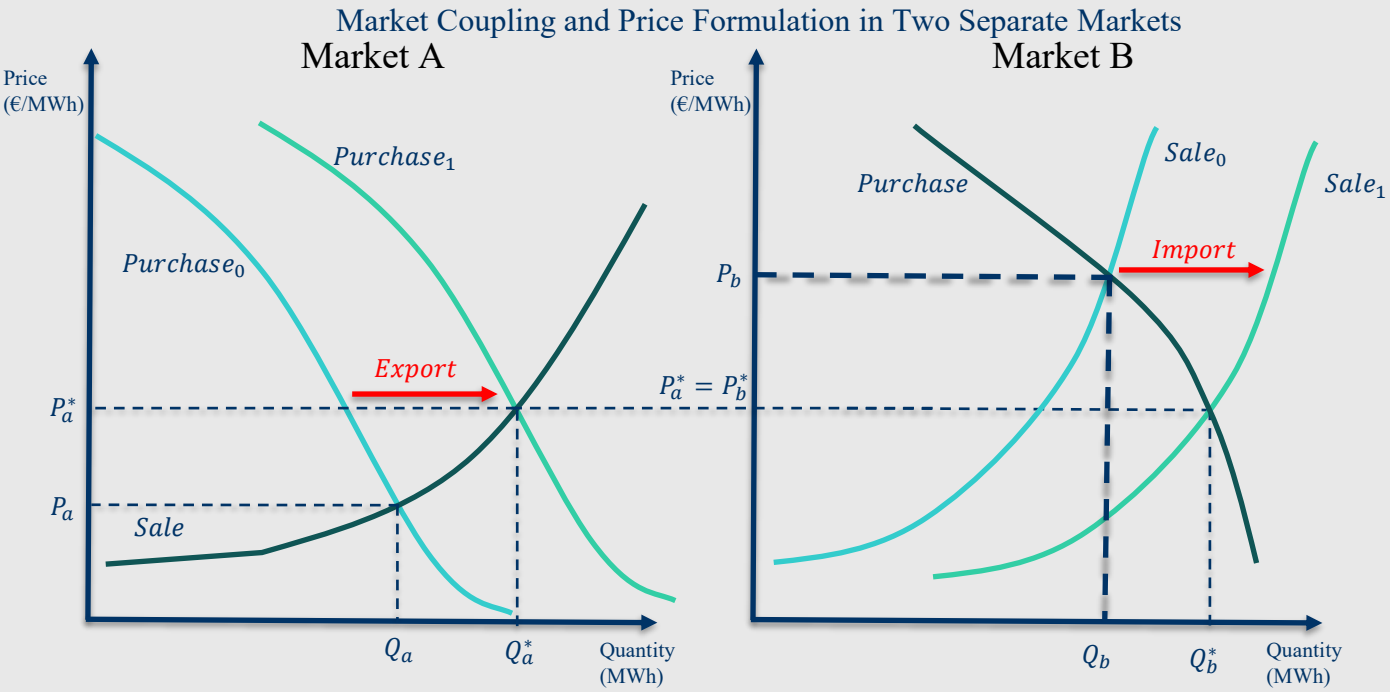






The same volatility pattern is observed across all Intraday Marekts as in DAM for the respective hours

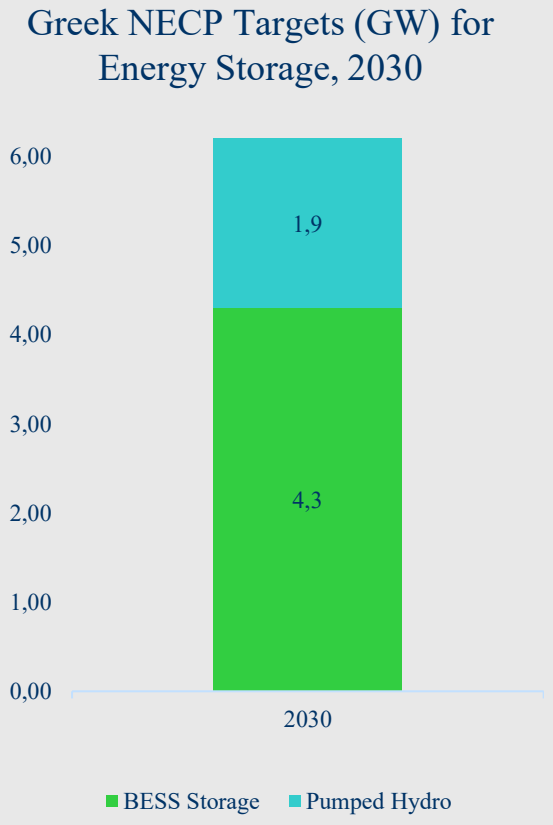
Market Coupling

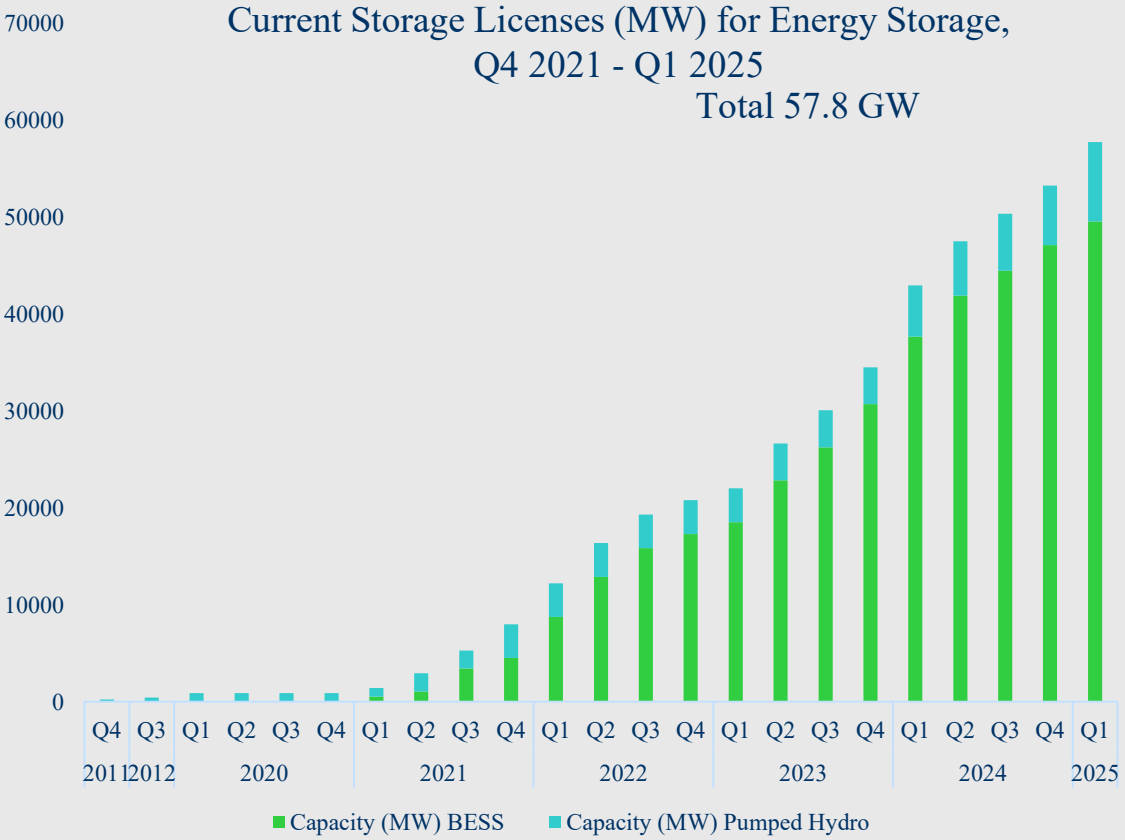


Market Coupling allows for unrealized quantities in one area to be realized in another, while simultaneously bringing down electricity prices.

Currently, 98,6% of EU consumption is coupled in Day-Ahead Terms.
In Intraday Terms 25 out of 27 EU27 countries are coupled. Cyprus and Malta are yet to be coupled.

Greek NECP targets in RES and Storage





Battery Auctions and Operating Aid for Battery Energy Storage Systems in Greece

1st Auction: August 2023
- 12 projects were awarded
- Awarded 411,79 MW across the projects
- Average bid: 49.748 €/MW p.a.
- Lowest bid: 33.94 €/MW p.a.
- Highest bid: 64.12 €/MW p.a.
- 2h storage

2nd Auction: February 2024
- 11 projects were awarded
- Awarded 300 MW across the projects
- Average bid: 47.6 €/MW p.a.
- Lowest bid: 44.1 €/MW p.a.
- Highest bid: 49.9 €/MW p.a.
- 2h storage

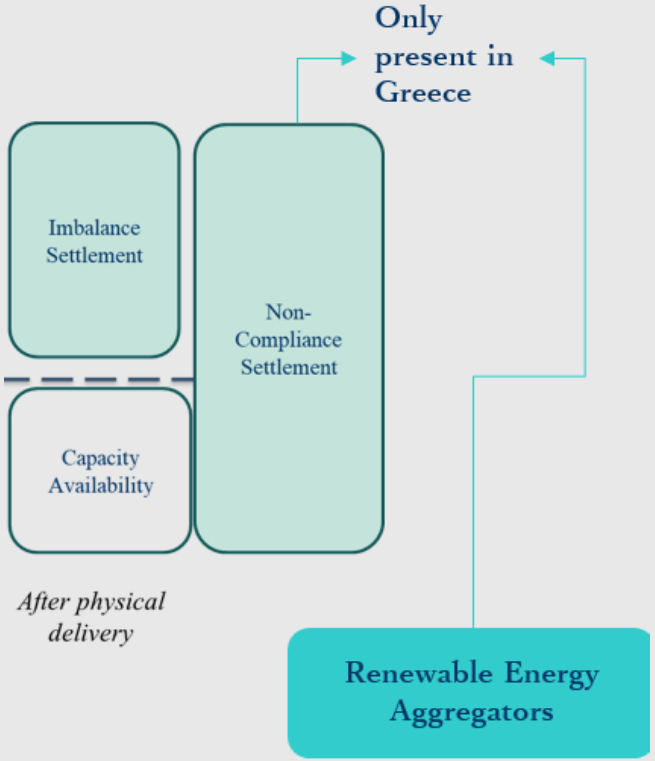
Group A

Auction: January 2025
- 9 projects were awarded
- Awarded 188.9 MW across the projects
- Average bid: 52.589 €/MW p.a.
- Lowest bid: 43.927 €/MW p.a.
- Highest bid: 58.773 €/MW p.a.
- 4h storage

Group B

The RAAEY framework for Battery Energy Storage Systems (BESS) in Greece aims to:
- Encourage active market participation by subsidized BESS
- Reduce risk and revenue uncertainty through a Contract for Difference (CfD) mechanism
- Ensure minimum technical performance over the CfD period

Implications of the Balancing Market in Greece



- The Market Schedules are quarter-hour
- Additional to the Imbalance Settlement Greece has the Non-Compliance Settlement for aggregators to stay in compliance with their submissions
- Renewable Energy Aggregators: working with non-dispatchable RES (Wind and Solar) unable to comply fully with their sumbissions

Conclusions

Target Model

- Introduced to enhance cross-border trading, competition, and reduce emissions
- High-RES penetration

High RES penetration challenges

- Zero (and negative) prices
- RES curtailments
- High price volatility

Causes

- Solar PV oversaturation
- Lack of implemented storage techonologies
- A System for conventional energy sources

Suggestions

- Lifting of non-compliance charges
- Quarter-hour market schedules both in Spot and Balancing Markets
- Storage implementation
- Grid upgrades and additional interconnection capacities