

AURORA  
**Battery**  
**Conference**  
LONDON 2024



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| **OPENING  
KEYNOTE**



# We've been on quite a journey since Aurora's first Battery Conference in 2016...



New analysis from Aurora Energy Research predicts around 13GW of flexible and distributed generation assets set to be deployed through to 2030

BusinessGreen (11 October 2018)



Alan Whitehead @alanwhiteheadmp · 14 Oct  
Good grilling from @UKenergywonk at @AuroraER\_Oxford's #BattConf19 on Labour energy policy.

No crystal ball for the future system - but I'm confident storage and flexibility will be a sizeable part of it!

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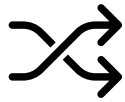
We've had a fantastic day at the Aurora Energy Research Battery Conference London - hosted at the impressive Church House Westminster. Some really interesting discussions taking place, addressing many of the key challenges and opportunities the storage industry is facing today.

## ...many of our predictions have aged well, others less so



GB will see large deployment of grid-scale battery storage reaching ~7GWs by 2030

Likely to be closer to 10GWs



Energy trading will be the dominant battery business model by 2030

Getting there already



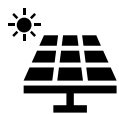
Battery CAPEX will fall significantly by 2025

Yes, though did not foresee the surge in battery costs in 2022-23



A 1-hour battery would earn £68/kW year on average in the 2020s

Aurora's latest forecast would see an average of £66/kW for the remaining 2020s



Colocation provides a material upside to standalone storage

Yes, though colocation deployment has been slower than we expected



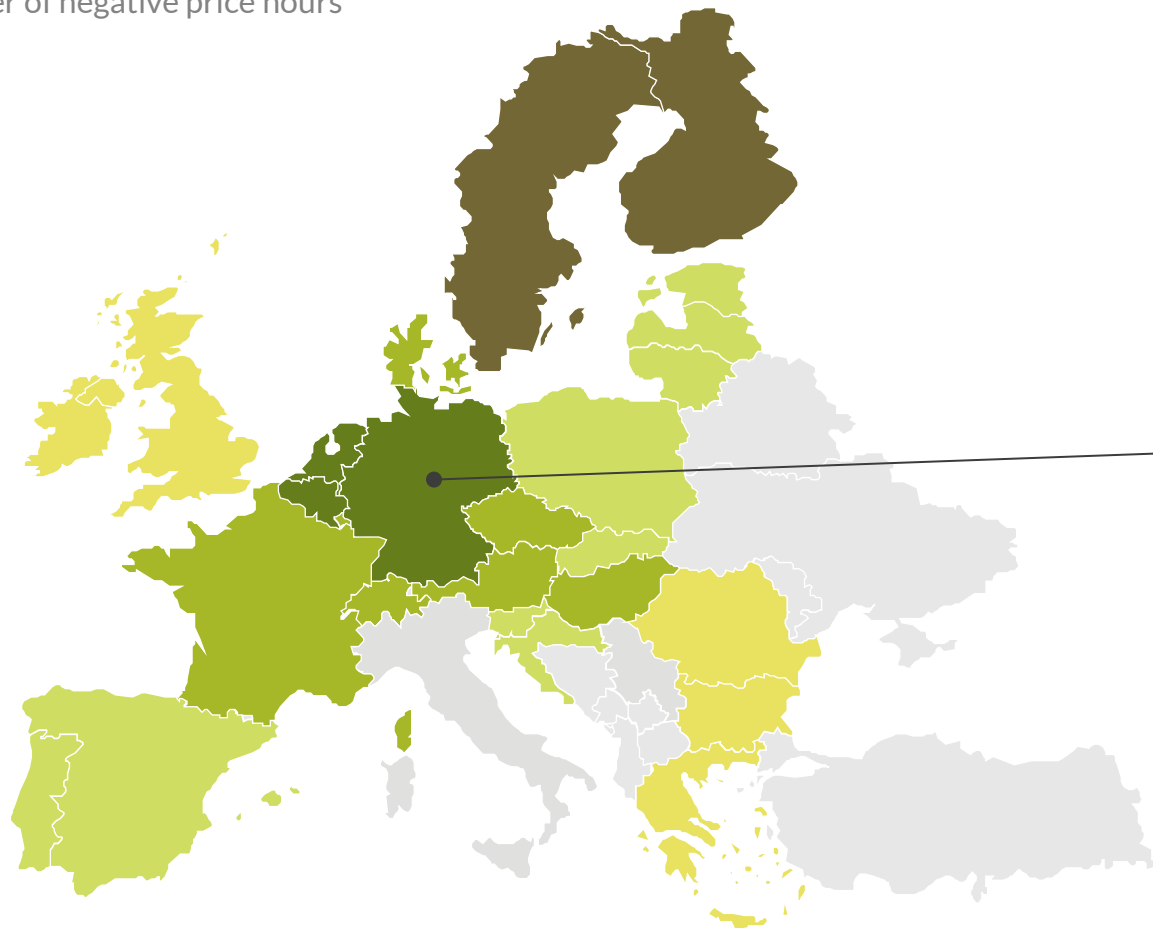
Gas peaker capacity would exceed that of batteries in 2030

Probably still true... but not by much and gas peaker pipeline has dried up

# An increasing number of negative price hours poses a risk for renewables in Europe, but presents a clear upside for batteries

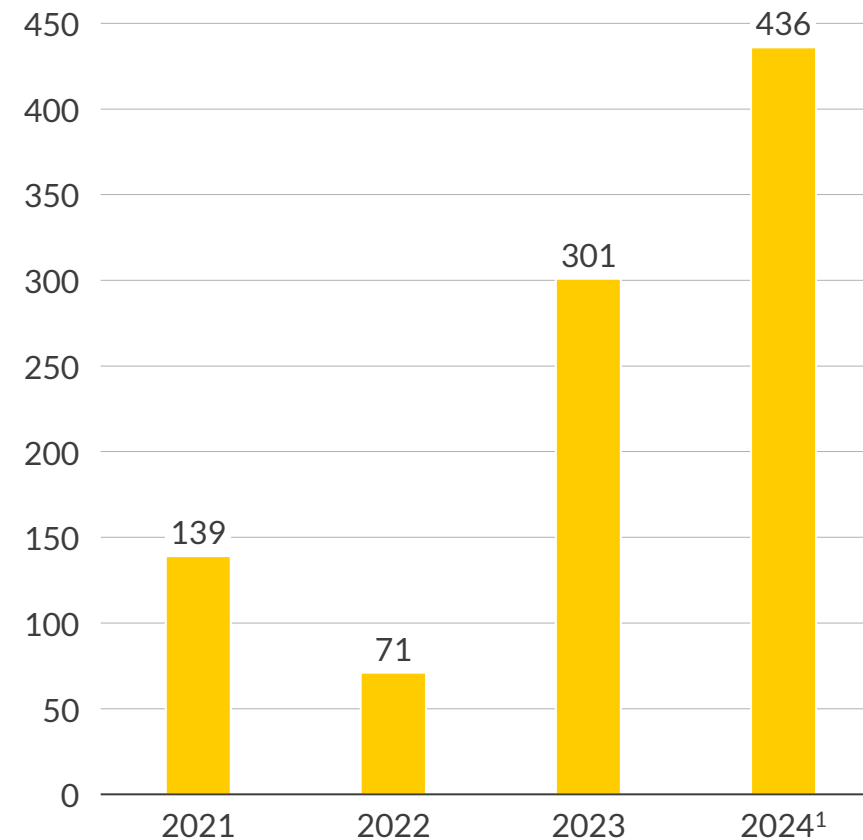
## Negative price hours on the Day Ahead market in 2024<sup>1</sup>

Number of negative price hours



## Yearly number of negative price hours in Germany

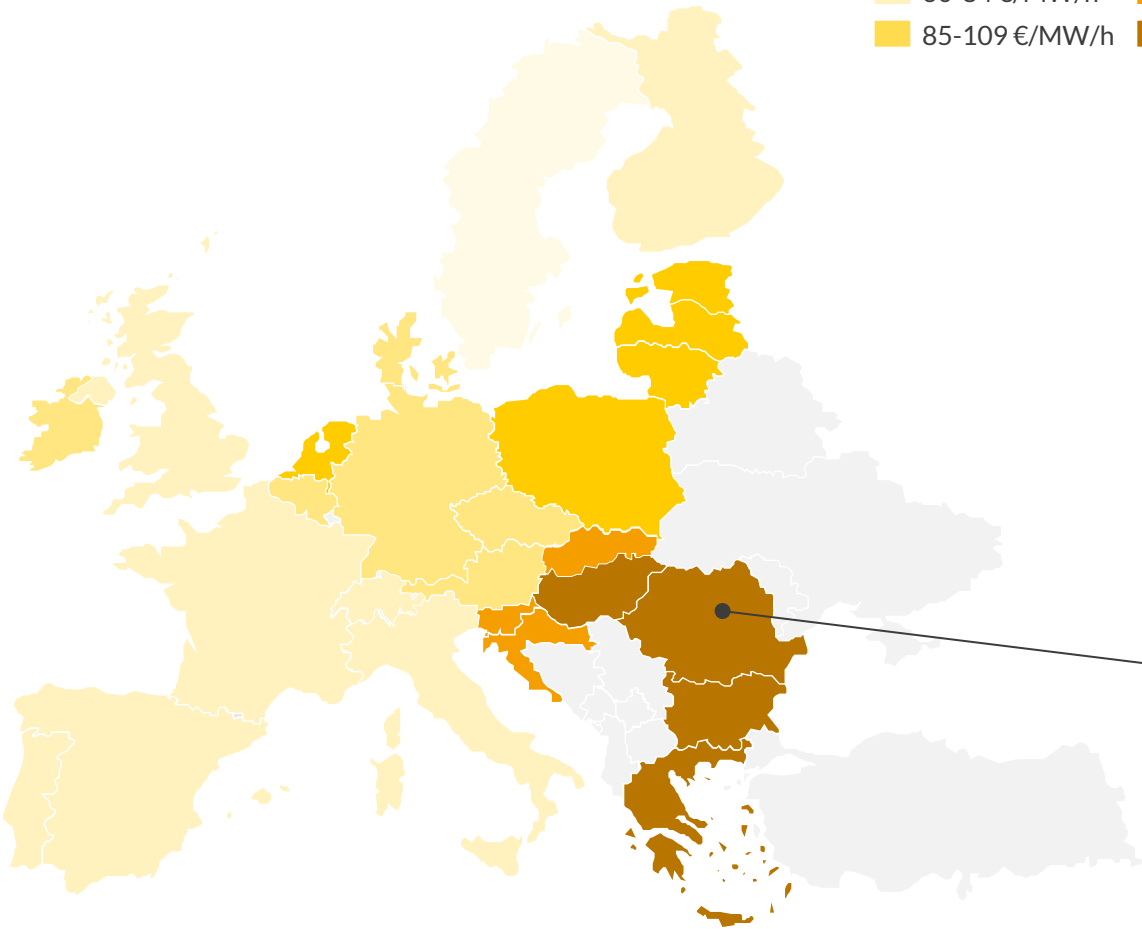
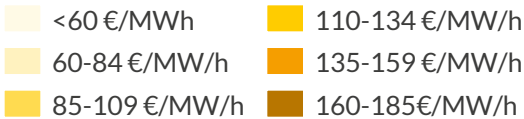
Number of negative price hours



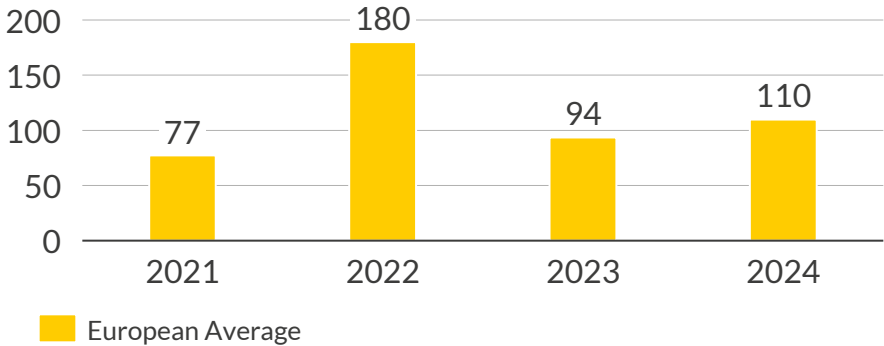
1) Until Nov 2024

# Heatwaves drove price spreads in Southeastern Europe to new heights, averaging above 300 €/MWh in July

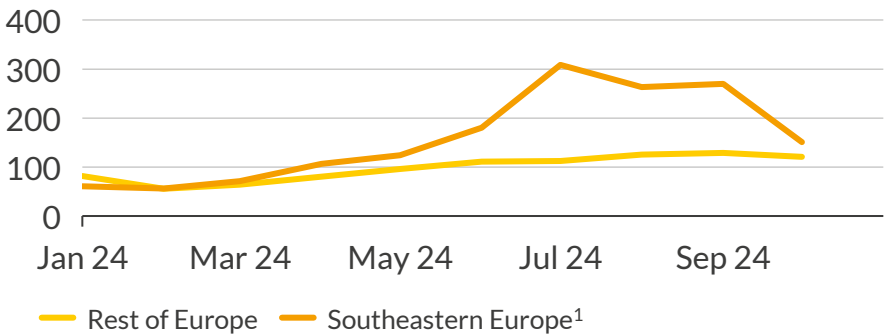
Average daily spreads in the Day-Ahead market 2024  
€/MW/h, nominal



Yearly average daily spread in the Day-Ahead market  
€/MW/h, nominal



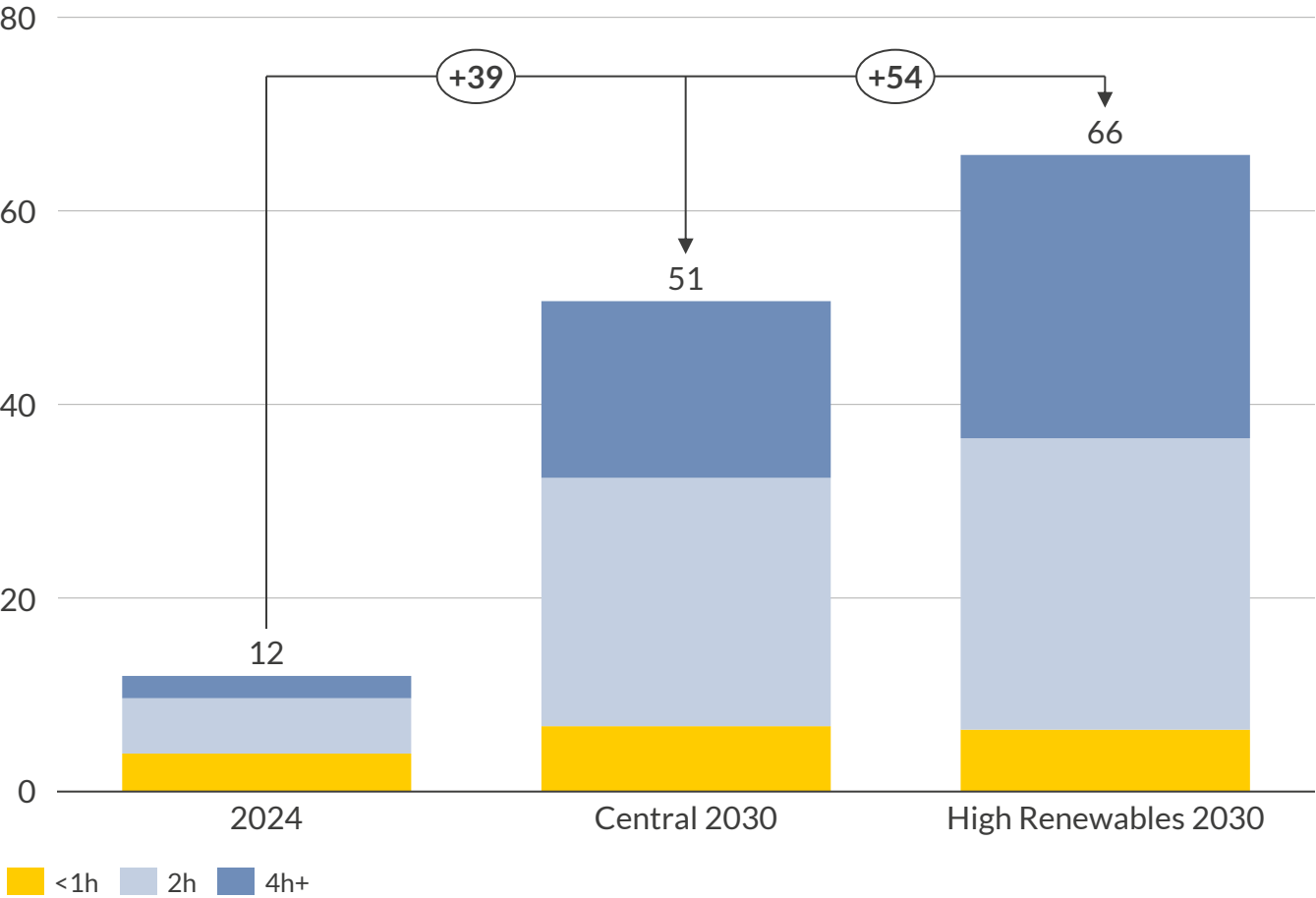
Monthly average daily spreads in the Day-Ahead market  
€/MW/h, nominal



1) Southeastern Europe includes Bulgaria (BGR), Greece (GRC), Hungary (HUN), Croatia (HRV), Romania (ROU), Slovakia (SVK) and Slovenia (SVN)

# Outlook for battery storage in Europe remains very strong with likely addition of 39-54 GW by 2030 and at least 34€bn investment

Installed grid-scale battery capacity in Europe  
GW



Rapid deployment of renewables...



...alongside slow uptake of EVs and demand flexibility...



...leading to a surge in low and negative prices



Slow pace of grid upgrades, leading to curtailment



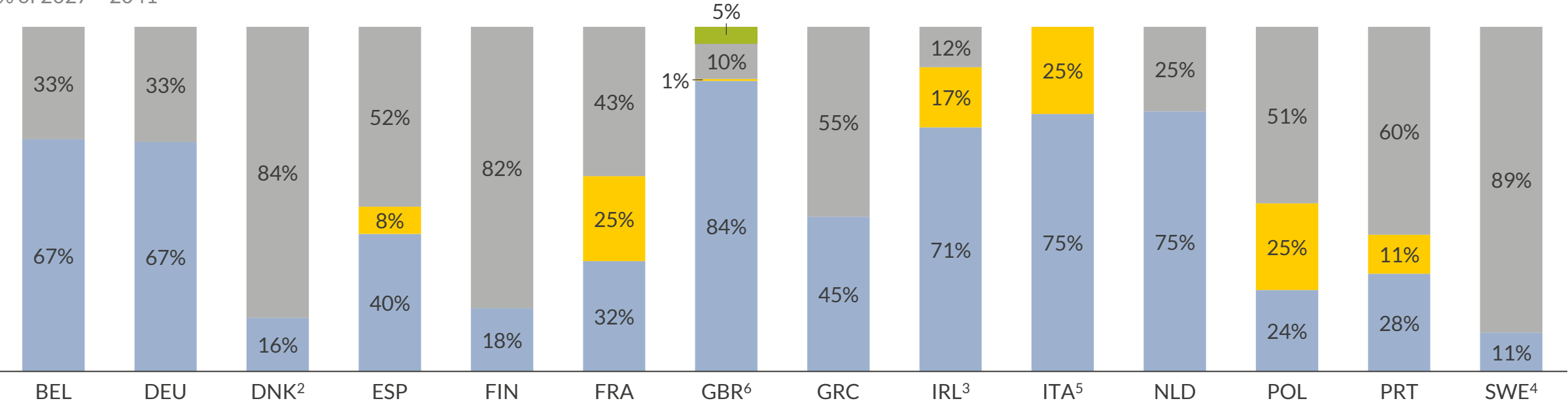
Accelerated phaseout of thermal capacities



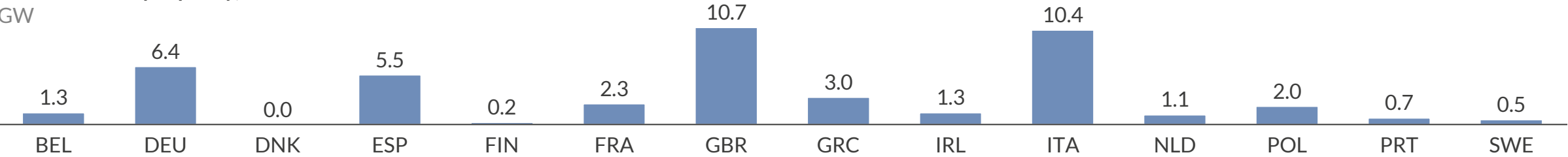
Government support and reform of markets

# There’s no one size fits all: European battery markets vary significantly in their size and revenue opportunities

Average composition of gross margin stack, 2hr battery<sup>1</sup>  
% of 2027 – 2041



Forecast battery capacity, 2030  
GW



Energy arbitrage (Wholesale Market + Ancillary Services + Other Balancing) Capacity Market Payments Capacity payments for ancillary services Other Ancillary Markets

1) Shown for a representative battery with 2027 entry year; 2) Represents DK2; 3) Assumes improvements to Irish network communication with generators; 4) Represents SE4; 5) Represents the North zone of Italy. Energy arbitrage is between day ahead market and MSD; 6) Includes Triads and GDUoS benefits in GBR  
Source: Aurora Energy Research

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