

GB Market Summary December 2023

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A U R  R A

Power markets



Renewables



Storage



Electric vehicles



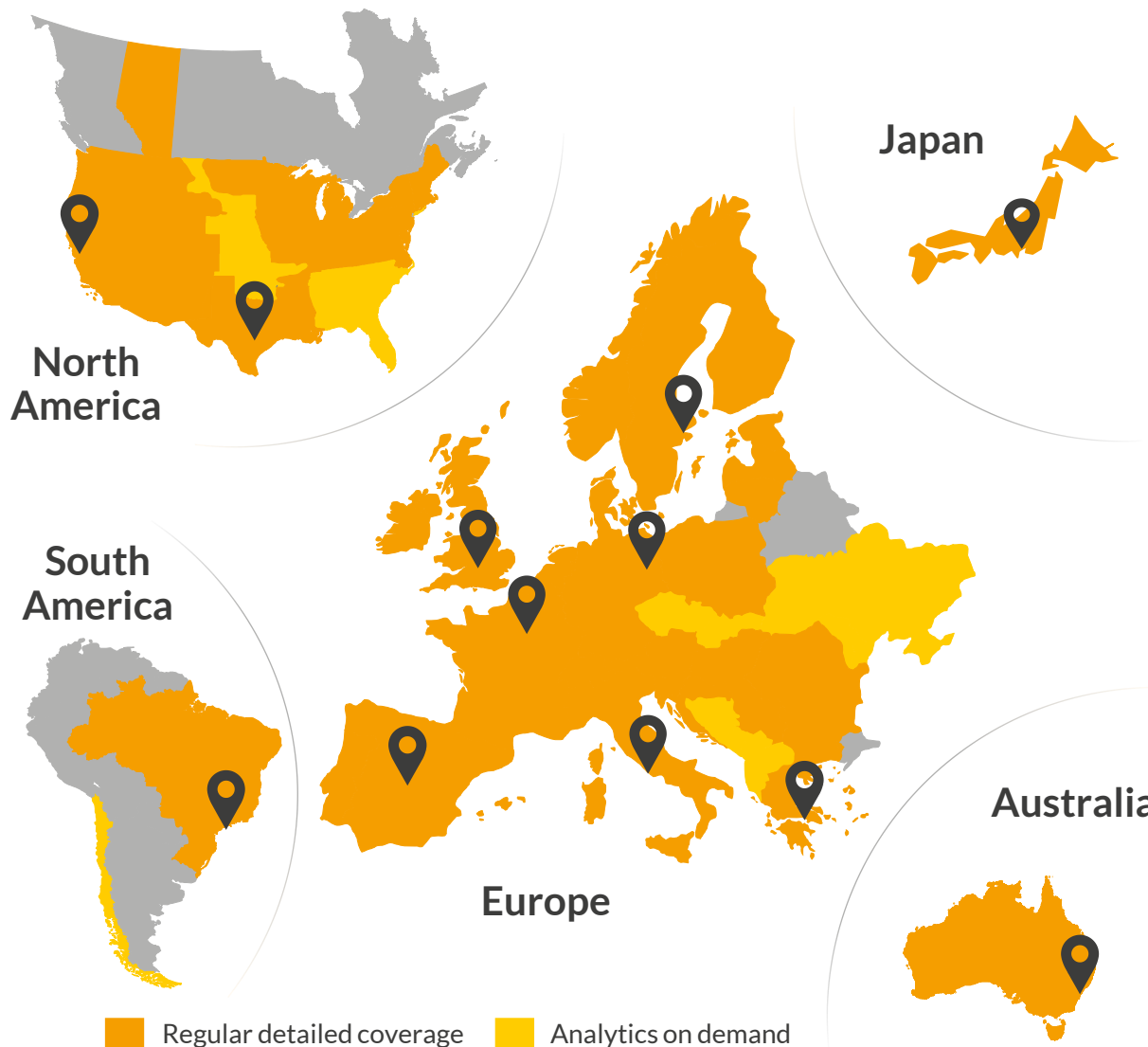
Hydrogen



Carbon



Natural gas



12 Offices

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São Paulo



500+

market experts



750+

subscribing companies



150+

transactions supported in 2022



Executive Summary

- The average power price in December was £66.6/MWh, a 27% decrease since the average of £91.3/MWh in November and a 72.6% decrease year-on-year
- This monthly fall in average power price despite higher demand is due to lower average gas and carbon prices alongside significant onshore and offshore wind generation
- Higher low carbon generation led to grid carbon intensity falling 26.4% month-on-month, and 32% year-on-year
- The UK-ETS remained heavily discounted to the EU ETS, trading at 40% discount at an average of £37.2/tCO₂ in December

		Monthly value ¹	Month-on-month change	Year-on-year change	Slide reference(s)
System Performance	Power prices, £/MWh	66.6	-24.6 (27.0%)	-176.4 (72.6%)	<u>5, 6</u>
	Gas prices, £/MWh	29.0	-7.2 (19.9%)	-62.1 (68.2%)	<u>8</u>
	Carbon ² prices, £/tCO ₂	52.7	-7.4 (12.2%)	-41.7 (44.2%)	<u>8</u>
	Transmission demand, TWh	23.7	+1.0 (4.6%)	-1.2 (4.7%)	<u>12</u>
	Low carbon ³ generation, TWh	15.4	+3.3 (24.6%)	+2.8 (20.6%)	<u>13, 14</u>
	Thermal ⁴ generation, TWh	6.6	-1.3 (16.3%)	-3.2 (32.4%)	<u>13, 14</u>
	Grid carbon intensity, gCO ₂ e/kWh	129.2	-46.4 (26.4%)	-60.9 (32.0%)	<u>16</u>
Capture Prices	Offshore wind, £/MWh	57.9	-23.5 (28.9%)	-139.9 (70.7%)	<u>20</u>
	Onshore wind, £/MWh	55.2	-22.8 (29.2%)	-140.5 (71.8%)	<u>20</u>
	Solar PV, £/MWh	84.1	-5.3 (5.9%)	-214.9 (71.9%)	<u>20</u>

		Monthly value ¹	Variance to historical monthly average ⁵	Slide reference(s)
Load Factors	Offshore wind, %	62.8	+12.8 p.p.	<u>19</u>
	Onshore wind, %	46.4	+14.3 p.p.	<u>19</u>
	Solar PV, %	1.7	-0.7 p.p.	<u>19</u>

1) Values averaged over the calendar month. 2) Includes CPS and EU ETS until 18th May 2021 and UK ETS from 19th May 2021 onwards; 3) Includes renewables and nuclear generation 4) Includes CCGTs, coal and other fossil plants; 5) Comparing to the average of same month in the previous 5 years.

Sources: Aurora Energy Research, Thomson Reuters, National Grid, Ofgem, Elxon

- I. Wholesale market summary
- II. Renewable performance (redacted)
- III. Company performance (subscriber only)
- IV. Plant performance (redacted)
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Historic monthly average EPEX spot price

Average EPEX spot price¹
£/MWh



— Average monthly spot price — Annual average spot price (x) Month-on-month difference (x) Year-on-year difference

1) Average monthly EPEX is the average over the month of the volume-weighted reference prices for each half-hour interval.

Half-hourly EPEX spot price for December

EPEX spot price¹
£/MWh

Monthly average price in December 2023:
66.63 £/MWh



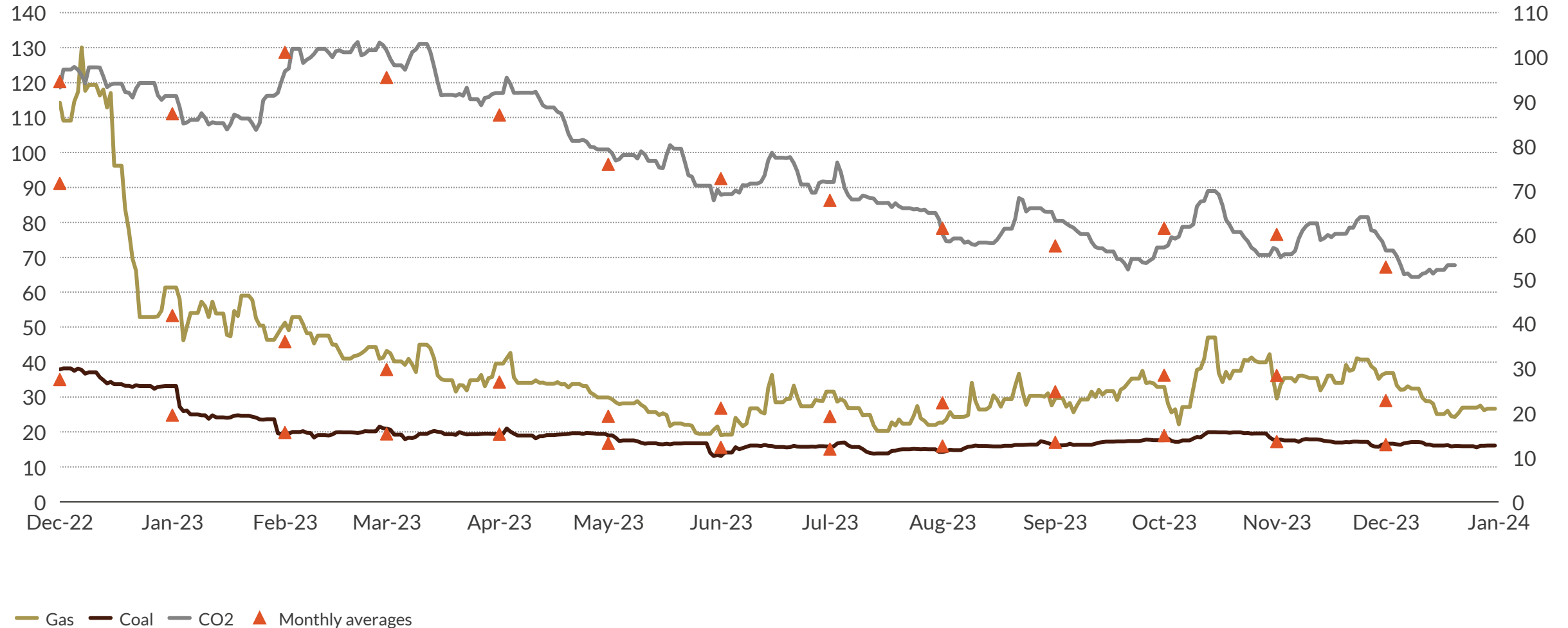
1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot

Historic fuel prices

Gas, Coal and Carbon daily prices

Gas/Coal price
£/MWh

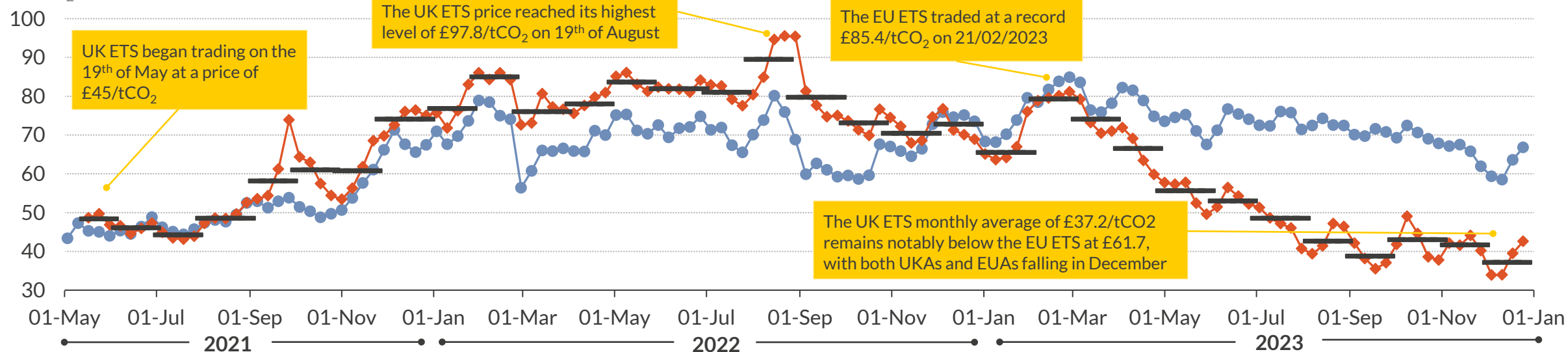
Total GB Carbon price
£/tCO₂



Historic weekly UK ETS and EU ETS Prices

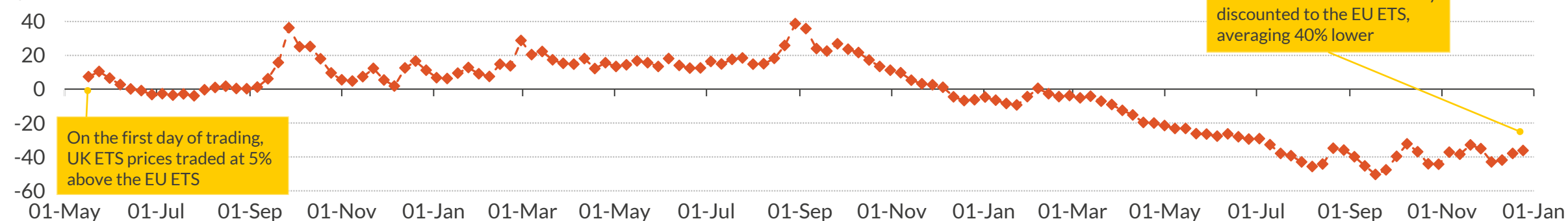
Weekly average EU and UK ETS prices

£/tCO₂



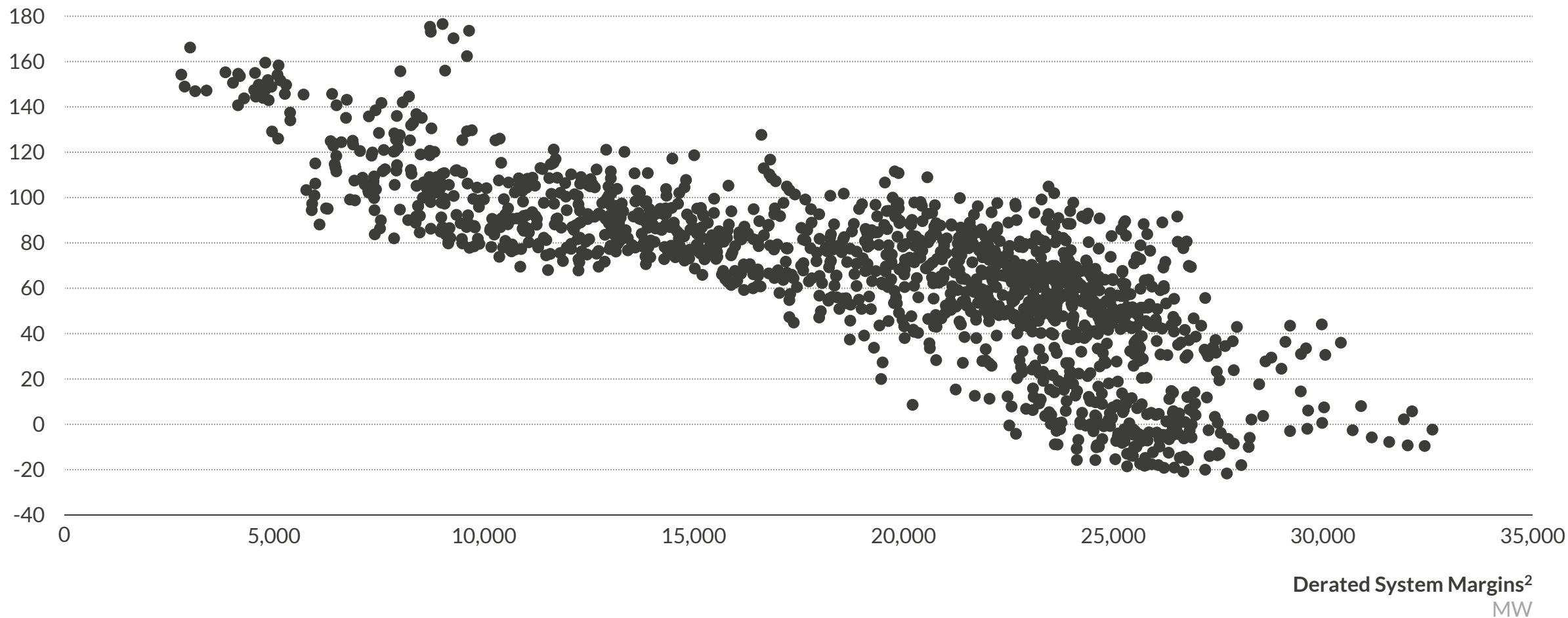
Relative difference between UK and EU ETS prices

%



Half-hourly spot prices against half-hourly system margins for December

EPEX spot price¹
£/MWh

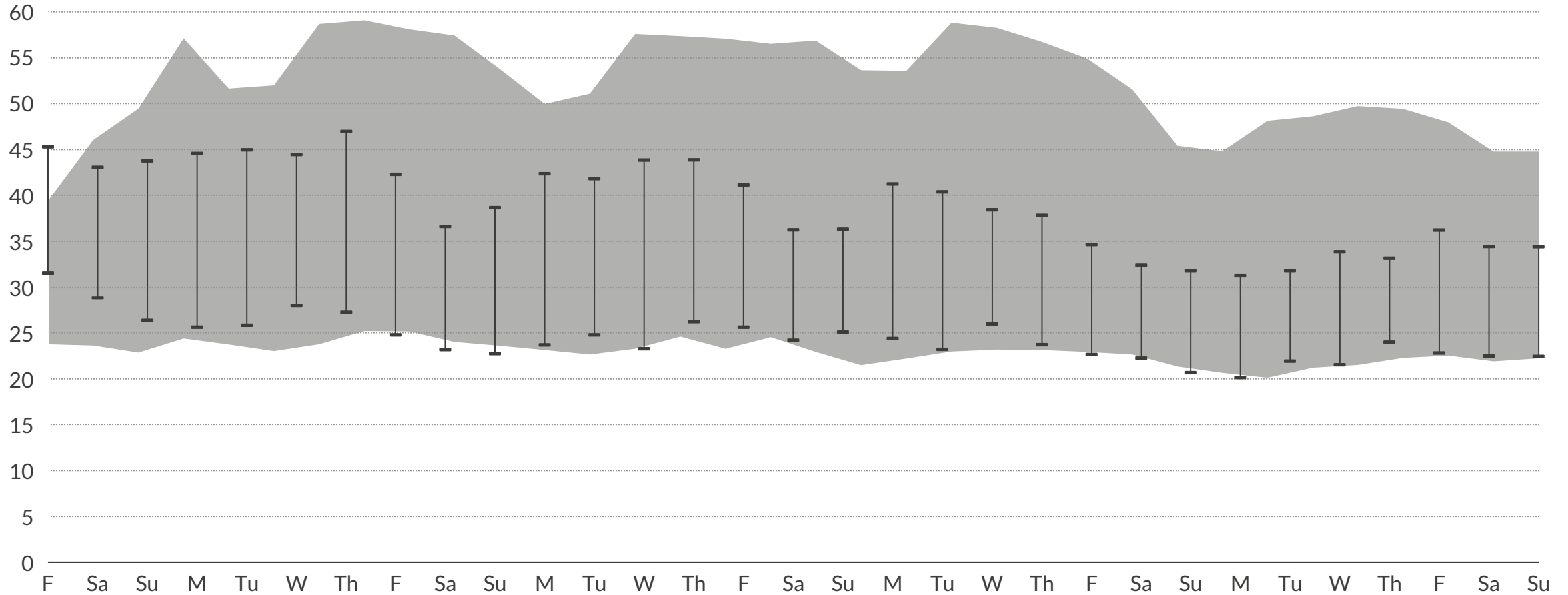


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) De-Rated Margin Forecast calculated in accordance with the Loss of Load Probability Calculation Statement from Elexon.

Daily December max and min demand

Relative to historic December max and min demand since 2010¹

Demand²
GW

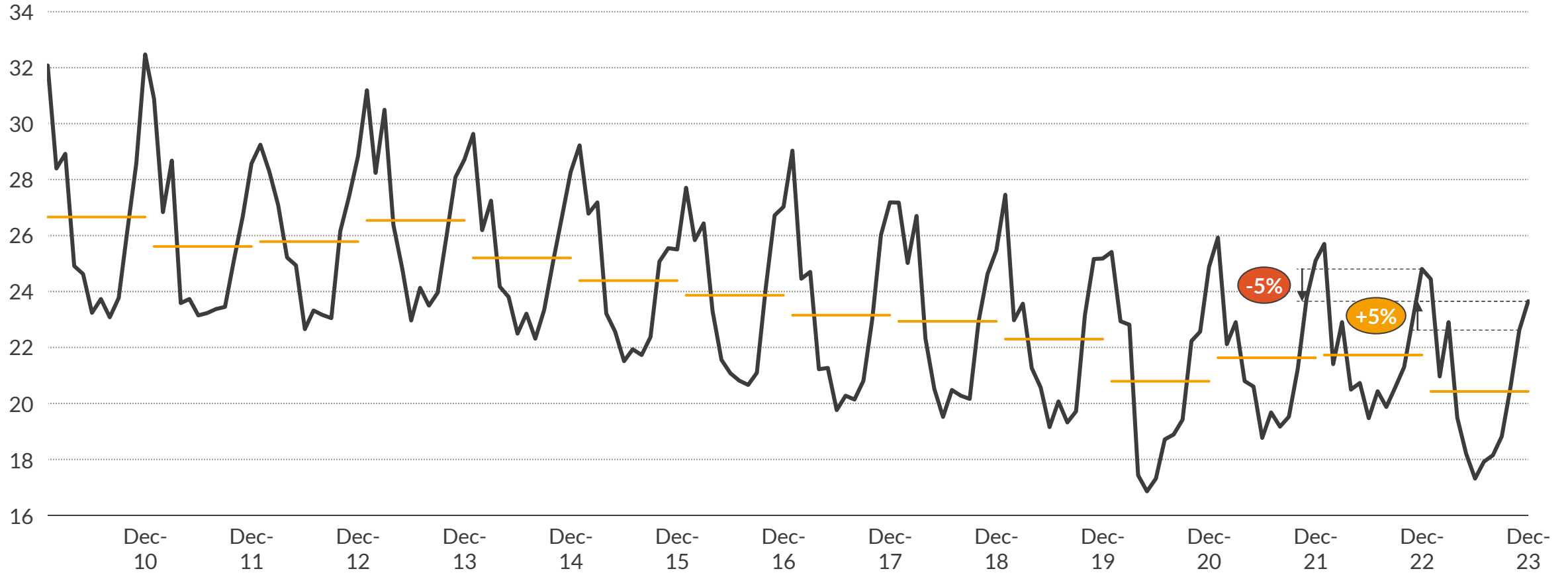


I Daily range ■ Historic maximum/minimum

1) Data from previous years is matched to the nearest weekday within the current month, to maintain the weekly demand pattern. 2) Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include embedded demand.

Monthly historical demand on the transmission system

Total demand¹
TWh

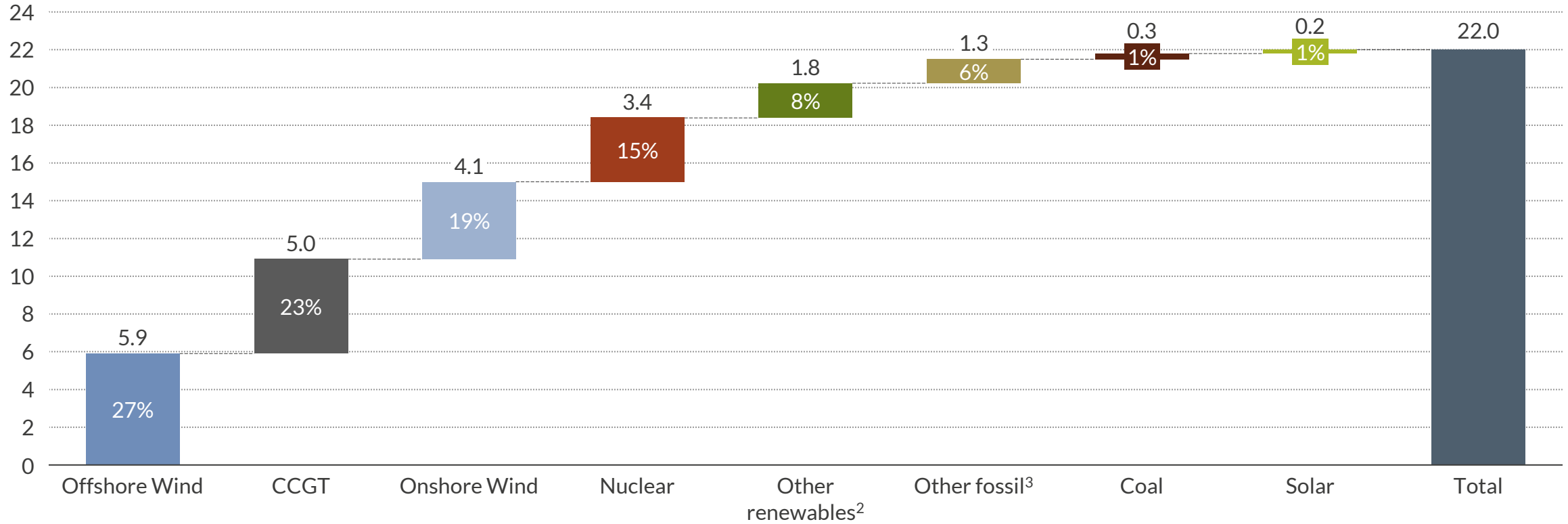


— Total monthly demand — Annual average demand x Month-on-month difference x Year-on-year difference

1) Demand data presented here is Initial Transmission System Demand Out-Turn, and includes station transformer load, pumped storage demand and interconnector demand, but does not include embedded demand.

Monthly fuel mix breakdown

Output¹
TWh



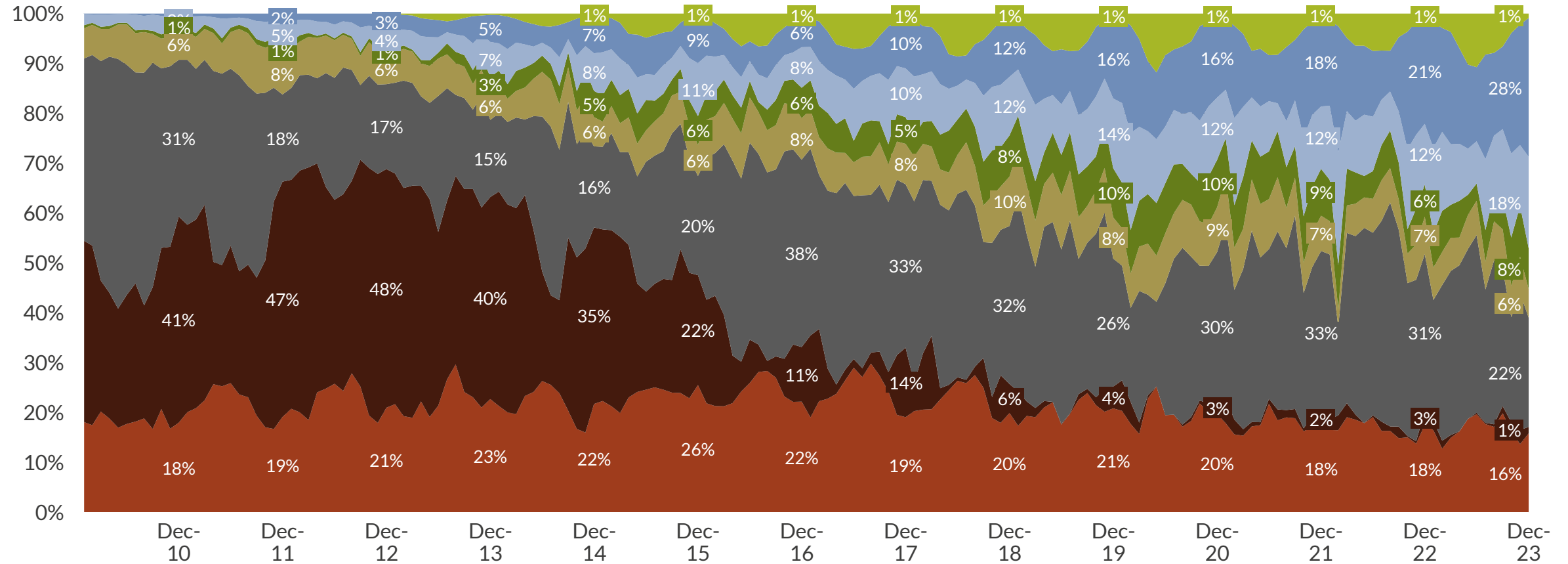
Load factor
%



1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV assets. All numbers are rounded to 0.1 TWh which means that subtotals may not sum to total value. 2) Other fossil includes oil, CHP-CCGT and OCGT. 3) Other renewables includes biomass and hydro.

Historical fuel mix breakdown

Output¹
% of total

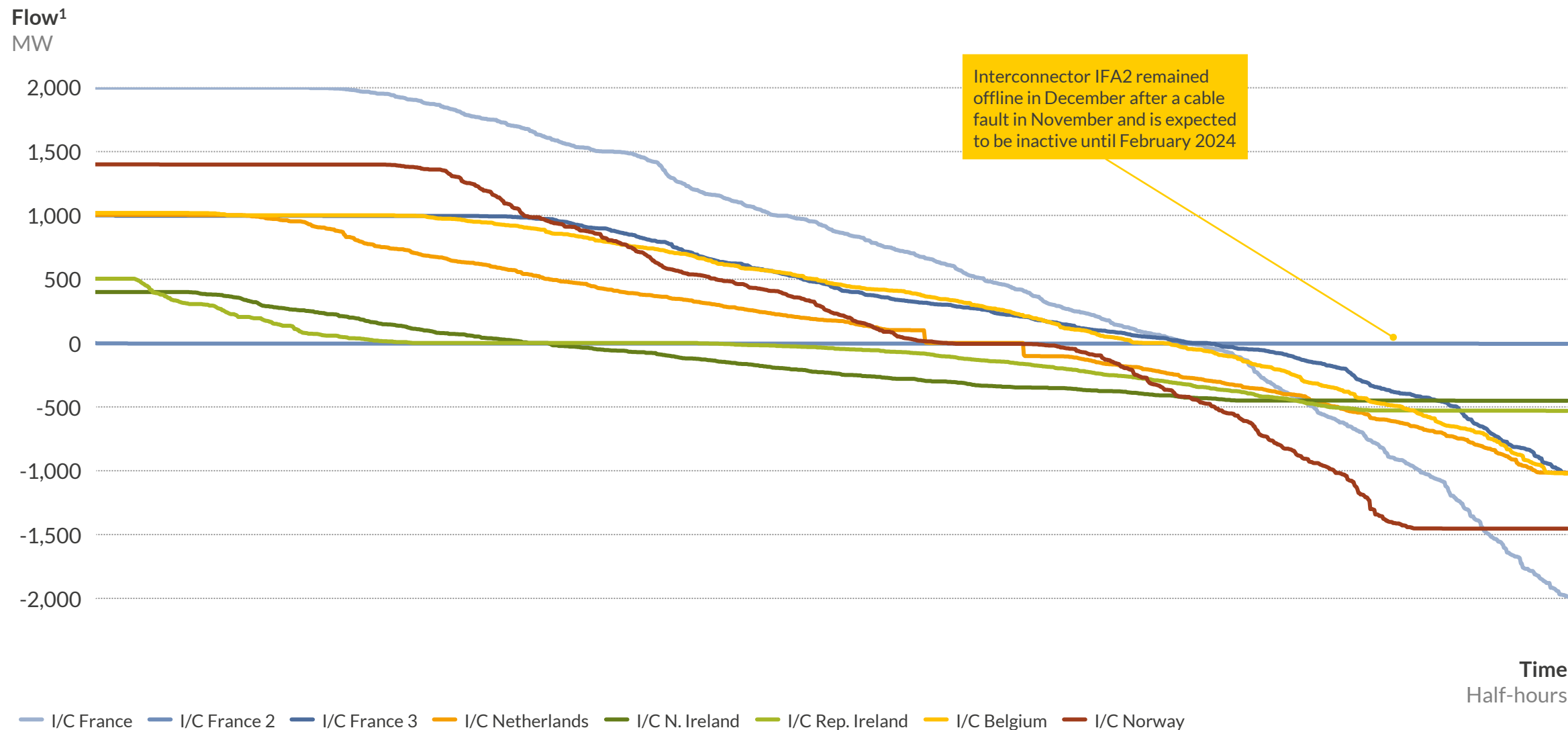


Imports Solar Offshore Wind Onshore Wind Other renewables³ Other fossil² CCGT Coal Nuclear

1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV. 2) Other fossil includes oil, CHP-CCGT and OCGT. 3) Other renewables includes biomass and hydro.

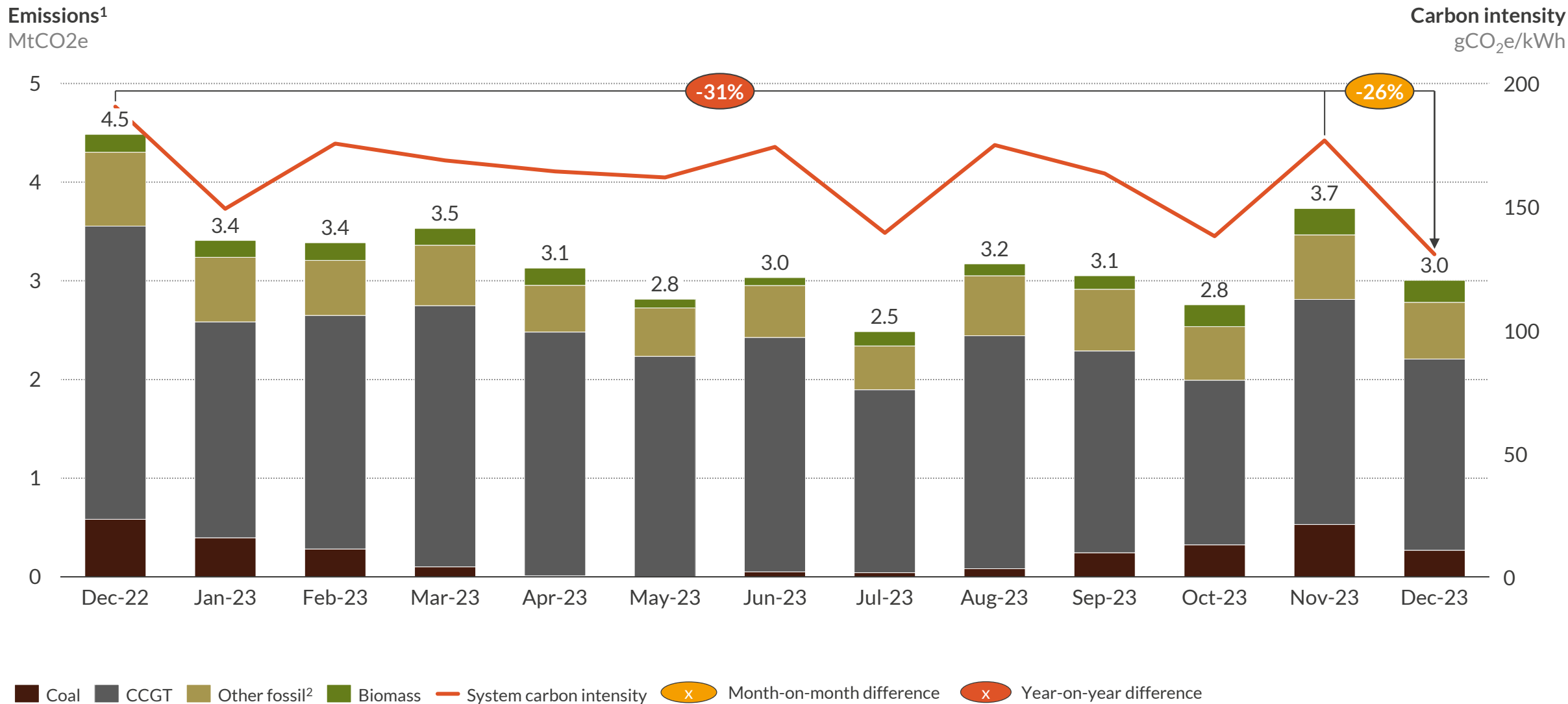
Monthly interconnector flow duration curve

Flow in each half-hour for GB interconnectors



1) Positive flow is imports into GB, negative flow is exports.

Monthly emissions by technology



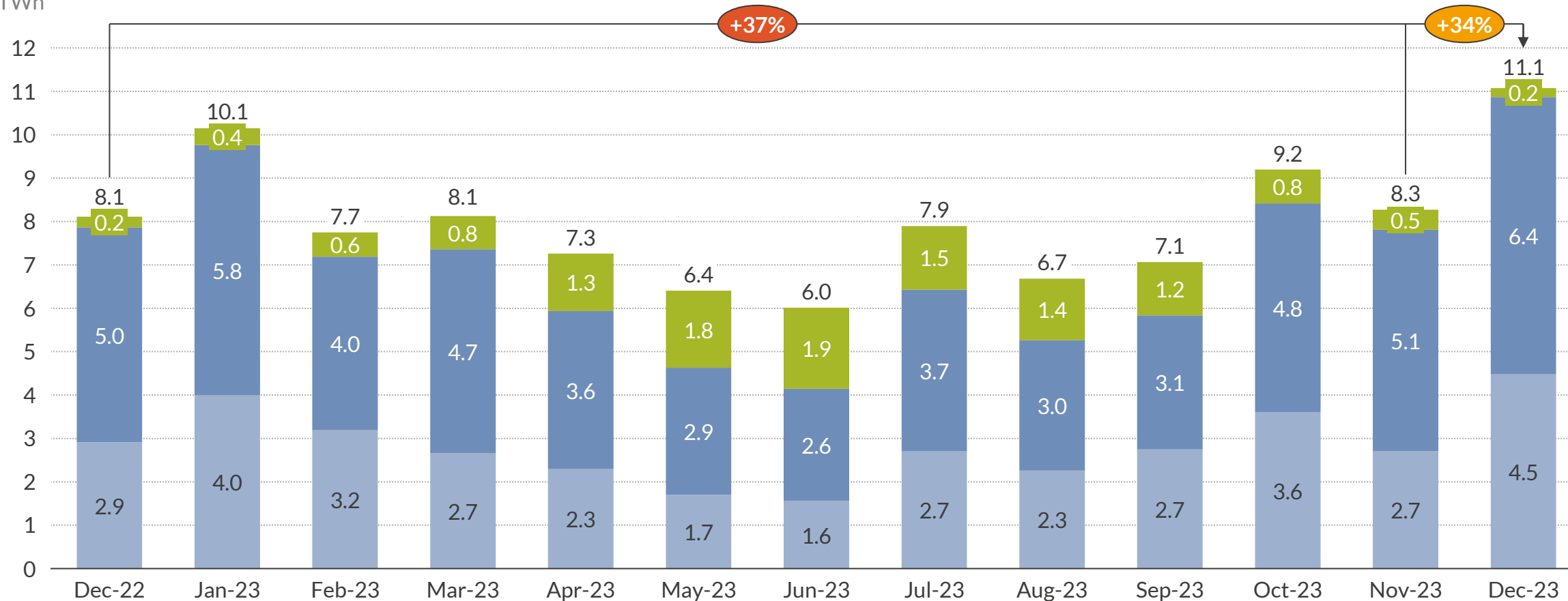
1) Please refer to Appendix for details of methodology employed to calculate emission amounts. Includes all Balancing Mechanism plants. 2) Other fossil includes oil, OCGT and gas CHP-CCGT.

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Monthly renewables output

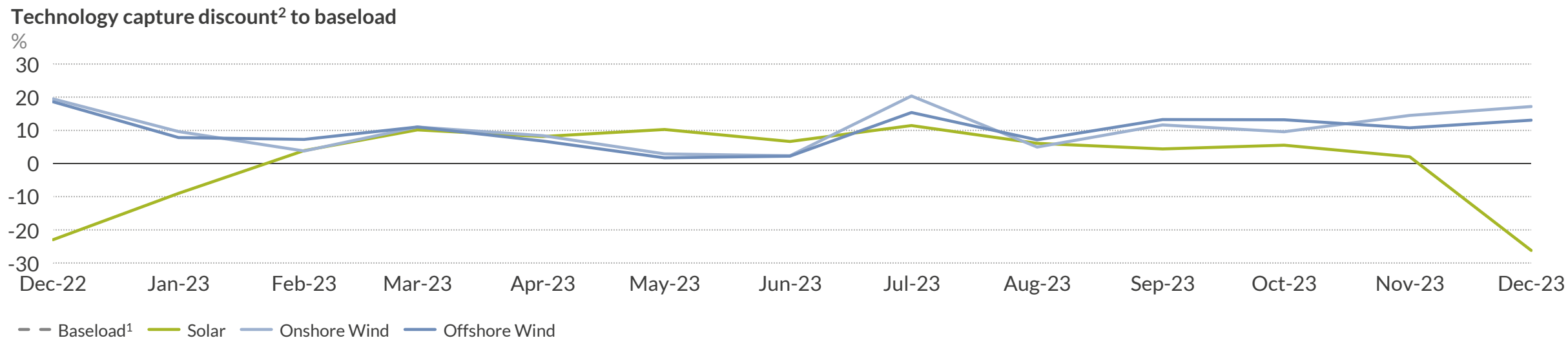
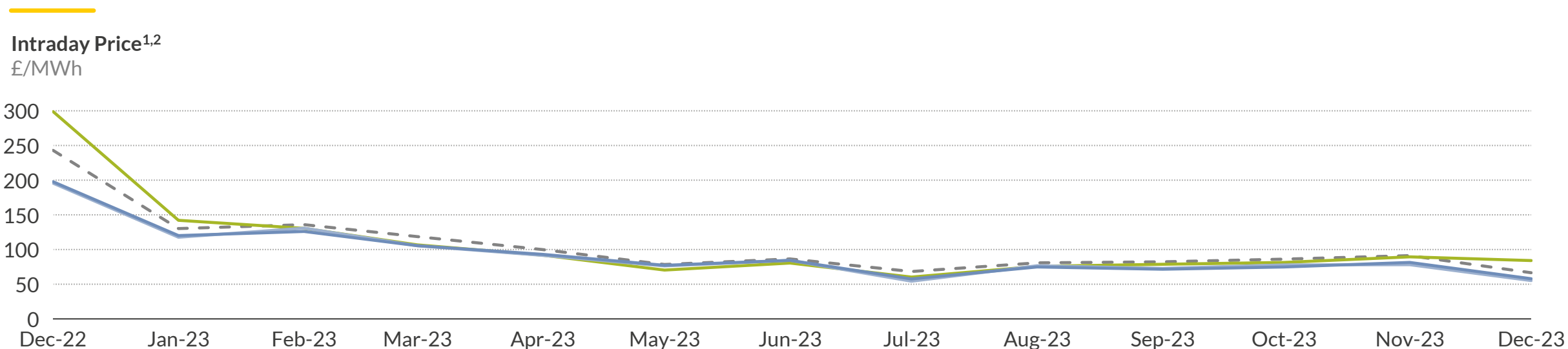
Output¹
TWh



Onshore Wind Offshore Wind Solar x Month-on-month difference x Year-on-year difference

1) Includes outputs from wind generators registered as BM Units as well as embedded wind and solar PV

Capture price versus baseload APX price



1) The baseload price is the average monthly APX spot price. The capture price of a technology is the load-weighted monthly average APX price across all half-hourly periods; 2) Includes generators registered as BM Units as well as embedded wind

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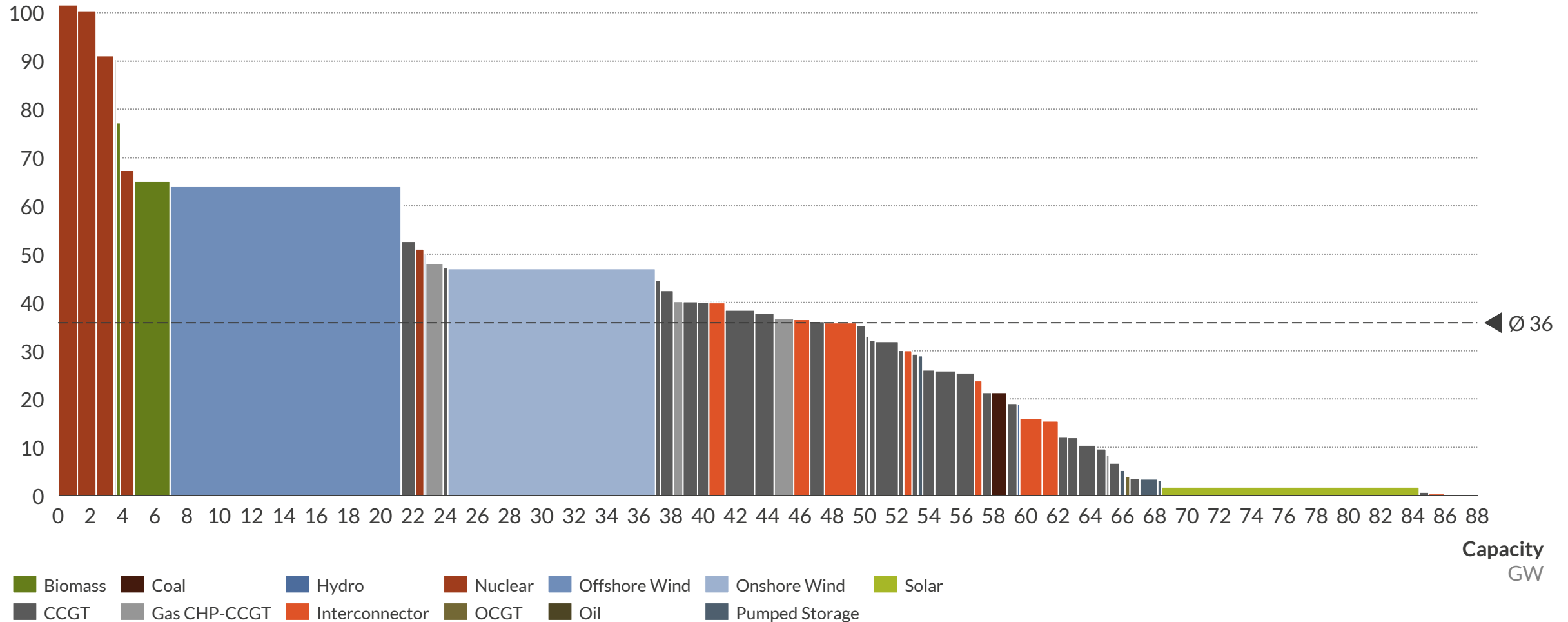
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Plant utilisation – load factors by plant for December

Load factor¹
%

Column width
reflects capacity



1) Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for wind and solar. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months. Please refer to Appendix for a detailed description of the data used and categories presented

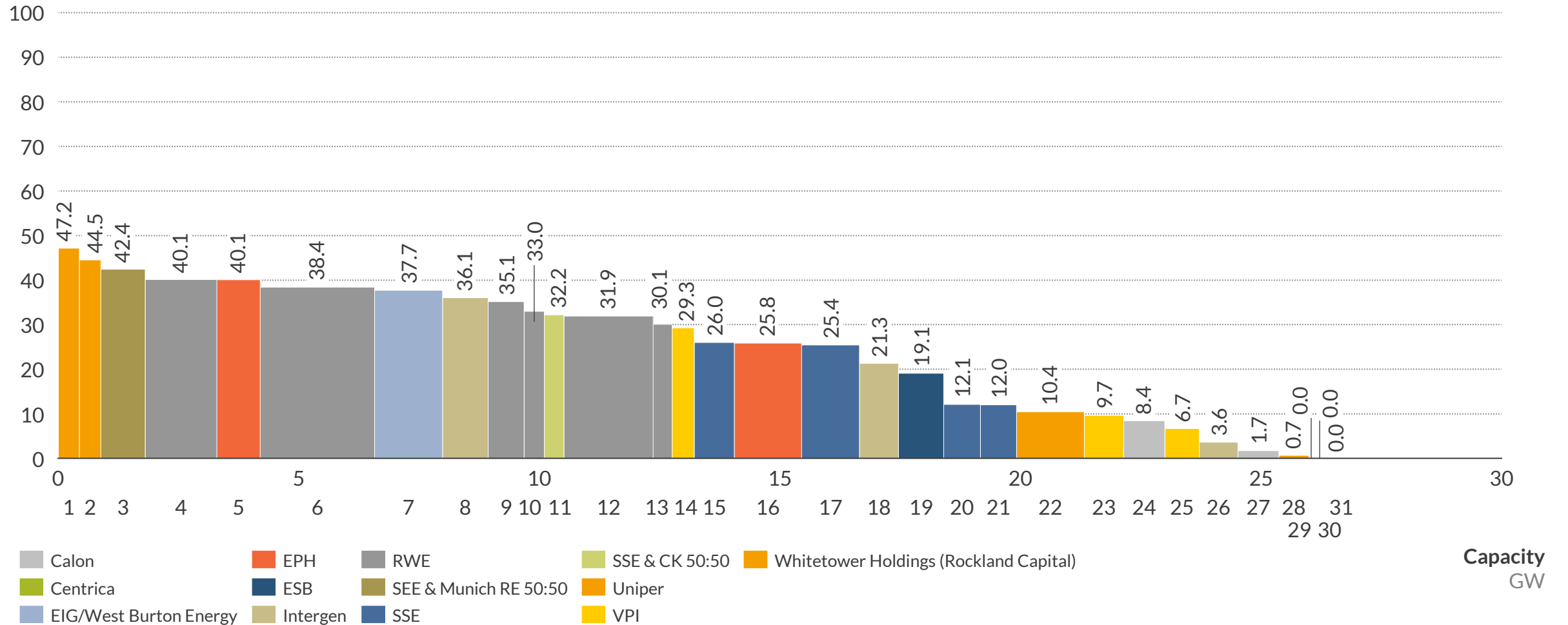
Sources: Aurora Energy Research, Elexon, BEIS

CCGT plant utilisation – by plant for December

Full load hours¹

% of total for the period

Column width
reflects capacity

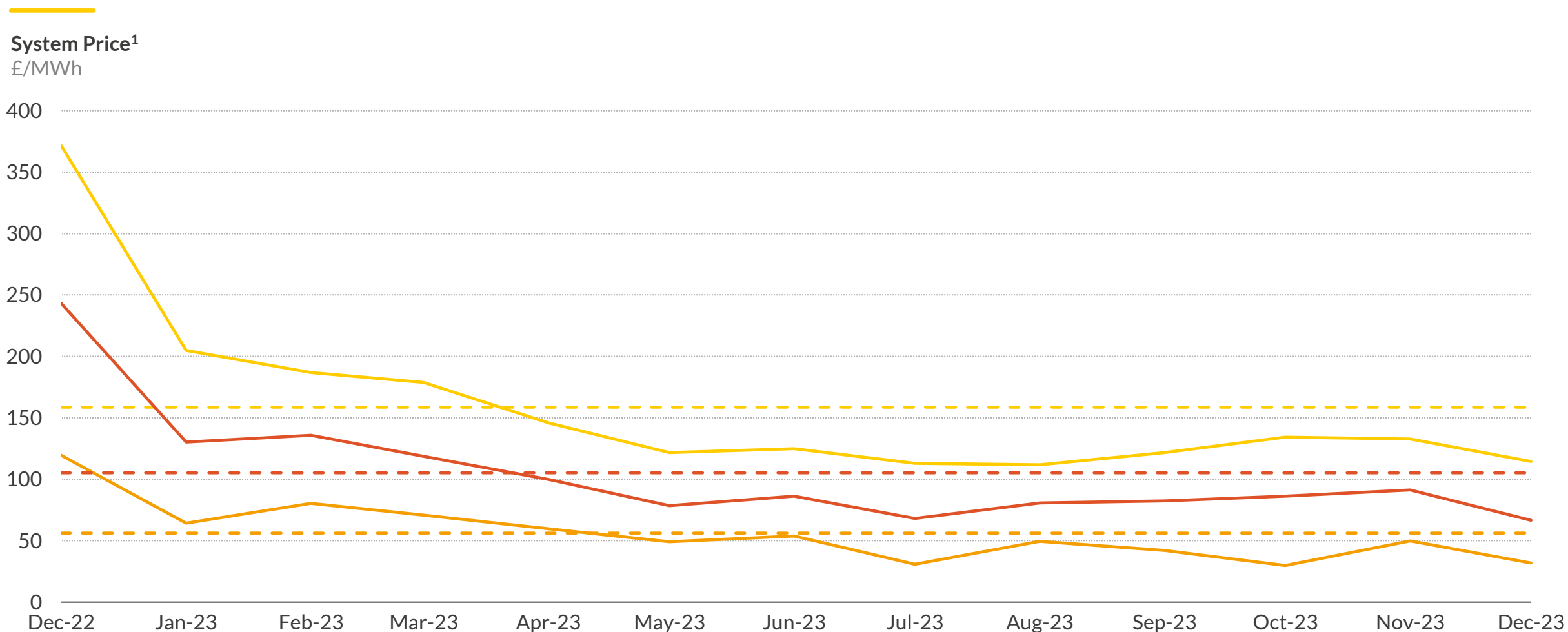


1) Includes all CCGT plants of the presented companies that report to the Balancing Mechanism. Plant Names: 1. Enfield Energy, 2. Cottam Dvpt Centre, 3. Marchwood, 4. Didcot B, 5. Langage, 6. Pembroke, 7. West Burton B, 8. Spalding, 9. Little Barford, 10. Great Yarmouth, 11. Seabank 2, 12. Staythorpe, 13. Kings Lynn, 14. Shoreham, 15. Seabank 1, 16. South Humber Bank, 17. Peterhead, 18. Rocksavage, 19. Carrington, 20. Keadby, 21. Medway, 22. Connahs Quay, 23. Damhead Creek, 24. Severn, 25. Rye House, 26. Coryton, 27. Sutton Bridge, 28. Killingholme 2, 29. Glanford Brigg, 30. Peterborough, 31. Corby. Sources: Aurora Energy Research, Elexon

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Monthly average system prices for the last 13 months

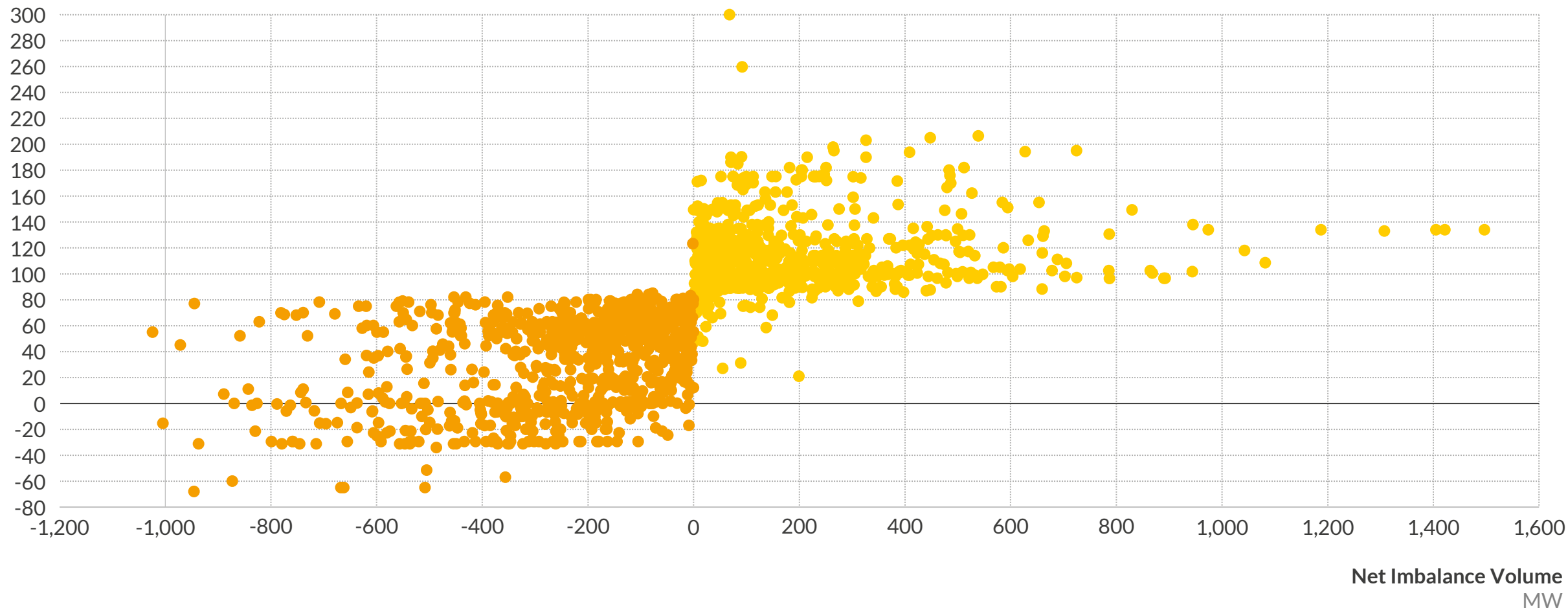


— System price, long - - Long average — System price, short - - Short average — Spot price² - - Spot average

1) Monthly average; 2) Half-hourly wholesale spot price is the volume-weighted reference price over that half hour interval, as provided by APX Power UK

Half-hourly System Price against Net Imbalance Volume for December

System Price
£/MWh

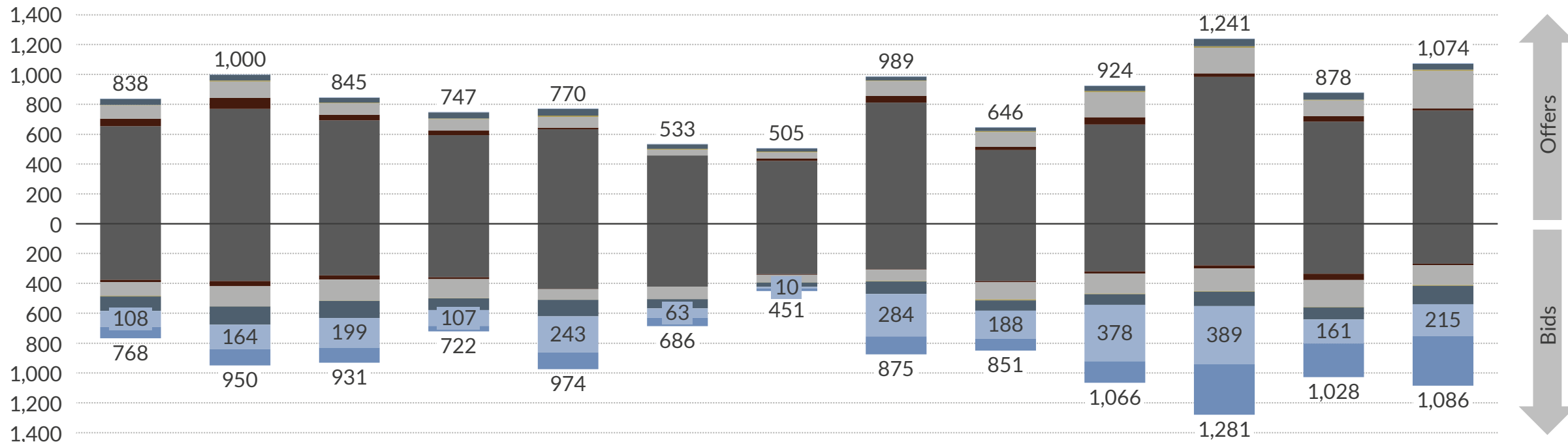


System imbalance: ● Short ● Long

Bid-offer acceptance volumes breakdown by technology for the last 13 months

A U R  R A

Accepted offer¹ volumes
GWh



Accepted bid² volumes
GWh

Dec-22 Jan-23 Feb-23 Mar-23 Apr-23 May-23 Jun-23 Jul-23 Aug-23 Sep-23 Oct-23 Nov-23 Dec-23

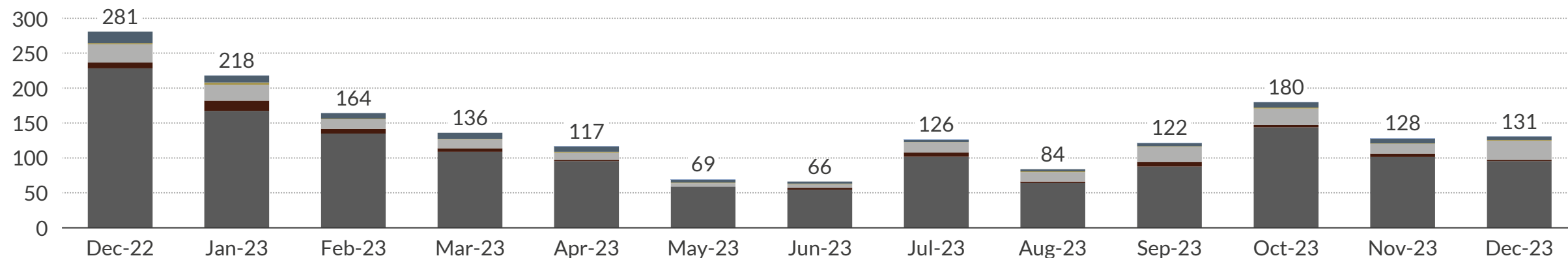
Offshore Wind Onshore Wind Storage⁵ Peaking⁴ Other³ Coal CCGT

1) Offers to increase generation or reduce demand; 2) Bids to reduce generation or increase demand; 3) Other includes oil, CHP-CCGT, biomass and hydro; 4) Peaking includes OCGT, reciprocating engines and DSR; 5) Storage includes batteries and pumped storage

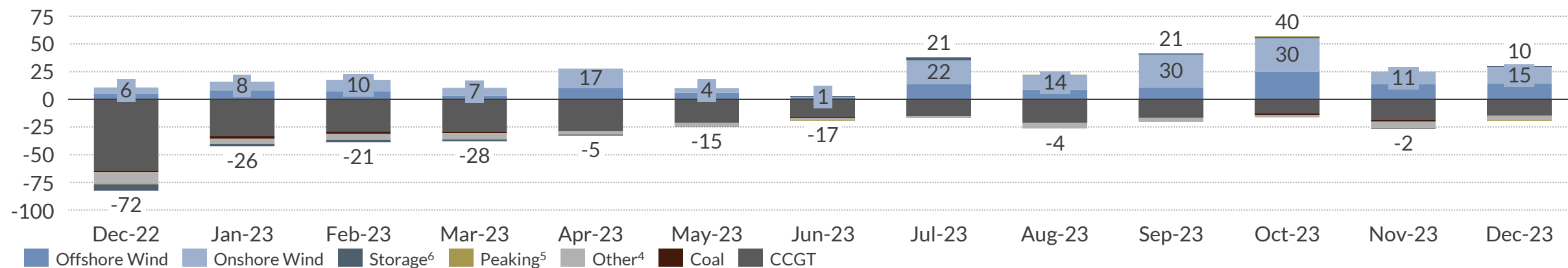
Sources: Aurora Energy Research, Ellexon

Bid-offer payments breakdown by technology for the last 13 months

Accepted offer¹ payments³
£million



Accepted bid² payments³
£million



1) Offers to increase generation or reduce demand; 2) Bids to reduce generation or increase demand; 3) Positive cashflow means payment to generators, negative is payment to National Grid; 4) Other includes oil, CHP-CCGT, biomass and hydro; 5) Peaking includes OCGT, reciprocating engines and DSR; 6) Storage includes batteries and pumped storage

Sources: Aurora Energy Research, Elexon

Data used

- Output values used in this summary reflect the sum of Final Physical Notifications (FPN) submitted by all BM Units of a given plant that have been active over the last three months.
- Capacity values used in this summary reflect the sum of capacities of individual BM Units, as reported to the Balancing Mechanism, that have been active over the last three months. They reflect long-term capacities and exclude temporary fluctuations due e.g. to plant failures or scheduled maintenance.
- Prices used in this summary are the EPEX half-hourly Reference Prices for half-hourly, two-hourly and four-hourly spot products.

Categories presented

- Full-load hours represent the plants' load factors, calculated as the ratio of the output produced in a given month to the maximum possible output given the plants' capacity.
- Running hours represent the proportion of time in a given month when a plant has been active, i.e. when at least one of its BM Units produced output greater than zero.
- Capture prices (or average output-weighted prices) are calculated as an average of EPEX half-hourly prices per MWh weighted by the plants' corresponding half-hourly outputs for all periods.
- Average gross margins are calculated as a sum of the uplift and inframarginal rent. Uplift is calculated as the difference between the EPEX price and the system marginal cost (SMC). SMC is the maximum marginal cost of all the plants with at least one generator producing above 80% of its installed capacity in a given half-hour.
- Emissions are calculated as plant output divided by electrical efficiency, multiplied by theoretical carbon content of the fuel input. The carbon content of fuel inputs is sourced from BEIS's Greenhouse gas reporting – Conversion factors 2016. System carbon intensity is calculated as the total emission divided by total electricity generated.

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