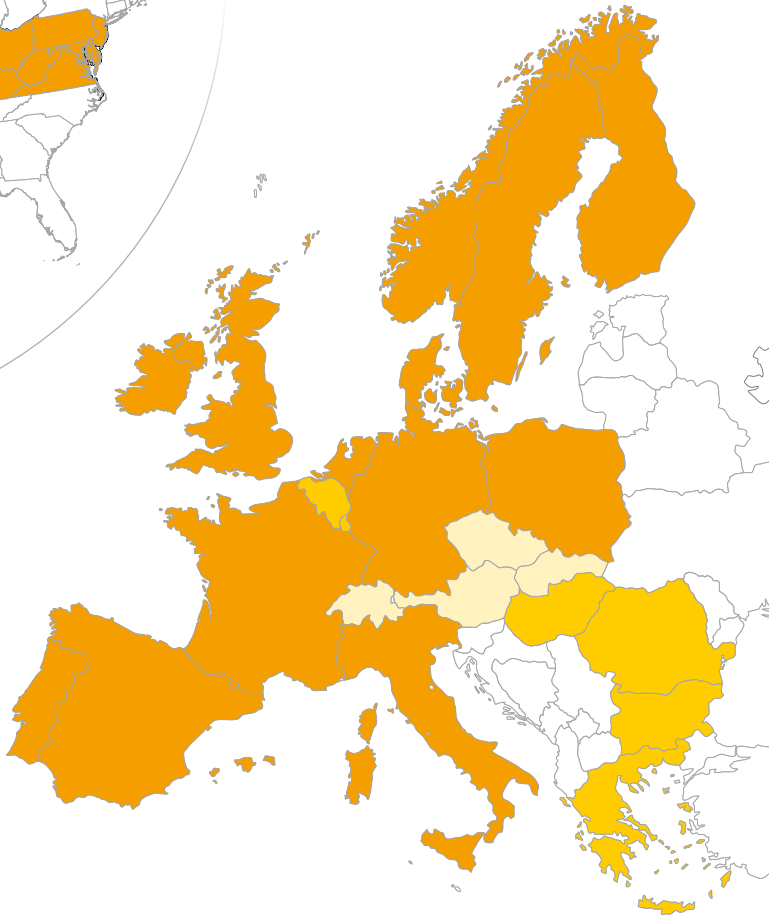
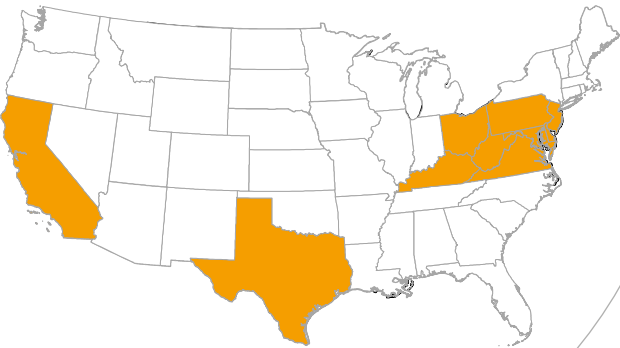


# GB Wholesale Market Summary December 2021

Published January 2022



# Aurora offers power market forecasts and market intelligence spanning Europe's key markets, the US and Australia



| Bespoke forecasts  | Power Market Forecast Reports  | Comprehensive Power Market Services   |
|--|--|---|
| <ul style="list-style-type: none"><li>✓ Aurora can provide power market forecasts upon request</li></ul> | <ul style="list-style-type: none"><li>✓ Power market forecast reports</li><li>✓ Forecast data in Excel</li><li>✓ Analyst support</li></ul> | <ul style="list-style-type: none"><li>✓ Market forecast reports</li><li>✓ Forecast data in Excel</li><li>✓ Global energy market forecast reports</li><li>✓ Strategic insight reports</li><li>✓ Regular subscriber group meetings</li><li>✓ Policy updates</li><li>✓ Bilateral workshops</li><li>✓ Analyst support</li></ul> |



# Executive Summary

- The average power price in December was £225.6/MWh, a 23% increase from November
- The month-on-month increase in power prices was mainly driven by the increase in commodity prices which rose by between 24-42% and an increase in production from thermal generation to meet a 6% rise in transmission demand
- The rise in thermal generation primarily came from CCGTs, with average load factors increasing from 30% in November to 33% in December
- Subsequently, domestic power sector emissions rose to 4.7 MtCO<sub>2</sub>e, a 10% increase relative to November
- The monthly average total GB carbon price increased by 17%, with UKAs trading at an average of £74/tCO<sub>2</sub>

|  | Monthly value <sup>1</sup> | Month-on-month change | Year-on-year change | Slide reference(s) |
|--|----------------------------|-----------------------|---------------------|--------------------|
| <b>Power prices</b><br>£/MWh                           | 225.6                      | +42.1<br>(22.9%)      | +171.6<br>(317.4%)  | <u>5, 6</u>        |
| <b>Gas prices</b><br>£/MWh                             | 92.7                       | +24.3<br>(35.6%)      | +77.1<br>(493.6%)   | <u>7</u>           |
| <b>Carbon<sup>2</sup> prices</b><br>£/tCO <sub>2</sub> | 91.6                       | +13.0<br>(16.5%)      | +45.6<br>(99.1%)    | <u>7</u>           |
| <b>Transmission demand</b><br>TWh                      | 25.1                       | +1.3<br>(5.6%)        | +0.2<br>(0.9%)      | <u>10</u>          |
| <b>Low carbon<sup>3</sup> generation</b><br>TWh        | 13.4                       | -0.4<br>(2.5%)        | +0.2<br>(1.1%)      | <u>11, 12</u>      |
| <b>Thermal<sup>4</sup> generation</b><br>TWh           | 9.9                        | +1.0<br>(10.4%)       | +0.4<br>(3.7%)      | <u>11, 12</u>      |
| <b>Carbon emissions</b><br>MtCO <sub>2</sub> e         | 4.7                        | +0.4<br>(10.2%)       | +0.1<br>(2.4%)      | <u>14</u>          |
| <b>Grid carbon intensity</b><br>gCO <sub>2</sub> e/kWh | 211.5                      | +10.8<br>(5.4%)       | +1.2<br>(0.6%)      | <u>14</u>          |
| <b>Wind load factors<sup>5</sup></b><br>%              | 42.1                       | -1.8<br>(4.1%)        | +2.3<br>(5.5%)      | <u>25</u>          |
| <b>Wind capture prices<sup>5</sup></b><br>£/MWh        | 194.7                      | +22.7<br>(13.2%)      | +146.3<br>(302.7%)  | <u>27</u>          |

1) Values averaged over the calendar month. 2) Includes CPS and EU-ETS, the UK-ETS auctions will commence from May 2021. 3) Includes renewables and nuclear generation 4) Includes CCGTs, coal and other fossil plants. 5) Onshore wind only

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

# Agenda

---

- I. System performance
- II. Company performance
- III. Plant performance

# Half-hourly EPEX spot price for December

EPEX spot price<sup>1</sup>  
£/MWh

Monthly average price in December 2021:  
225.64 £/MWh

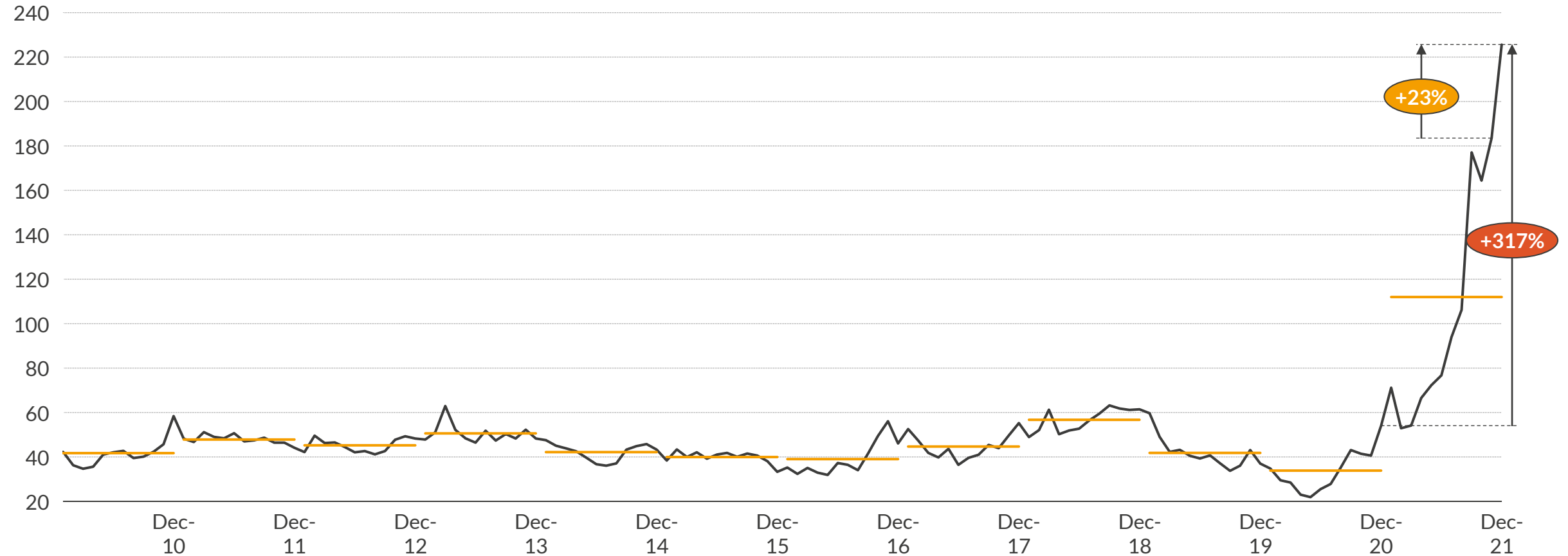


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot

# Historic monthly average EPEX spot price

## Average EPEX spot price<sup>1</sup>

£/MWh



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

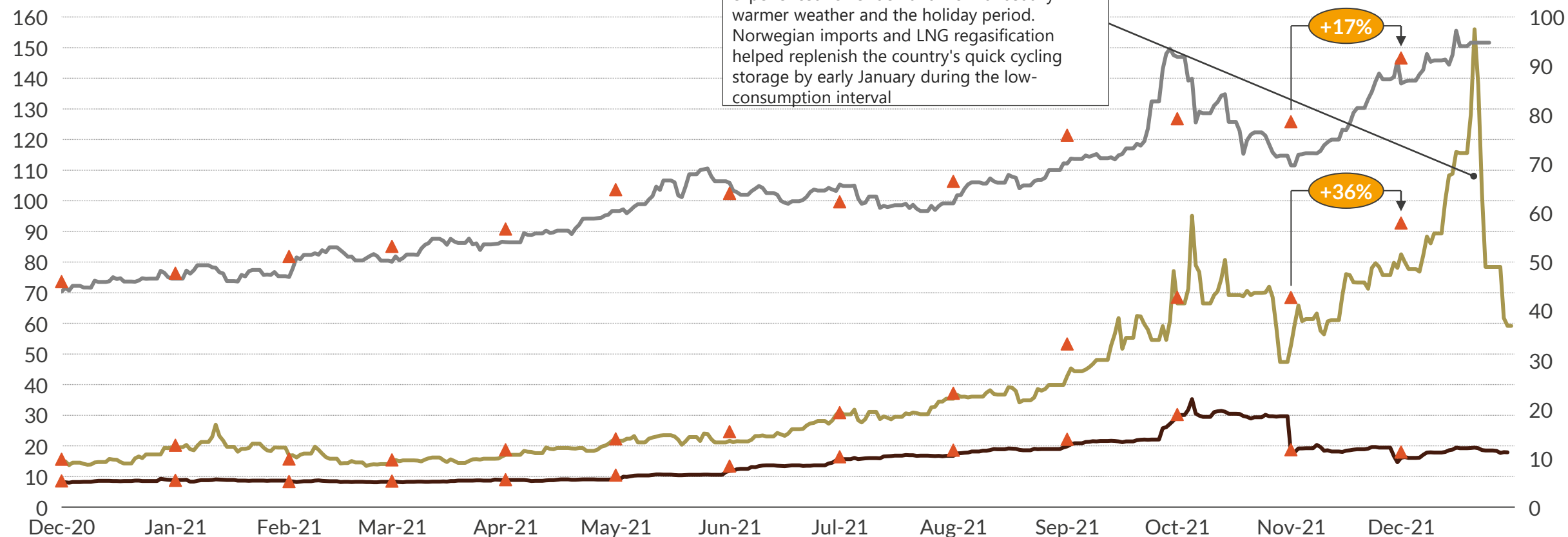
1) Average monthly EPEX is the average over the month of the volume-weighted reference prices for each half-hour interval.

# Historic fuel prices

## Gas, Coal and Carbon daily prices

Gas/Coal price  
£/MWh

Total UK carbon price<sup>1</sup>  
£/tCO<sub>2</sub>

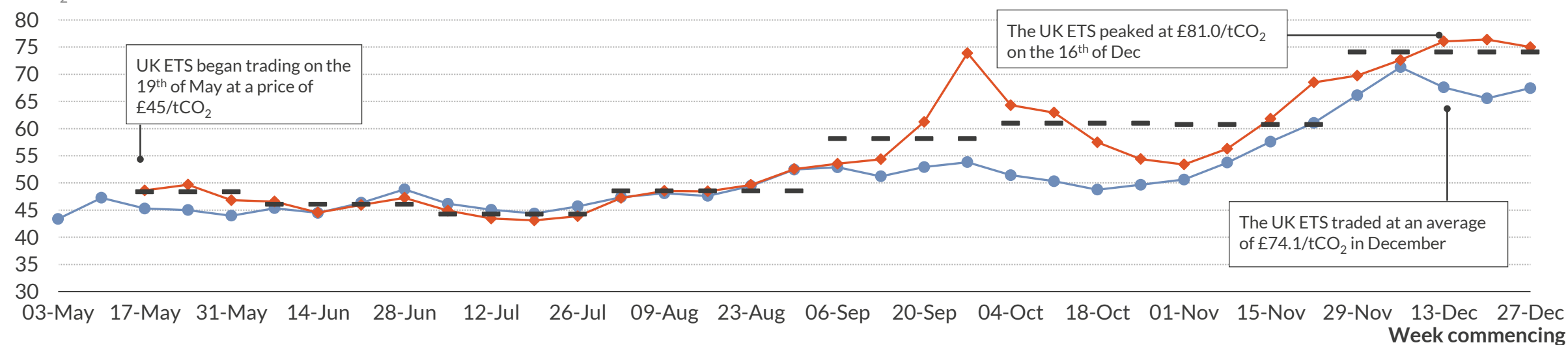


— Gas — Coal — CO2 ▲ Monthly averages ○ Month-on-month difference

1) Includes CPS and EU ETS until 18<sup>th</sup> May 2021 and UK ETS from the 19<sup>th</sup> May 2021 onwards.

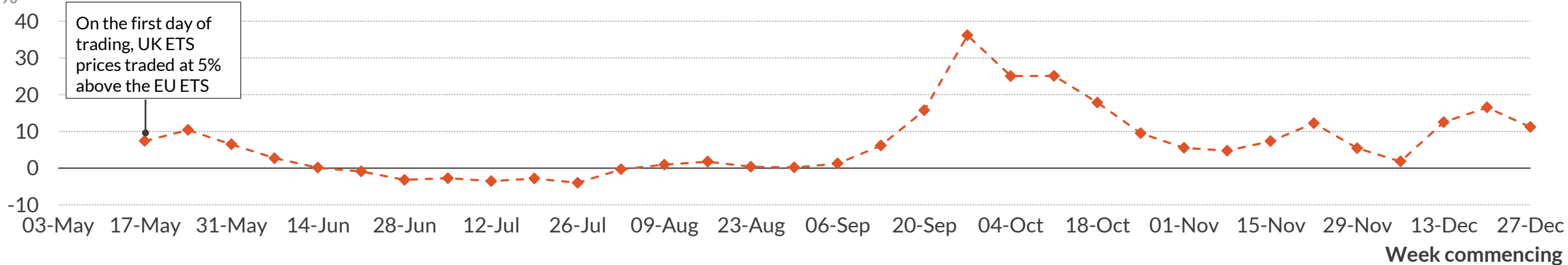
# Historic UK ETS and EU ETS Prices

## Weekly average EU and UK ETS prices

£/tCO<sub>2</sub>

## Relative difference between UK and EU ETS prices

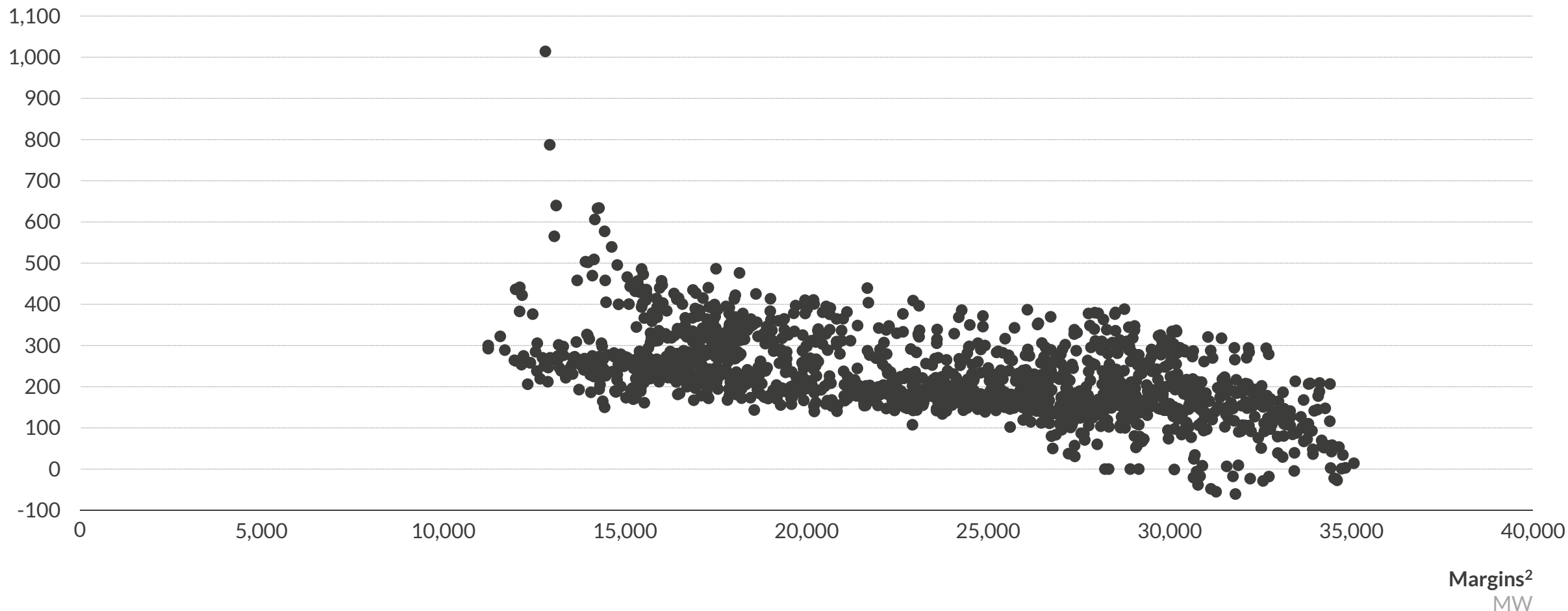
%





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

EPEX spot price<sup>1</sup>  
£/MWh



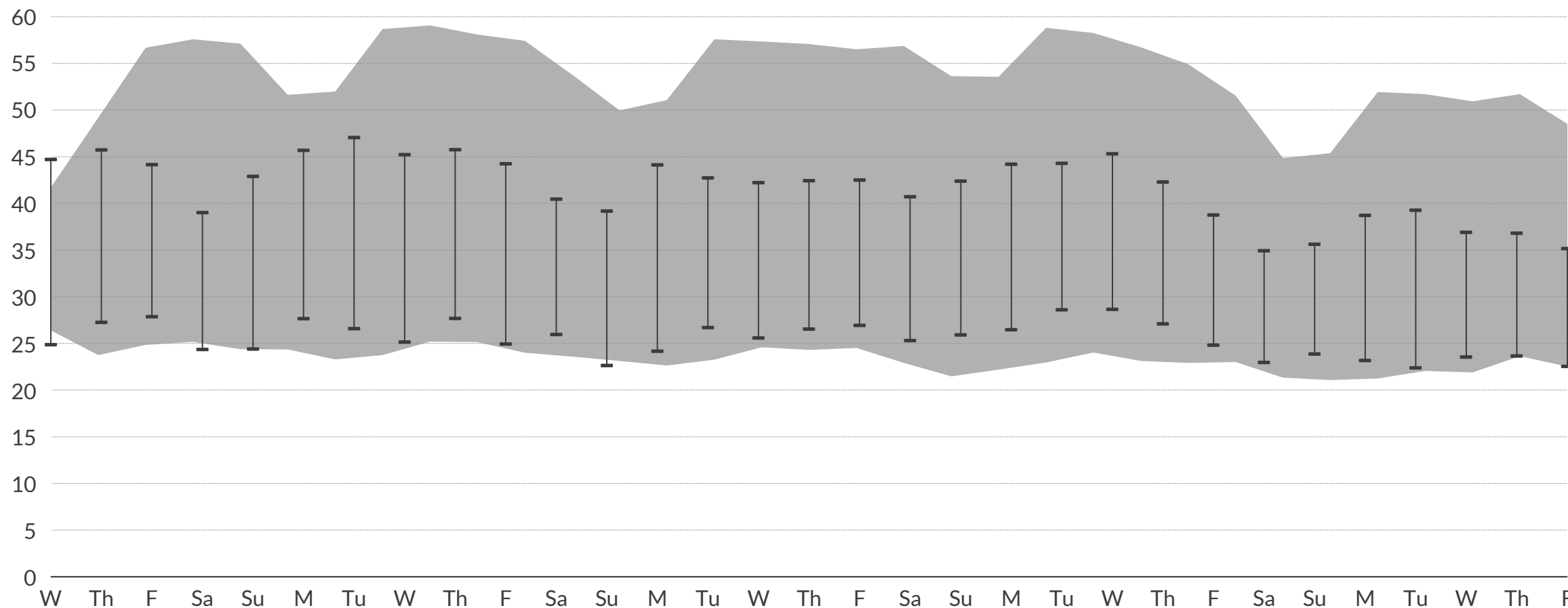
1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include embedded demand. MEL is calculated as the sum of all transmission BM units reporting MEL values in each half-hour. Where a BMU gives multiple values in a half-hour, only the least is taken.

Sources: Elaxon, National Grid, Thomson Reuters, Aurora Energy Research

# Daily December max and min demand

## Relative to historic December max and min demand since 2010<sup>1</sup>

Demand<sup>2</sup>  
GW

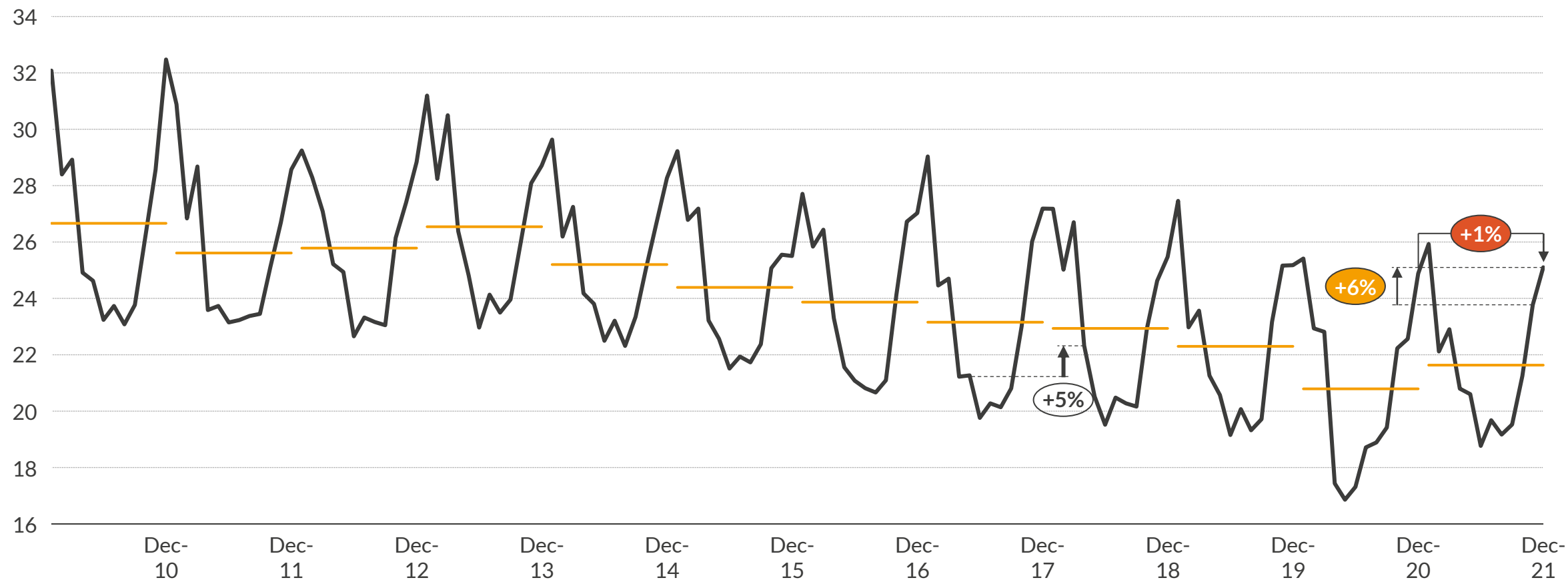


I Daily range ■ Historic maximum/minimum

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 demand<sup>1</sup>  
TWh



— Total monthly demand — Annual average demand



Month-on-month difference



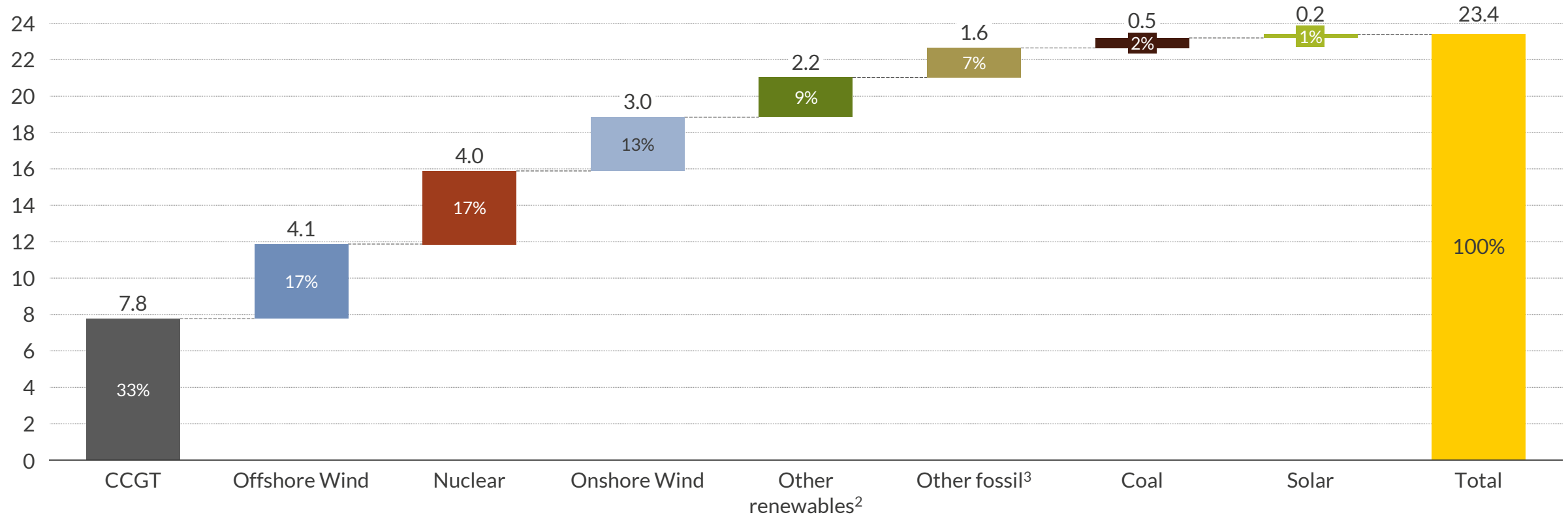
Year-on-year difference

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

## Output<sup>1</sup>

TWh



## Load factor

%



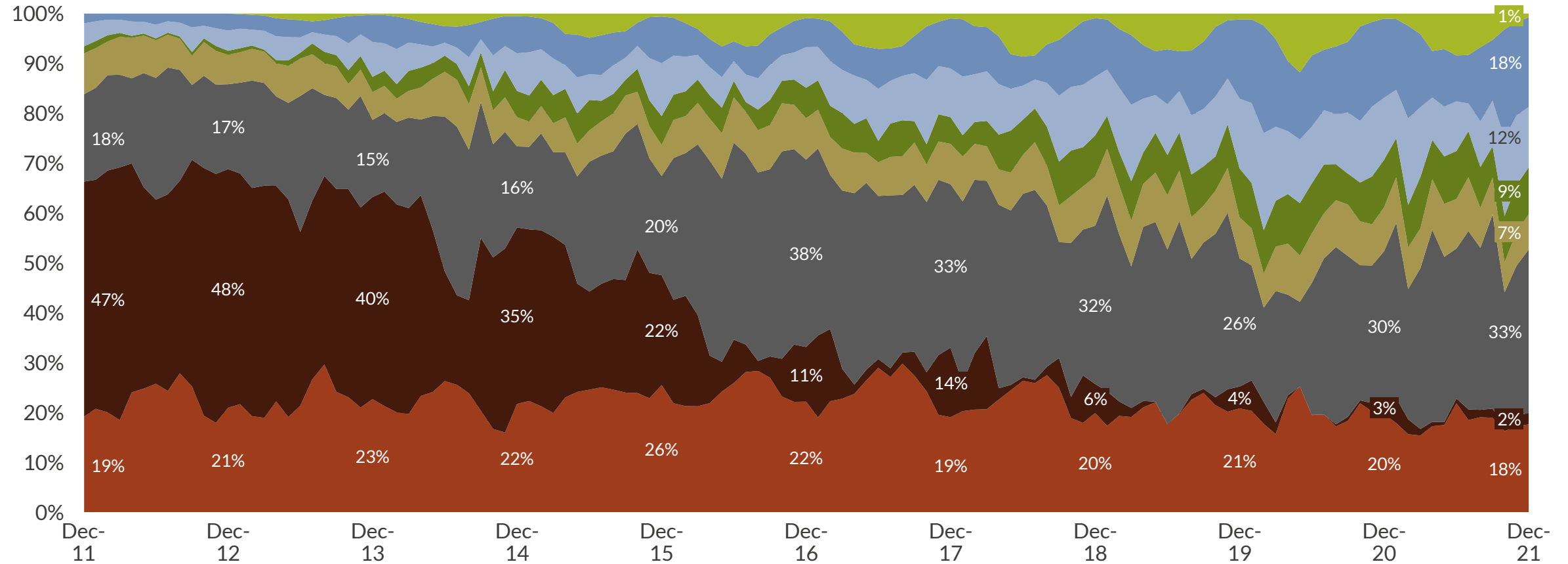
1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV assets. All numbers are rounded to 0.1 TWh which means that subtotals may not sum to total value. 2) Other fossil includes oil, CHP-CCGT and OCGT. 3) Other renewables includes biomass and hydro.

Sources: Elexon, Sheffield Solar, National Grid, Aurora Energy Research

# Historical fuel mix breakdown

Output<sup>1</sup>

% of total

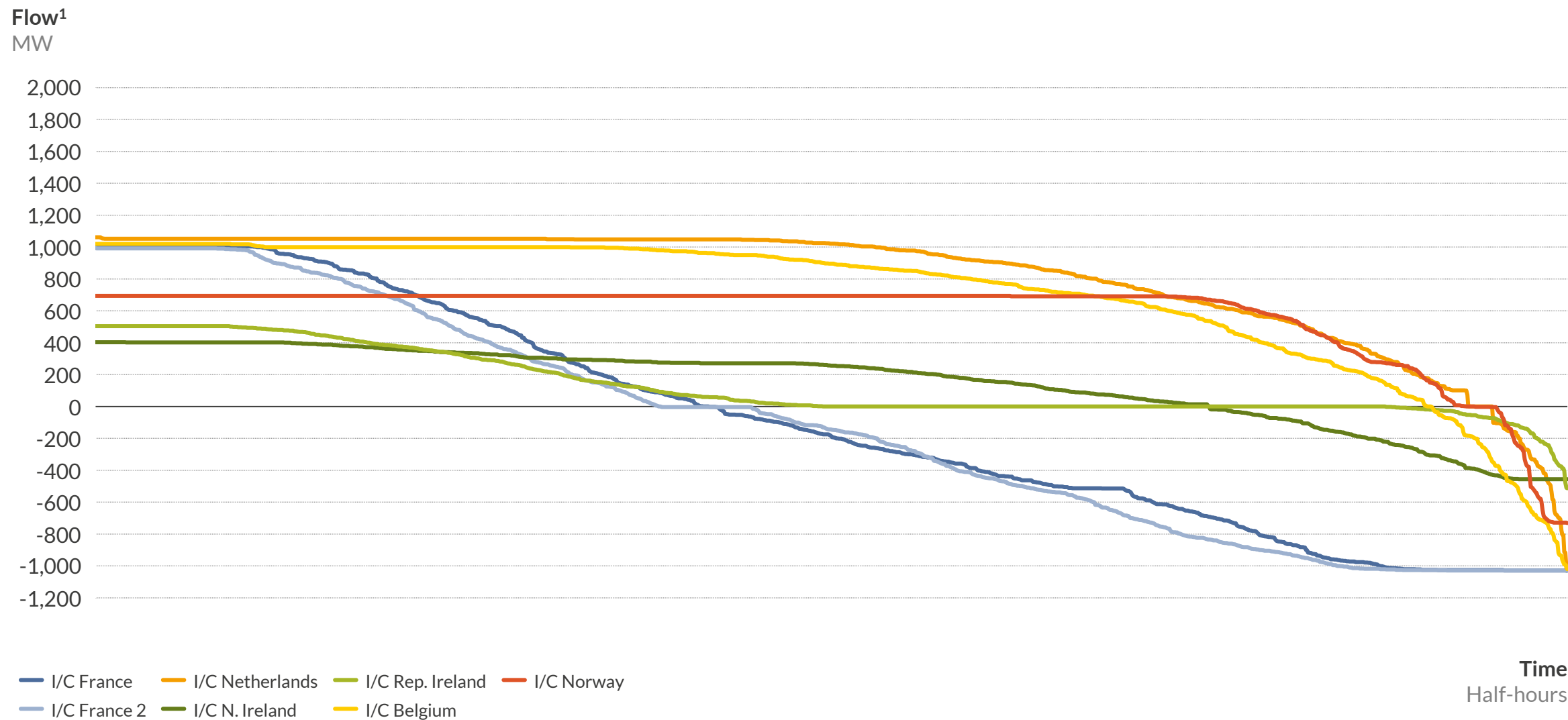


■ Nuclear 
 ■ Coal 
 ■ CCGT 
 ■ Other fossil<sup>2</sup>
■ Other renewables<sup>3</sup>
■ Onshore Wind 
 ■ Offshore Wind 
 ■ Solar 
 ■ Imports

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.

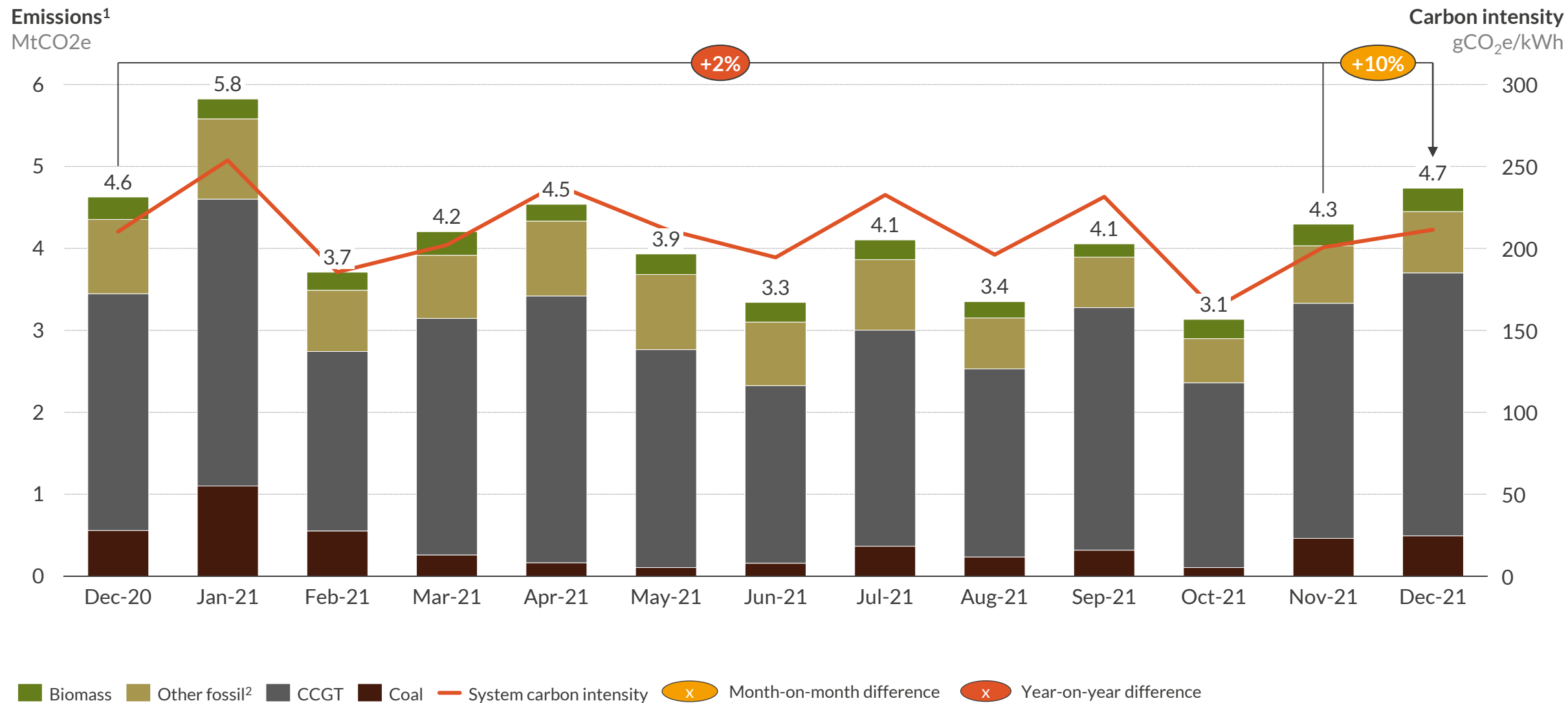
# Monthly interconnector flow duration curve

## 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.

# Agenda

---

I. System performance

II. Company performance (subscriber only)

III. Plant performance



# Agenda

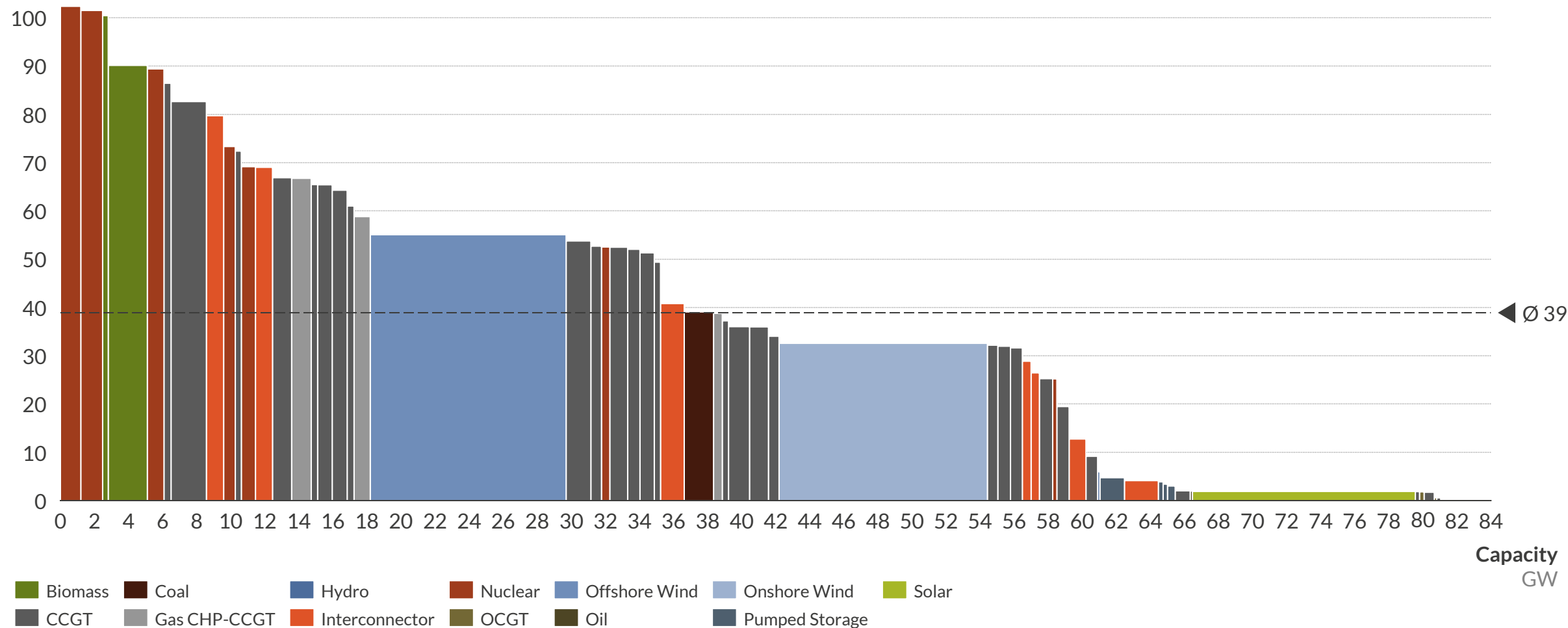
---

- I. System performance
- II. Company performance
- III. Plant performance

# Plant utilisation – load factors by plant

Load factor<sup>1</sup>  
%

Column width  
reflects capacity



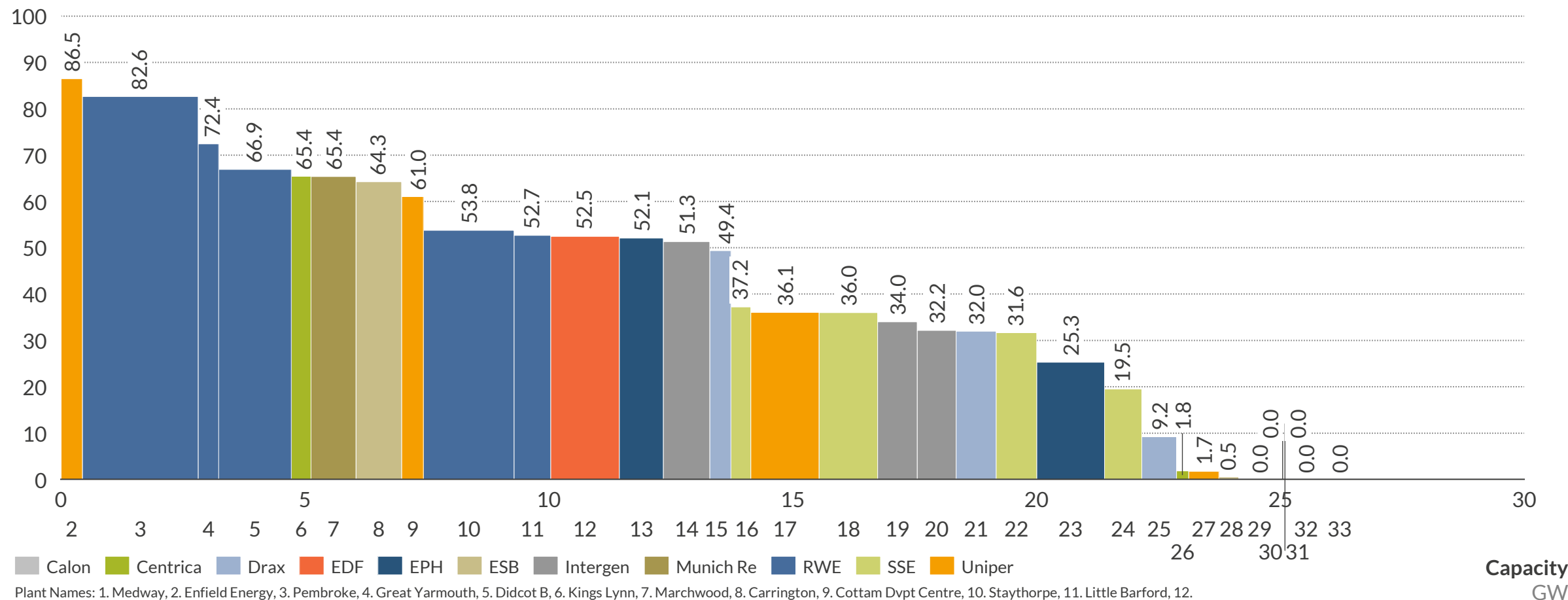
1) Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for wind and solar. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months. Please refer to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

Sources: Aurora Energy Research, Elexon, BEIS

# CCGT plant utilisation – by plant

**Full load hours<sup>1</sup>**  
% of total for the period

Column width  
reflects capacity



Plant Names: 1. Medway, 2. Enfield Energy, 3. Pembroke, 4. Great Yarmouth, 5. Didcot B, 6. Kings Lynn, 7. Marchwood, 8. Carrington, 9. Cottam Dvpt Centre, 10. Staythorpe, 11. Little Barford, 12. West Burton B, 13. Langage, 14. Spalding, 15. Shoreham, 16. Seabank 2, 17. Connahs Quay, 18. Peterhead, 19. Rocksavage, 20. Coryton, 21. Damhead Creek, 22. Seabank 1, 23. South Humber Bank, 24. Keadby, 25. Rye House, 26. Peterborough, 27. Killingholme 2, 28. Corby, 29. Severn, 30. Glanford Brigg, 31. Killingholme 1, 32. Sutton Bridge, 33. Baglan Bay.

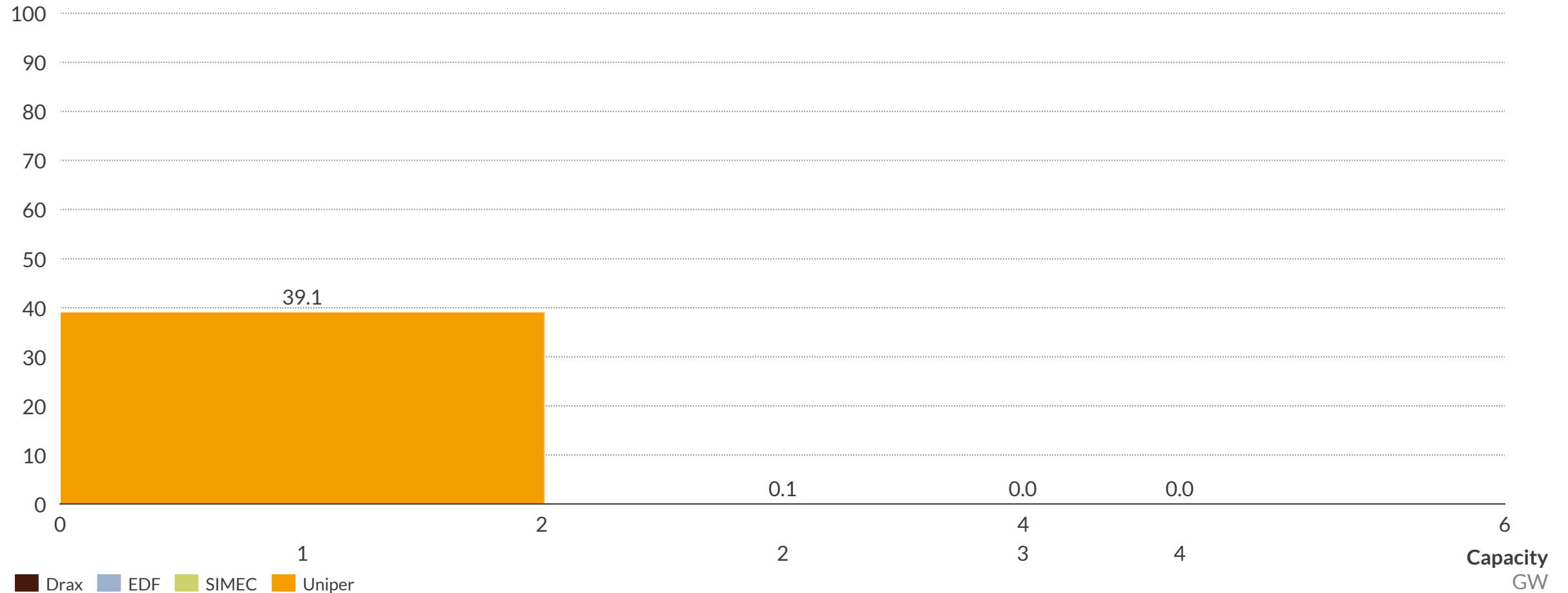
1) Includes all CCGT plants of the presented companies that report to the Balancing Mechanism

# Coal plant utilisation – by plant

## Full load hours<sup>1</sup>

% of total for the period

Column width  
reflects capacity



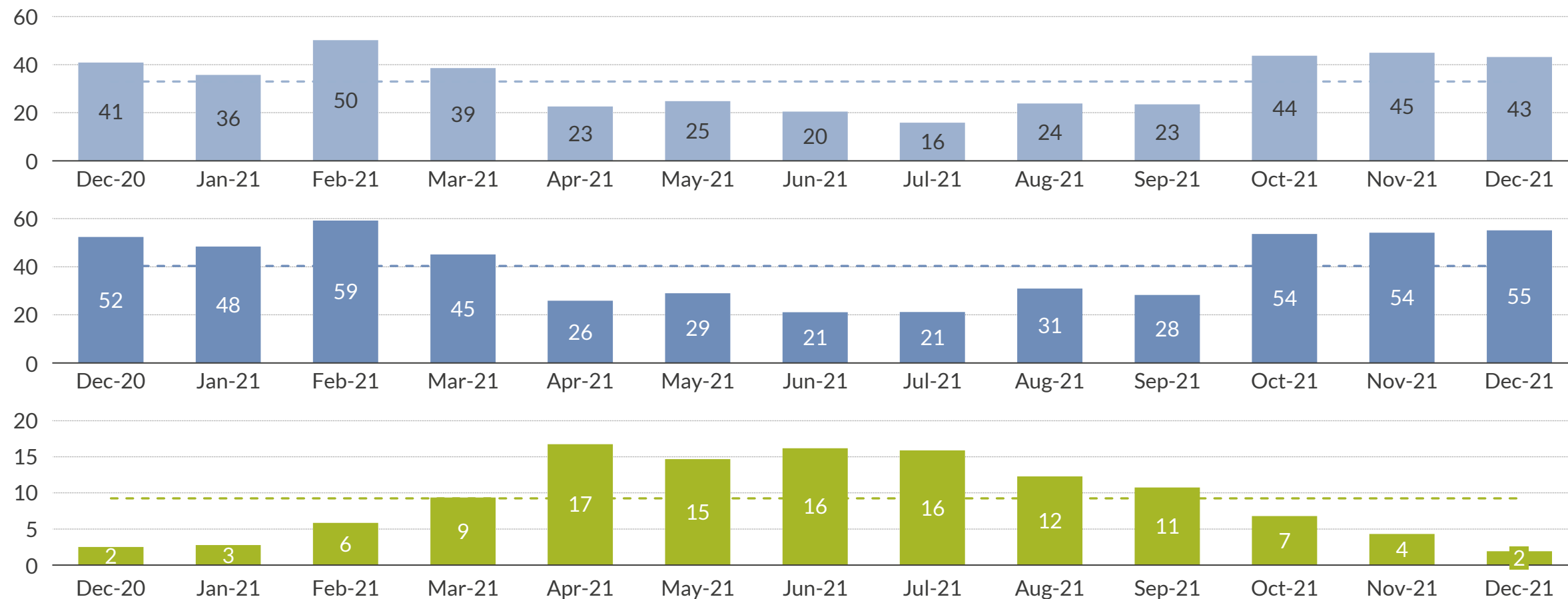
Plant Names: 1. Ratcliffe, 2. West Burton, 3. Uskmouth, 4. Drax Coal.

1) Includes all coal plants of the presented companies that report to the Balancing Mechanism

# Monthly load factors by technology

Average load factor<sup>1</sup>

%



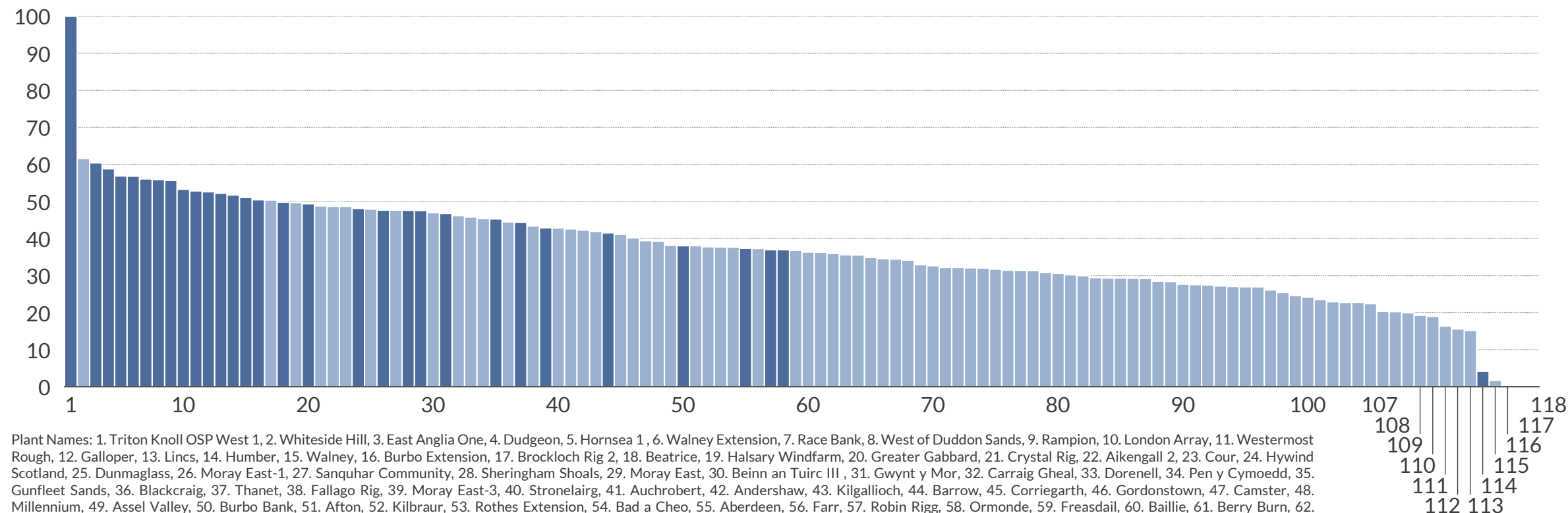
■ Onshore Wind    - - Onshore Average    ■ Offshore Wind    - - Offshore Average    ■ Solar    - - Solar Average

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

# Wind farm utilisation – load factor by wind farm

## Load factor<sup>1</sup>

%



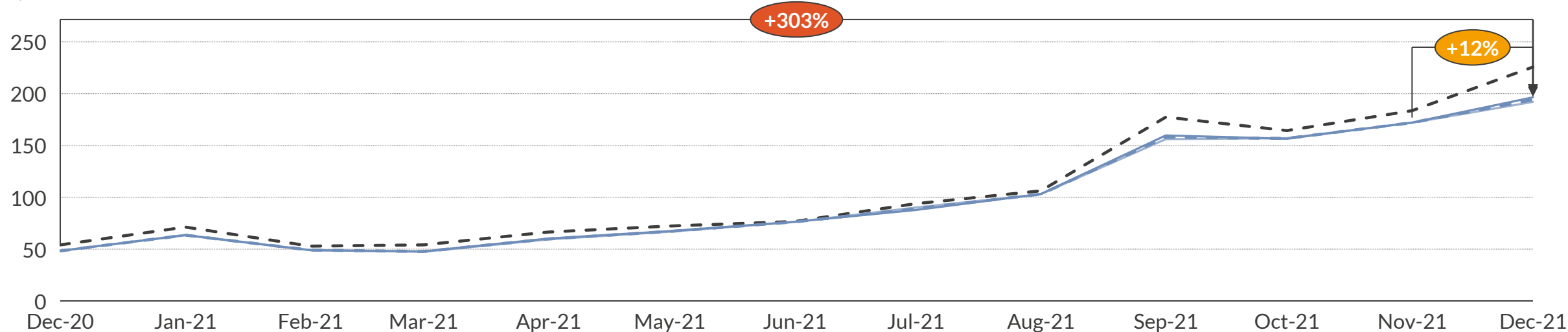
■ Offshore Wind ■ Onshore Wind

1) Represents UK wind farms reporting Balancing Mechanism Unit data. Figures presented reflect Final Physical Notification (FPN) expectations reported to the grid, which are not always representative of actual production

# RES capture price versus baseload price

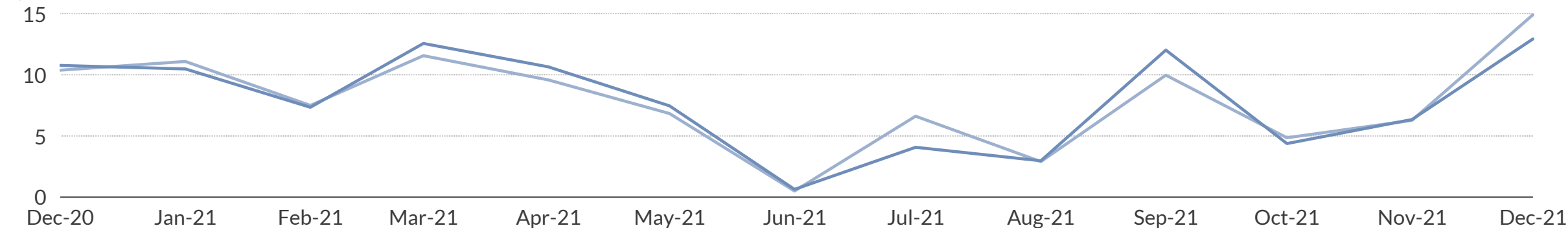
Baseload and capture price<sup>1,2</sup>

£/MWh



Technology capture discount<sup>2,3</sup> to baseload

%



— Baseload — Onshore Wind — Offshore Wind — Average wind (x) Month-on-month difference (average wind) (x) Year-on-year difference (average wind)

1) Baseload price is the average monthly EPEX price; 2) Wind capture price is the load-weighted monthly average EPEX price across all wind Balancing Mechanism plants for all half-hourly periods. 3) Negative values represent capture prices above the baseload price while positive values represent capture prices below the baseload price

Sources: Aurora Energy Research, Elexon, Thomson Reuters

---

## 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.



---

## General Disclaimer

This document is provided "as is" for your information only and no representation or warranty, express or implied, is given by Aurora Energy Research Limited and its subsidiaries Aurora Energy Research GmbH and Aurora Energy Research Pty Ltd (together, "**Aurora**"), their directors, employees agents or affiliates (together, Aurora's "**Associates**") as to its accuracy, reliability or completeness. Aurora and its Associates assume no responsibility, and accept no liability for, any loss arising out of your use of this document. This document is not to be relied upon for any purpose or used in substitution for your own independent investigations and sound judgment. The information contained in this document reflects our beliefs, assumptions, intentions and expectations as of the date of this document and is subject to change. Aurora assumes no obligation, and does not intend, to update this information.

## Forward-looking statements

This document contains forward-looking statements and information, which reflect Aurora's current view with respect to future events and financial performance. When used in this document, the words "believes", "expects", "plans", "may", "will", "would", "could", "should", "anticipates", "estimates", "project", "intend" or "outlook" or other variations of these words or other similar expressions are intended to identify forward-looking statements and information. Actual results may differ materially from the expectations expressed or implied in the forward-looking statements as a result of known and unknown risks and uncertainties. Known risks and uncertainties include but are not limited to: risks associated with political events in Europe and elsewhere, contractual risks, creditworthiness of customers, performance of suppliers and management of plant and personnel; risk associated with financial factors such as volatility in exchange rates, increases in interest rates, restrictions on access to capital, and swings in global financial markets; risks associated with domestic and foreign government regulation, including export controls and economic sanctions; and other risks, including litigation. The foregoing list of important factors is not exhaustive.

## Copyright

This document and its content (including, but not limited to, the text, images, graphics and illustrations) is the copyright material of Aurora, unless otherwise stated.

**This document is confidential and it may not be copied, reproduced, distributed or in any way used for commercial purposes without the prior written consent of Aurora.**