AURORA ENERGY RESEARCH

# GB Market Summary March 2022

Published April 2022

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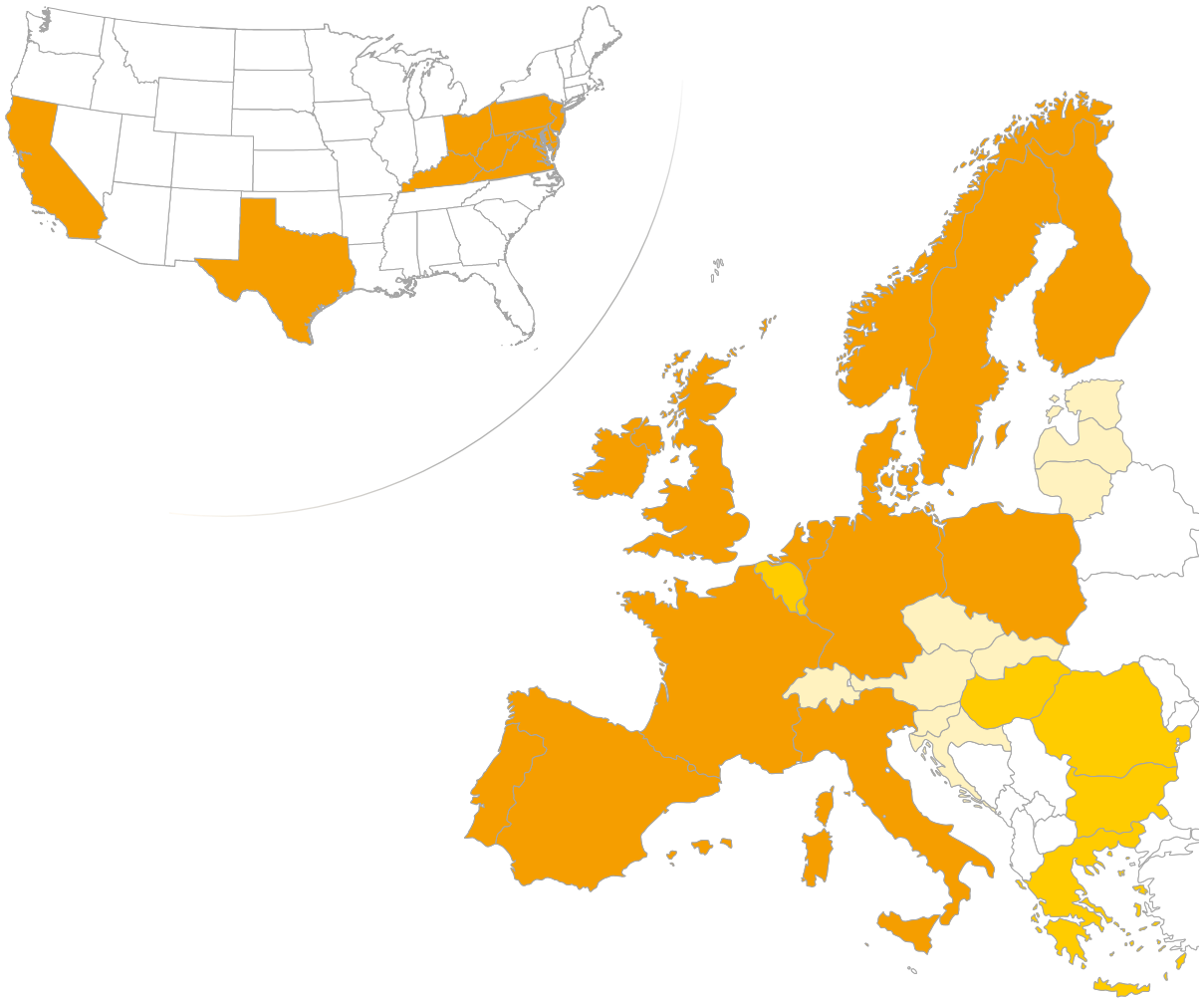

| Bespoke forecasts | Power Market Forecast Reports | Comprehensive Power Market Services |
|---|---|---|
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| | | ✓ Bilateral workshops |
| | | ✓ Analyst support |

Source: Aurora Energy Research

# Executive Summary

- The average power price in March was £236.8 /MWh, a 51% (+£79.6 /MWh) increase from February. Onshore and offshore wind capture prices were similarly up over 50% compared to February while solar prices were up 38%.
- The increase in power prices in March has been driven by a 59% (+£38.3/MWh) increase in gas prices, coupled with a 7% (1.5 TWh) increase in demand. This more than compensated for an 8.8% (-9.1£/tCO2) drop in carbon prices.
- Onshore and offshore wind load factors fell significantly in March to 27% (-28%) and 39% (-31%) respectively, both below their historical monthly averages. Consequently, average CCGT load factors increased from 18% in February to 34% in March.
- With reduced wind generation, domestic power sector emissions increased in March by 59% (+1.8 MtCO2e) to 4.4 MtCO2e compared to February.

*This is a slimmed down version of our subscriber monthly note. For more information on Aurora's monthly notes and forecasting services please contact cara.valentine@auroraer.com*

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| | | Monthly value[1] | Month-on-month change | Year-on-year change |
|---|---|---|---|---|
| System Performance | **Power prices,** *£/MWh* | 236.8 | +79.6 (50.6%) | +182.7 (337.4%) |
| | **Gas prices,** *£/MWh* | 102.9 | +38.3 (59.4%) | +87.4 (567.1%) |
| | **Carbon[2] prices,** *£/tCO$_2$* | 94.0 | -9.1 (8.8%) | +40.8 (76.8%) |
| | **Transmission demand,** *TWh* | 22.9 | +1.5 (7.0%) | -0.0 (0.0%) |
| | **Low carbon[3] generation,** *TWh* | 13.2 | -3.0 (18.6%) | +0.0 (0.3%) |
| | **Thermal[4] generation,** *TWh* | 9.7 | +4.5 (88.2%) | +0.4 (4.6%) |
| | **Grid carbon intensity,** *gCO$_2$e/kWh* | 191.4 | +71.4 (59.5%) | +3.7 (2.0%) |
| Capture Prices | **Offshore wind,** *£/MWh* | 235.0 | +80.5 (52.1%) | +187.1 (390.8%) |
| | **Onshore wind,** *£/MWh* | 235.9 | +81.3 (52.6%) | +188.6 (398.1%) |
| | **Solar PV,** *£/MWh* | 214.5 | +58.4 (37.5%) | +165.1 (334.1%) |

| | | Monthly value[1] | Variance to historical monthly average[5] |
|---|---|---|---|
| Load Factors | **Offshore wind,** *%* | 39.1 | -8.7 p.p. |
| | **Onshore wind,** *%* | 27.3 | -6.5 p.p. |
| | **Solar PV,** *%* | 11.4 | +1.7 p.p. |

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, Elexon

# Agenda

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I. Wholesale market summary

II. Renewable performance

III. Company performance (redacted)

IV. Plant performance

V. Balancing mechanism summary

# Historic monthly average EPEX spot price

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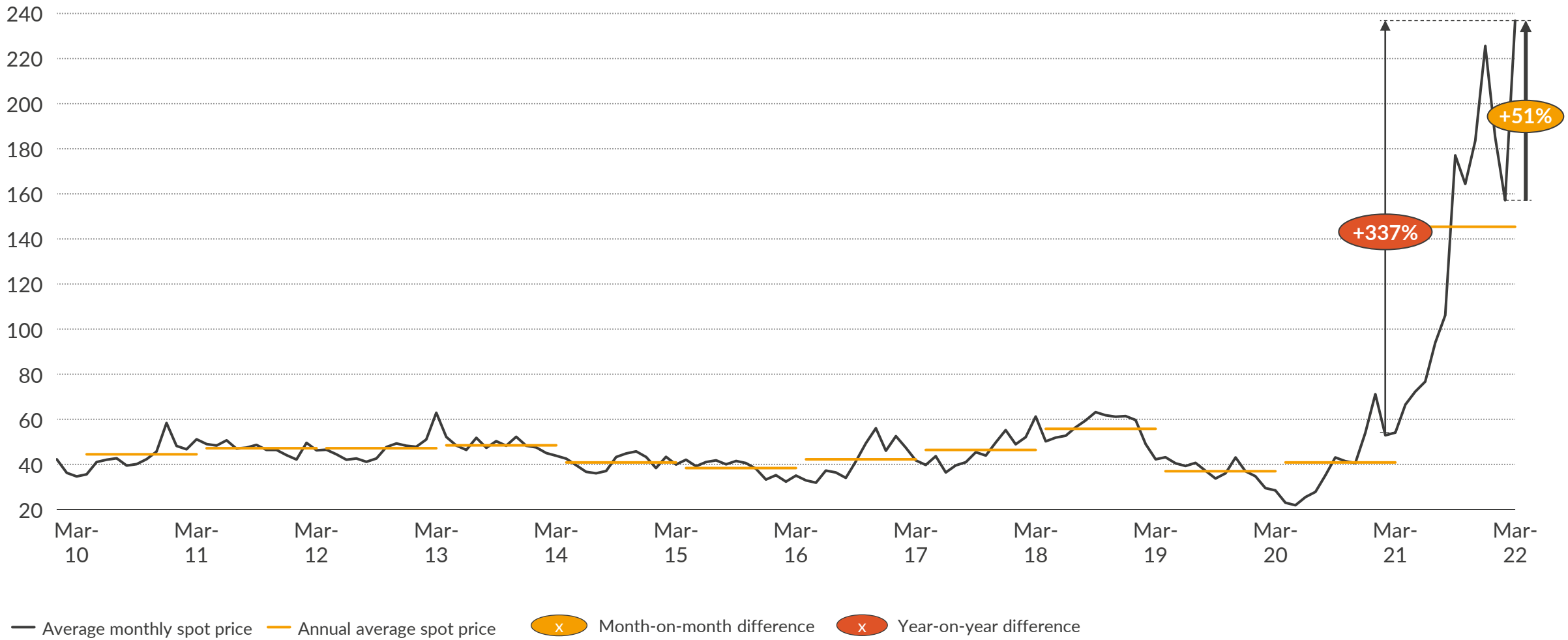
**Average EPEX spot price[1]**
£/MWh




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

Sources: Aurora Energy Research, Thomson Reuters

# Half-hourly EPEX spot price for March

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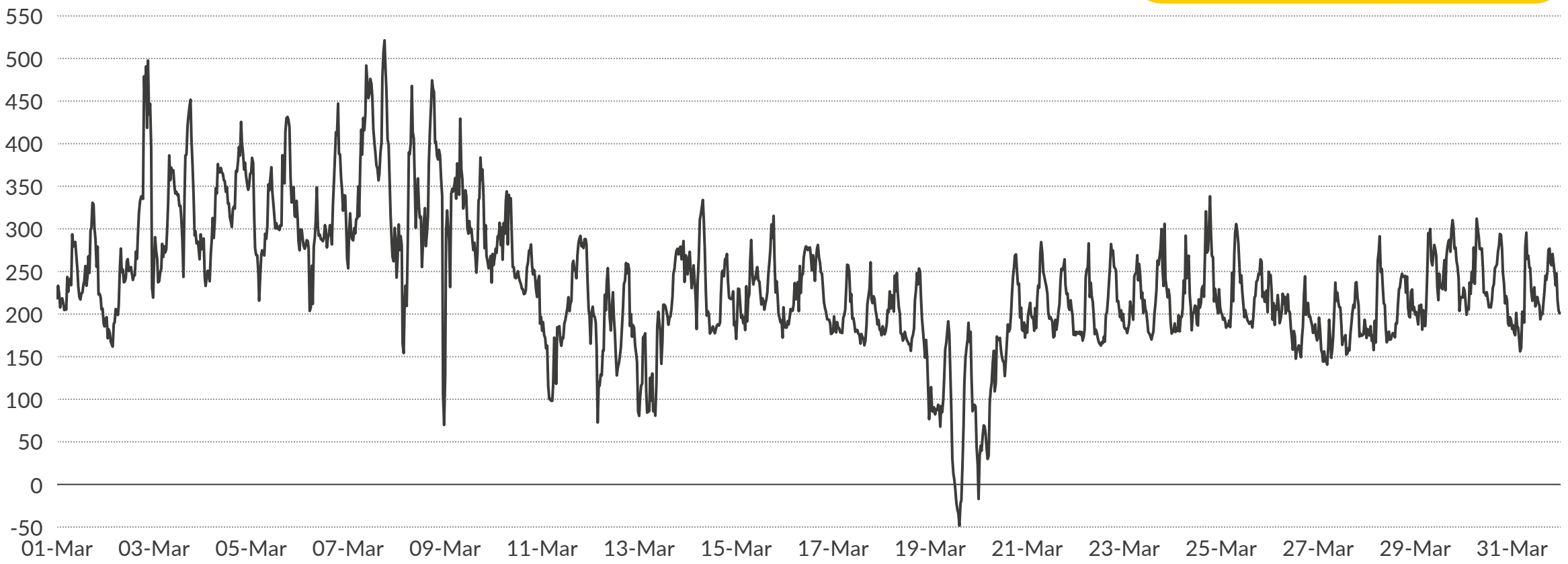
**EPEX spot price[1]**
£/MWh

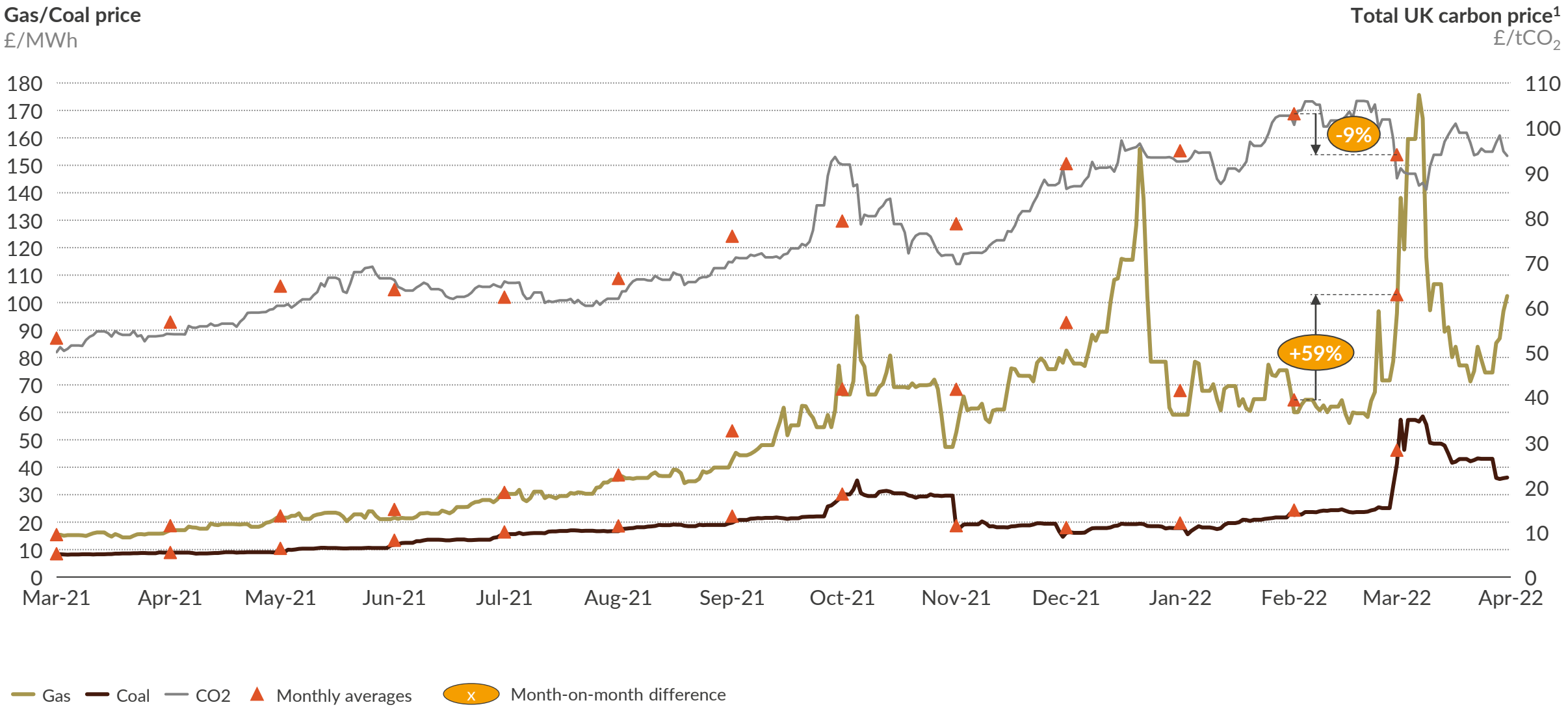
Monthly average price in March 2022:
236.80 £/MWh




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

Sources: Aurora Energy Research, Thomson Reuters

# Historic fuel prices
## Gas, Coal and Carbon daily prices




1) Includes CPS and EU ETS until 18th May 2021 and UK ETS from 19th May 2021 onwards.

Sources: Aurora Energy Research, Thomson Reuters

# Historic weekly UK ETS and EU ETS Prices

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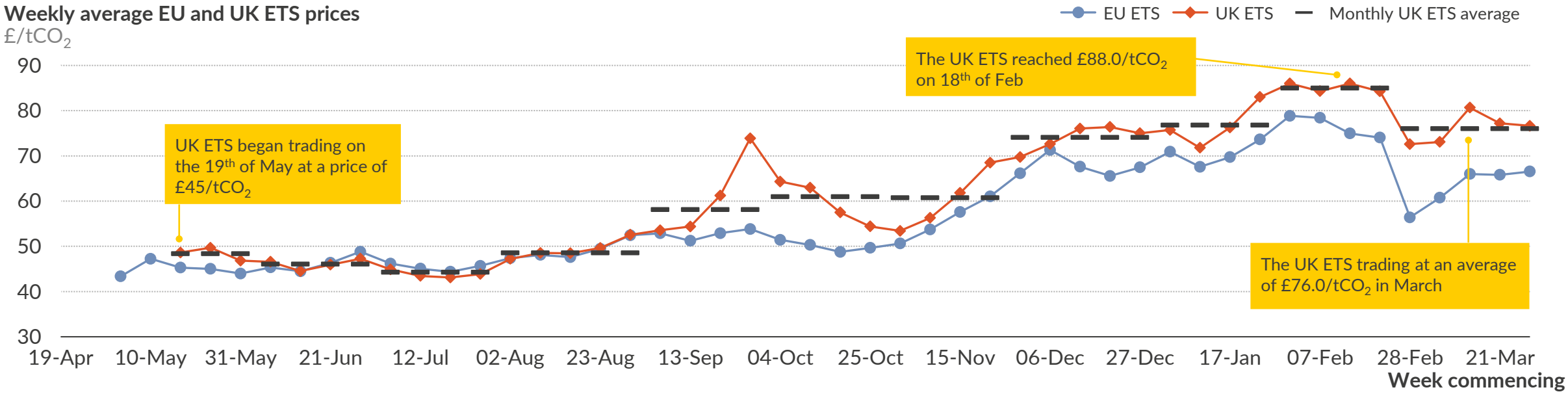
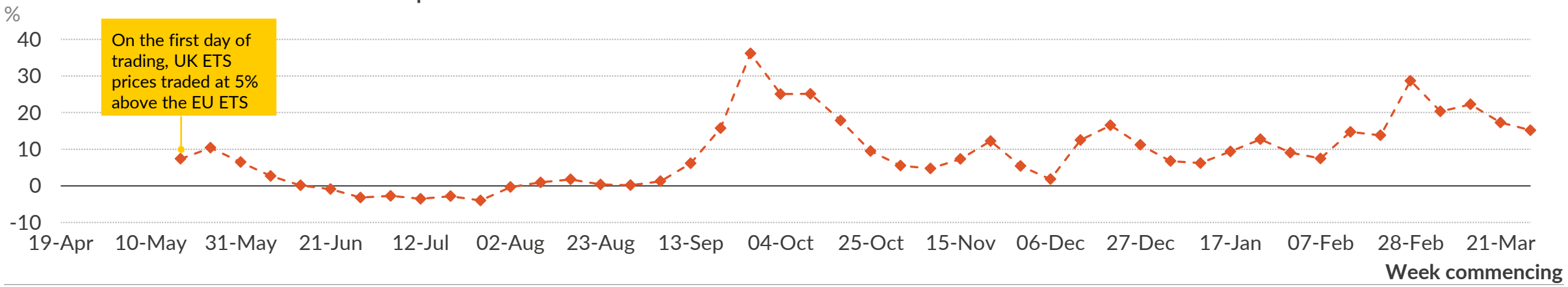
## Weekly average EU and UK ETS prices




## Relative difference between UK and EU ETS prices




Sources: Aurora Energy Research, ICE Futures, Bank of England

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

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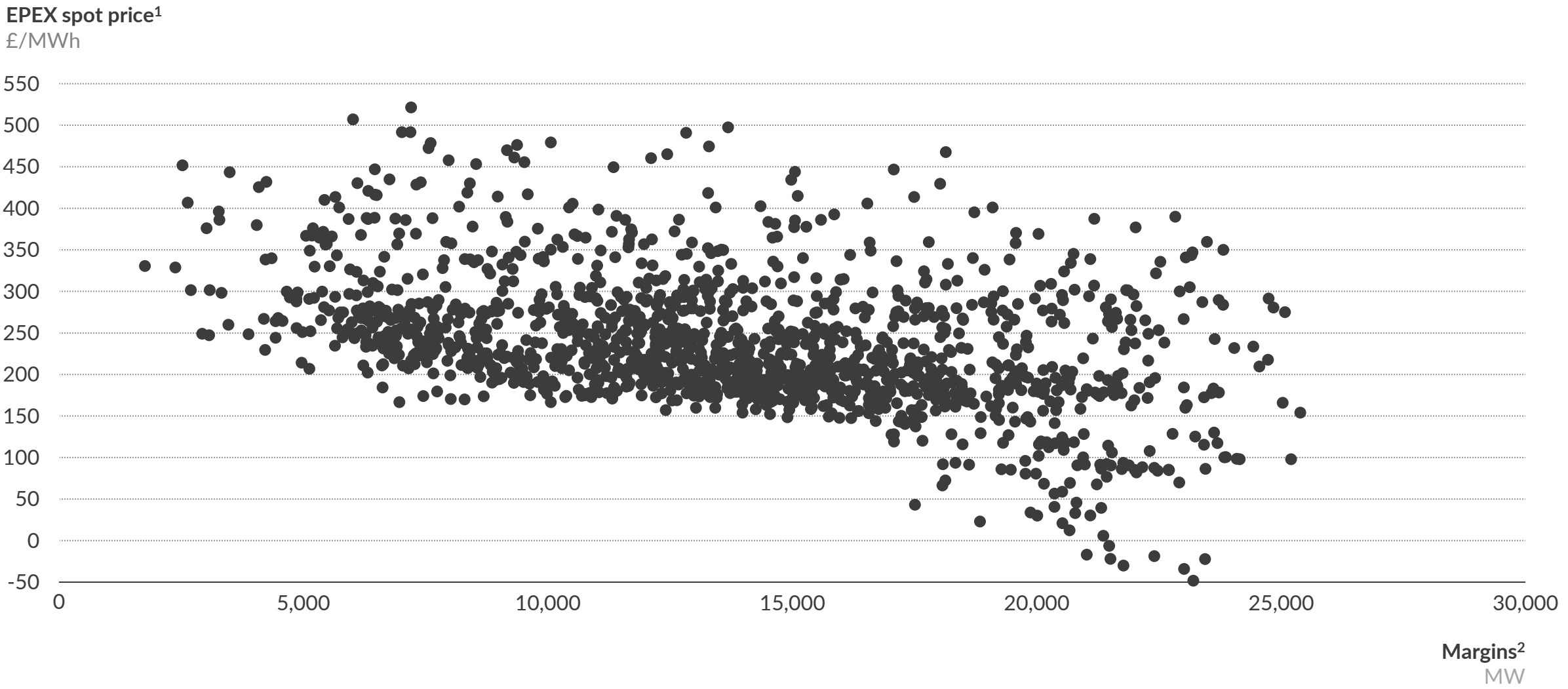


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) De-Rated Margin Forecast calculated in accordance with the Loss of Load Probability Calculation Statement from Elexon.

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

# Daily March max and min demand

## Relative to historic March max and min demand since 2010[1]

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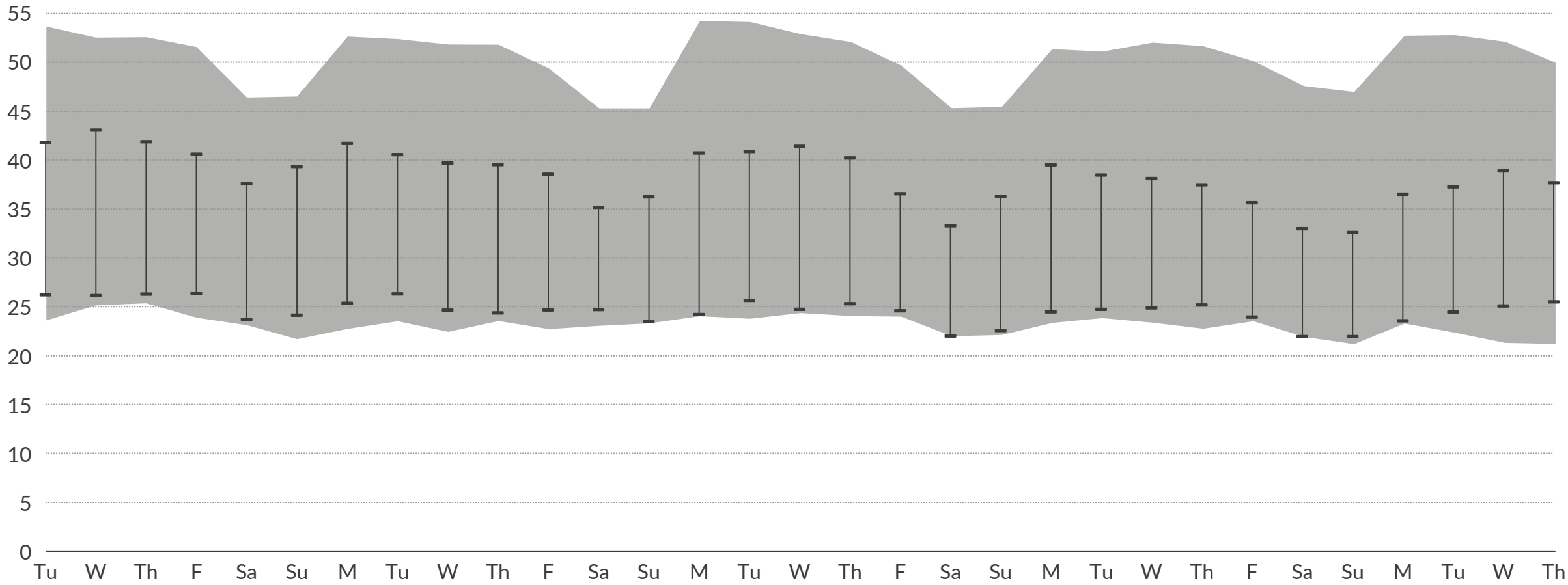
**Demand[2]**

GW




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.

Sources: National Grid, Aurora Energy Research

# Monthly historical demand on the transmission system

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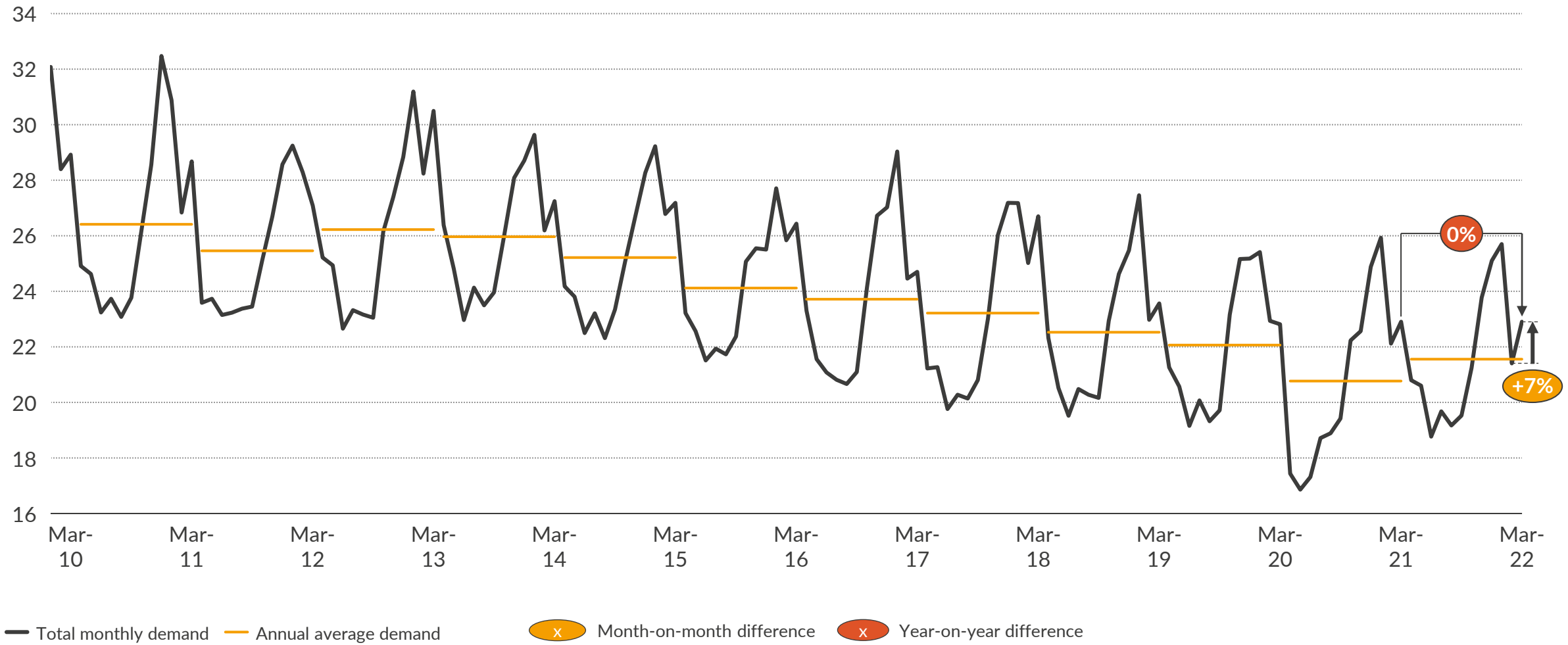
**Total demand[1]**

TWh




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.

Sources: National Grid, Aurora Energy Research

# Monthly fuel mix breakdown

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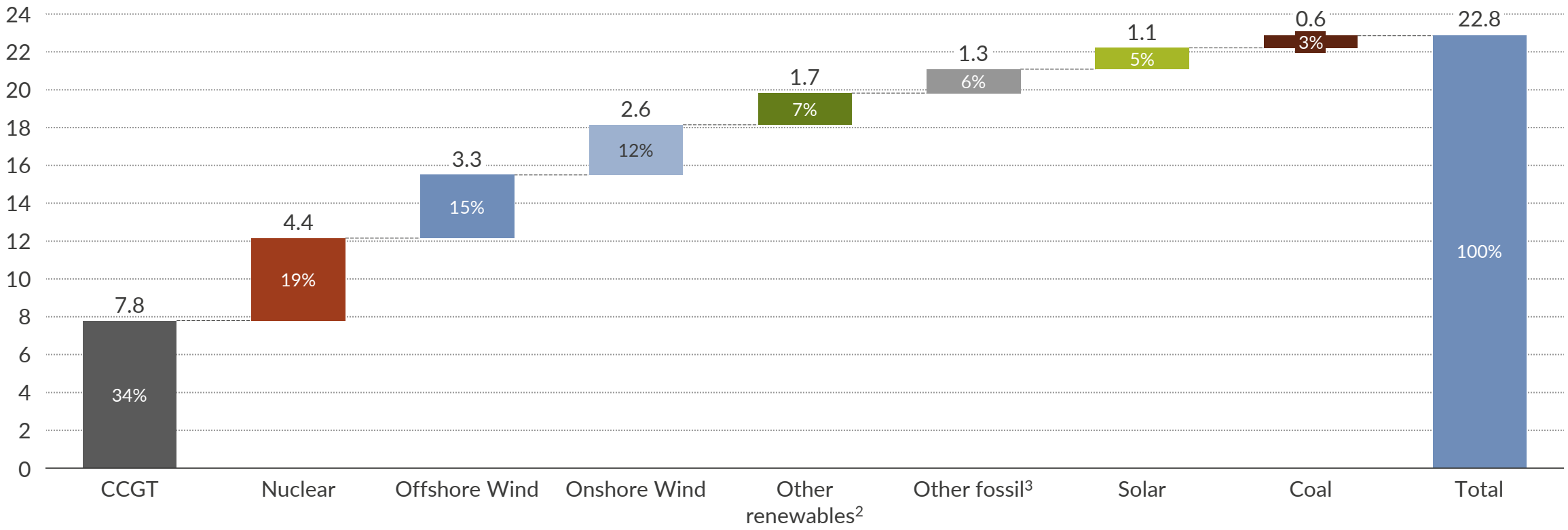
**Output**[1]

TWh




**Load factor,**

%

| CCGT | Nuclear | Offshore Wind | Onshore Wind | Other renewables[2] | Other fossil[3] | Solar | Coal |
|---|---|---|---|---|---|---|---|
| 37 | 79 | 39 | 27 | 34 | 18 | 11 | 16 |

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 renewables includes biomass and hydro.
3) Other fossil includes oil, CHP-CCGT and OCGT.

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

# Historical fuel mix breakdown

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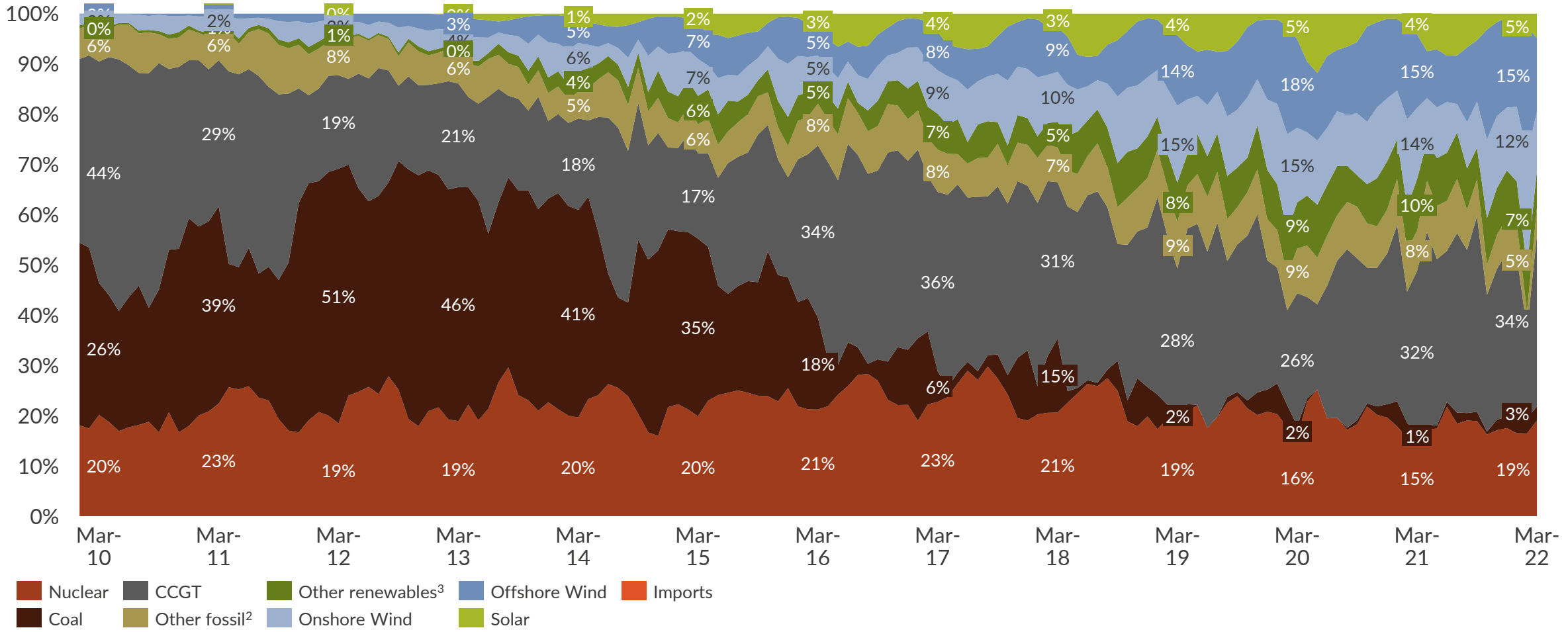
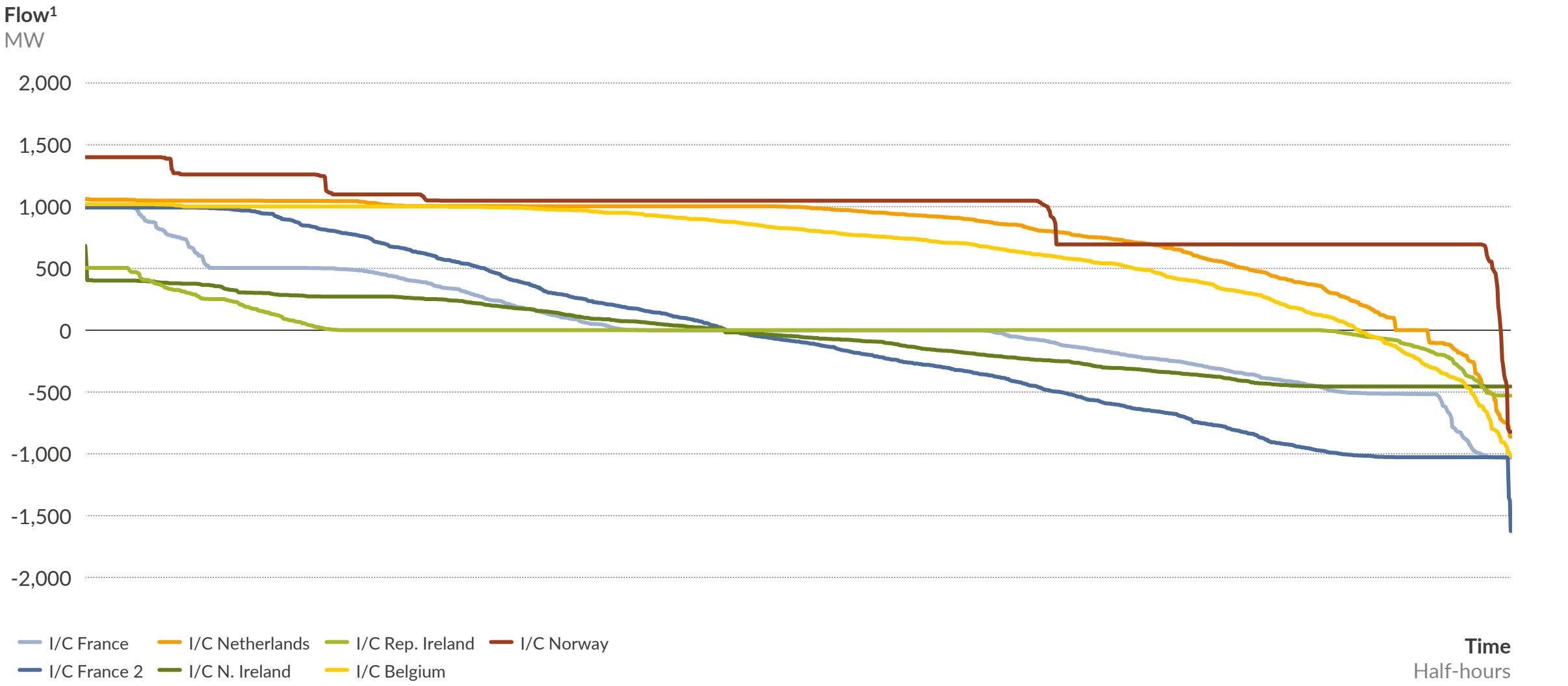
**Output**[1]
% of total




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.

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

# Monthly interconnector flow duration curve
# Flow in each half-hour for GB interconnectors




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

Sources: Elexon, National Grid, Aurora Energy Research

# Monthly emissions by technology

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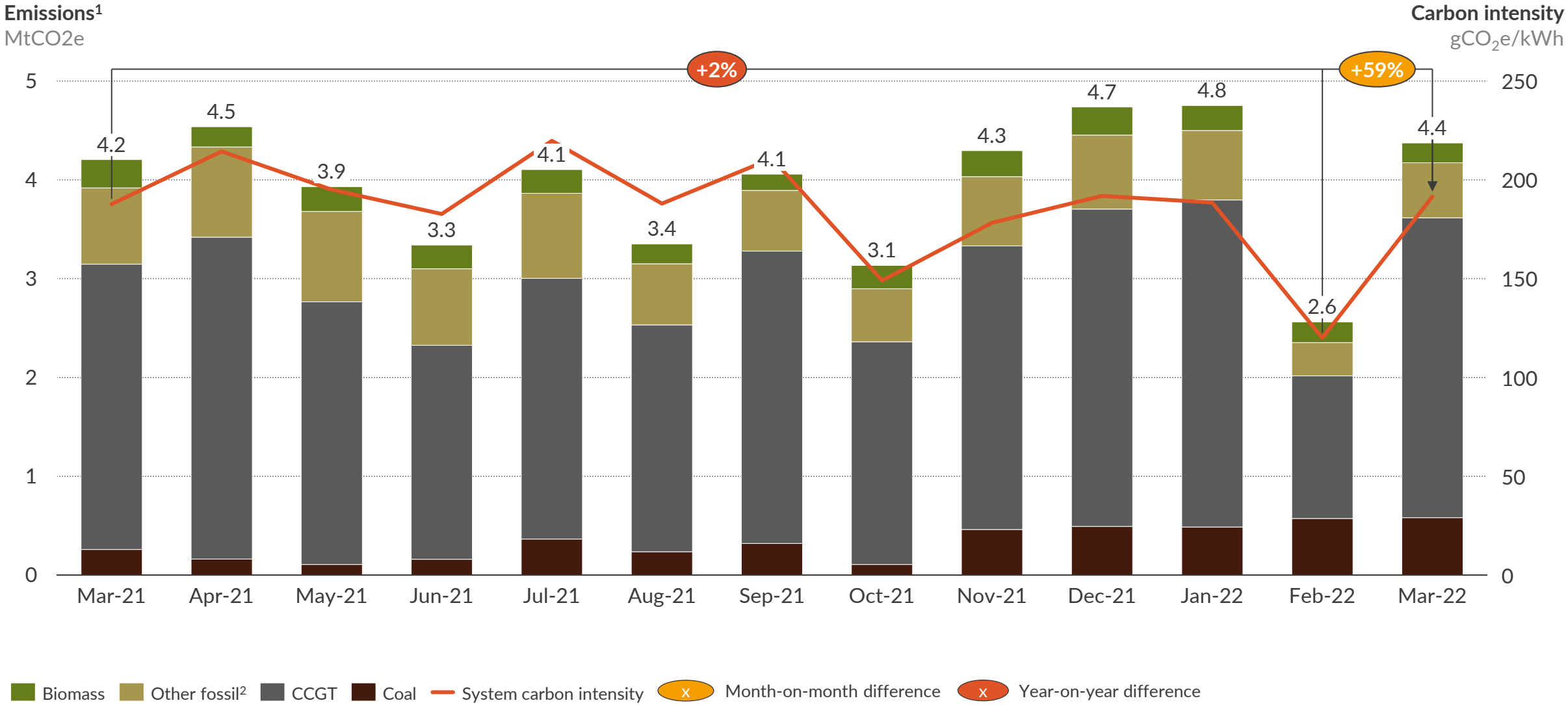


1) Please refer to Appendix for details of methodology employed to calculate emission amounts. Includes all Balancing Mechanism plants. 2) Other fossil includes oil, OCGT and gas CHP-CCGT.

Sources: Elexon, Ofgem, Aurora Energy Research

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# Monthly load factors by technology

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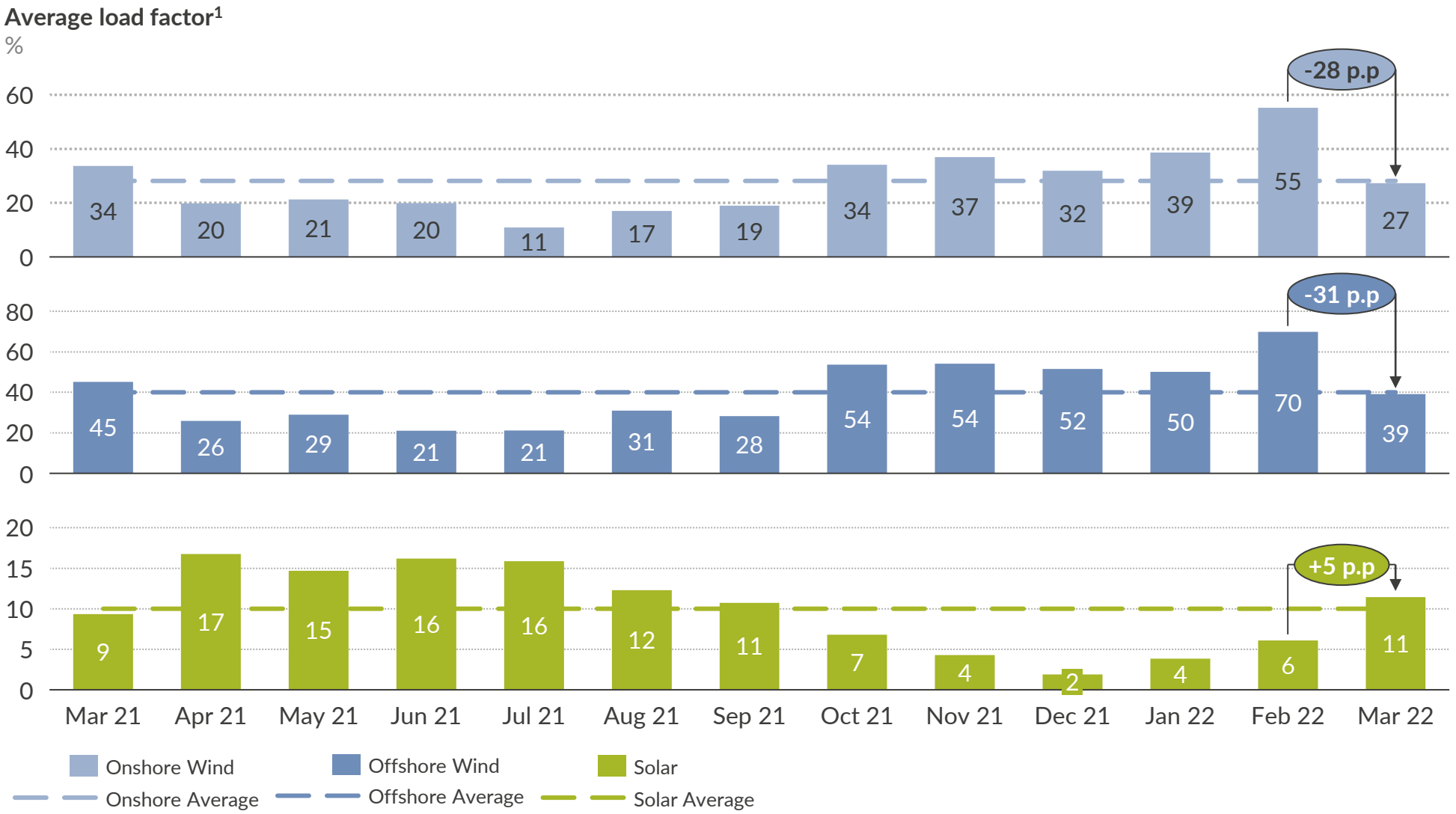


**February variance to 5-year average[2]**

-6.5

-8.7

+1.7

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

Sources: Aurora Energy Research, Elexon

# Capture price versus baseload APX price

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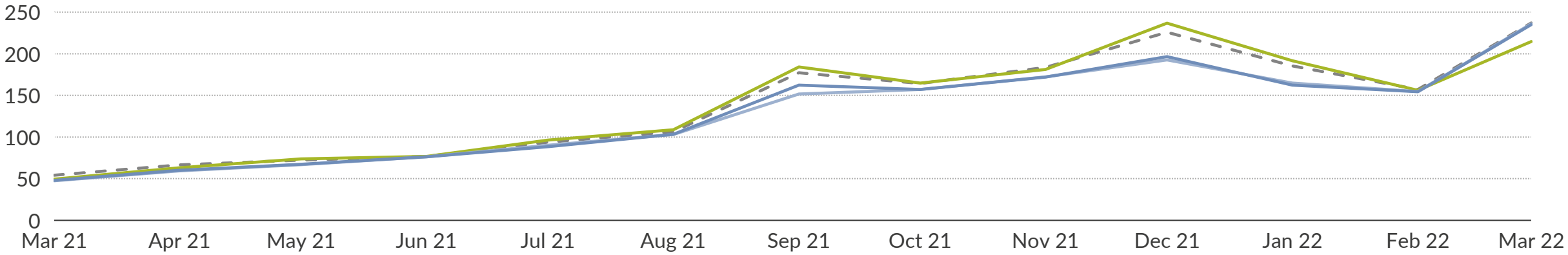
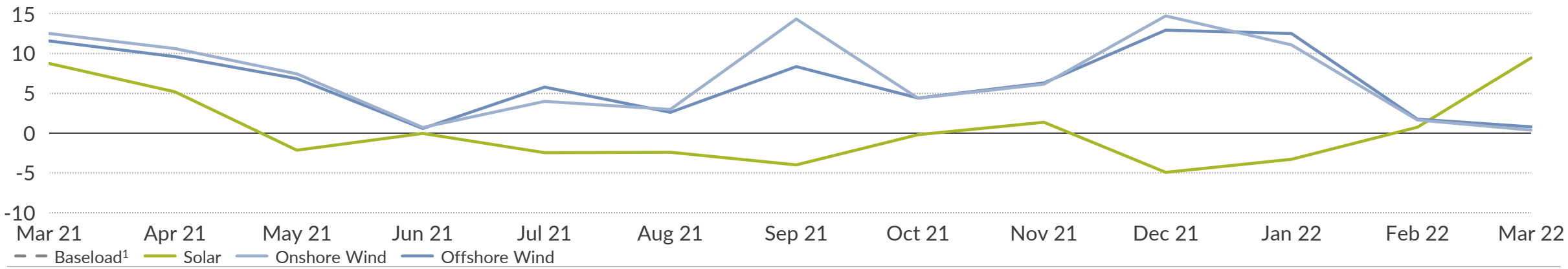
**Intraday Price[1,2]**
£/MWh




**Technology capture discount[2] to baseload**
%




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

Sources: Aurora Energy Research, Elexon, EPEX Spot

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# Plant utilisation – load factors by plant for March

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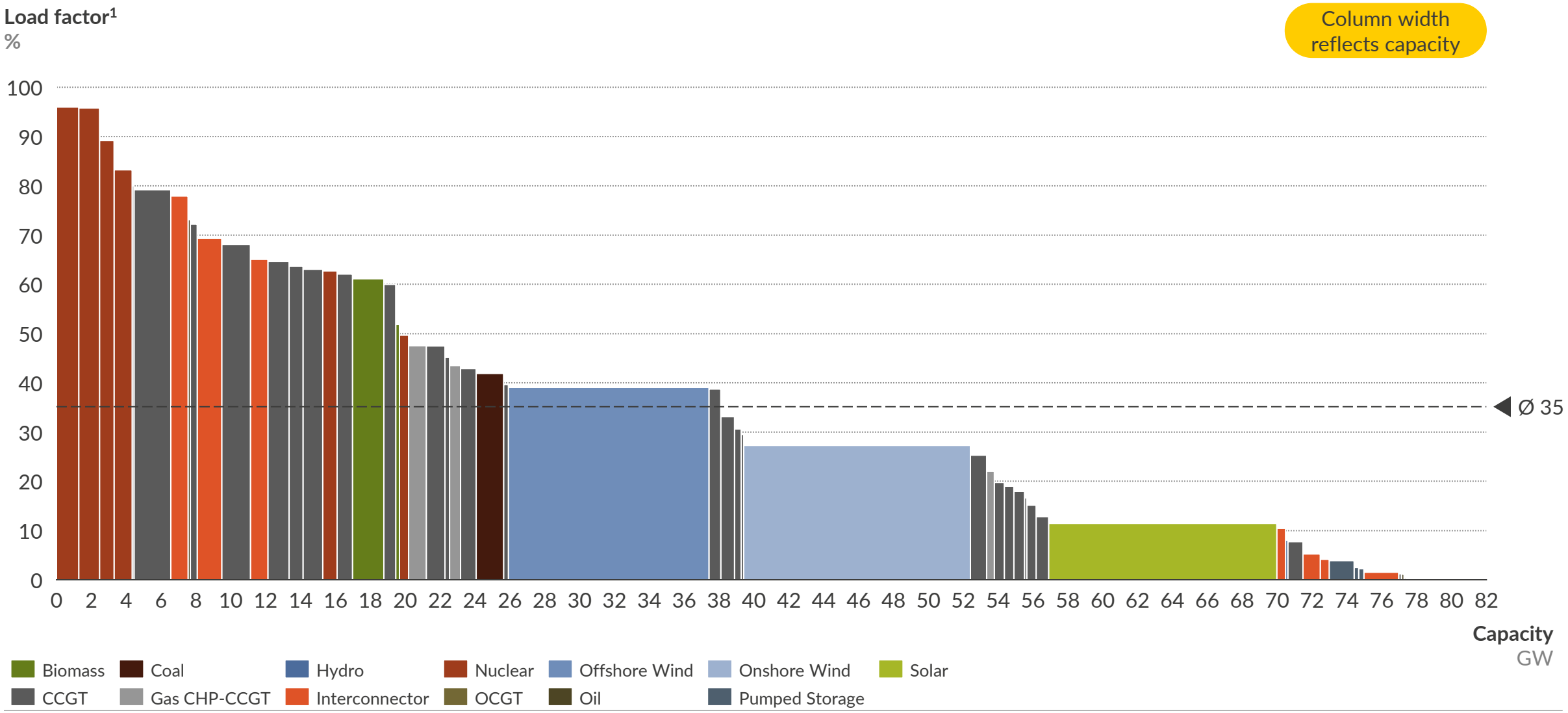


1) Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for wind and solar. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months. Please refer to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

Sources: Aurora Energy Research, Elexon, BEIS

# CCGT plant utilisation – by plant for March

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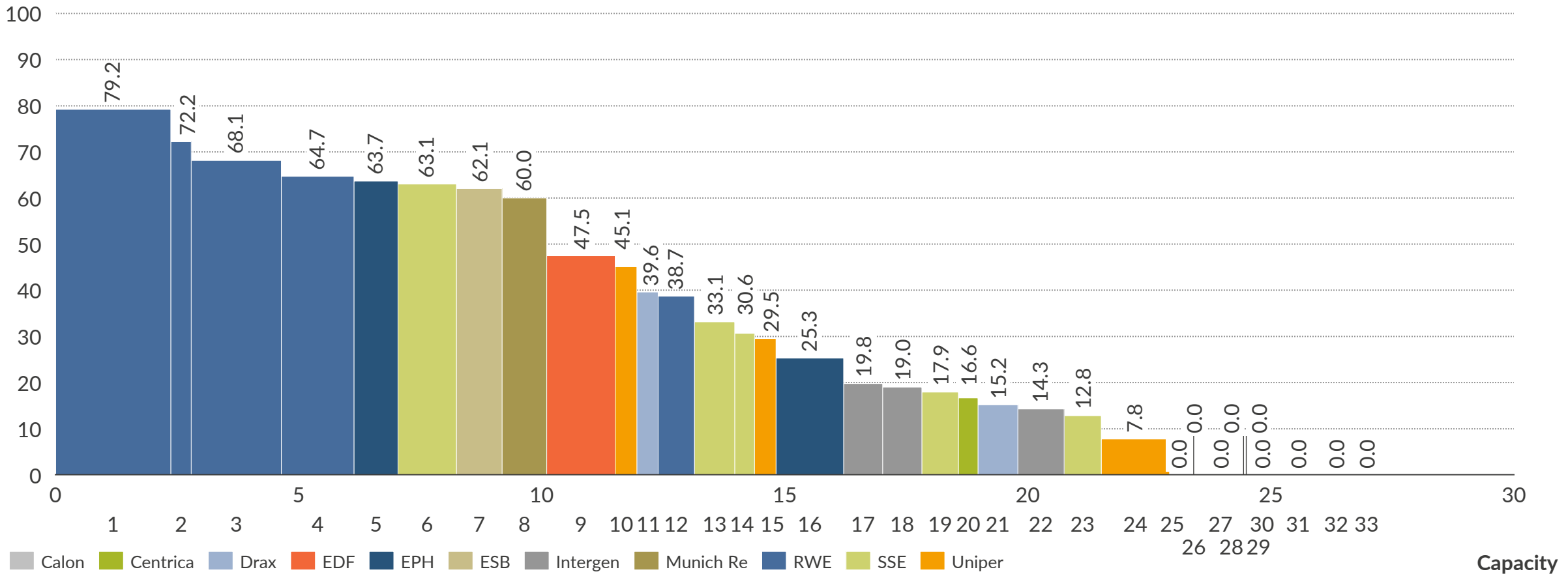
**Full load hours[1]**
% of total for the period

Column width reflects capacity




**Capacity**
GW

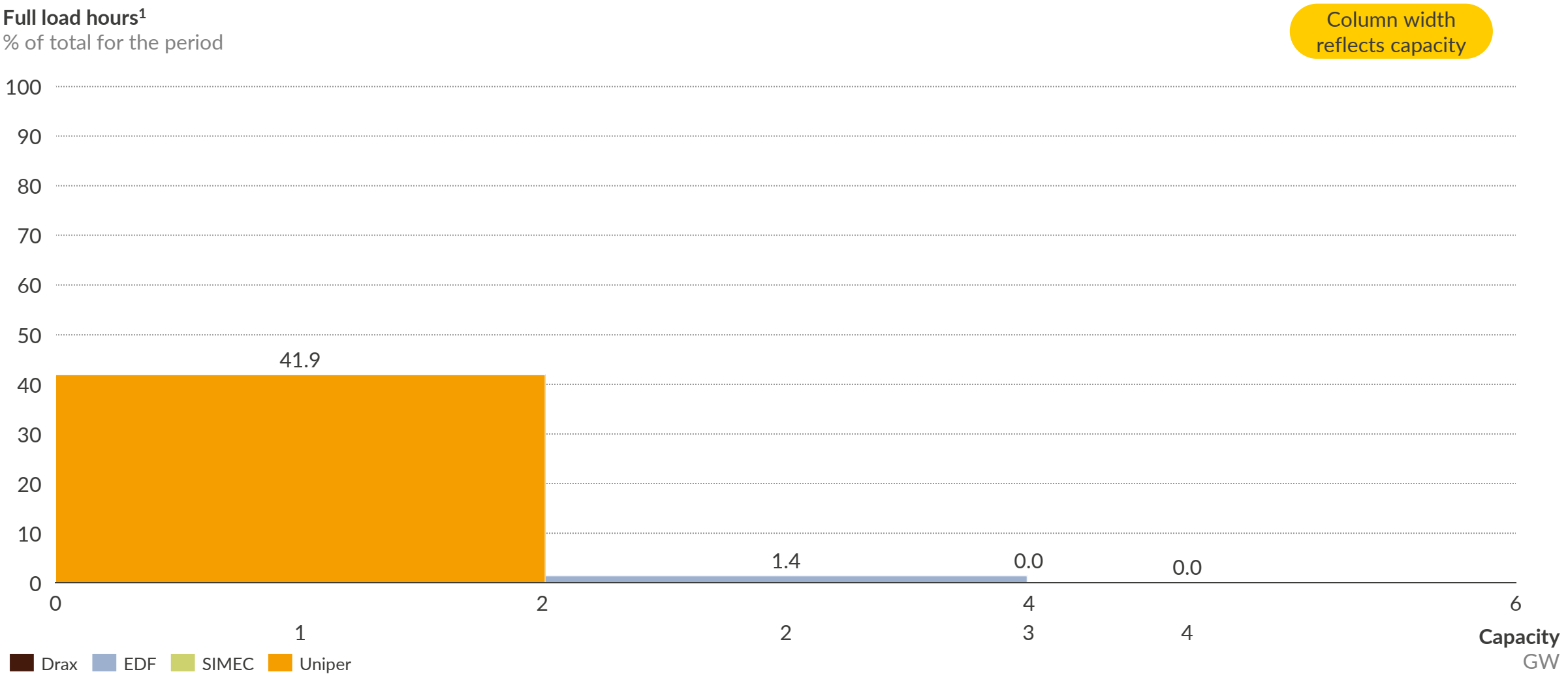
Plant Names: 1. Pembroke, 2. Great Yarmouth, 3. Staythorpe, 4. Didcot B, 5. Langage, 6. Peterhead, 7. Carrington, 8. Marchwood, 9. West Burton B, 10. Enfield Energy, 11. Shoreham, 12. Little Barford, 13. Seabank 1, 14. Seabank 2, 15. Cottam Dvpt Centre, 16. South Humber Bank, 17. Coryton, 18. Rocksavage,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

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

Sources: Aurora Energy Research, Elexon

# Coal plant utilisation – by plant for March

**Full load hours[1]**
% of total for the period




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

Sources: Aurora Energy Research, Elexon

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# Monthly average system prices for the last 13 months

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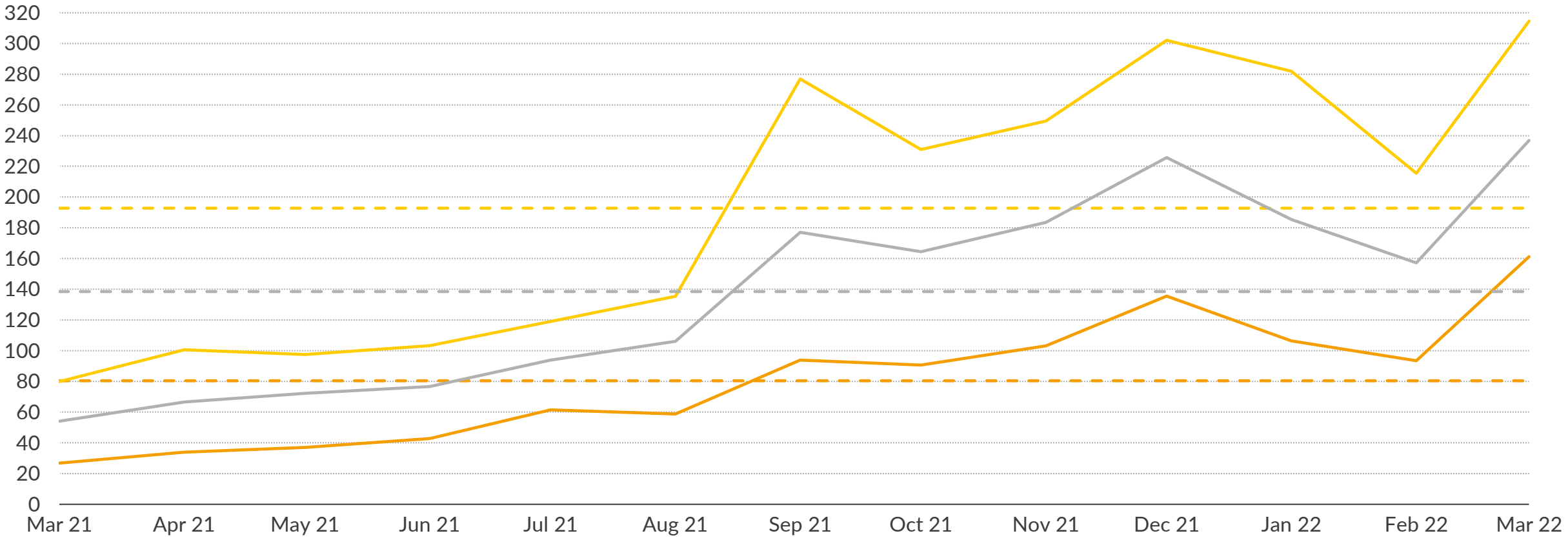
**System Price[1]**
£/MWh




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

Sources: Aurora Energy Research, Elexon, EPEX Spot

# Half-hourly System Price against Net Imbalance Volume for March

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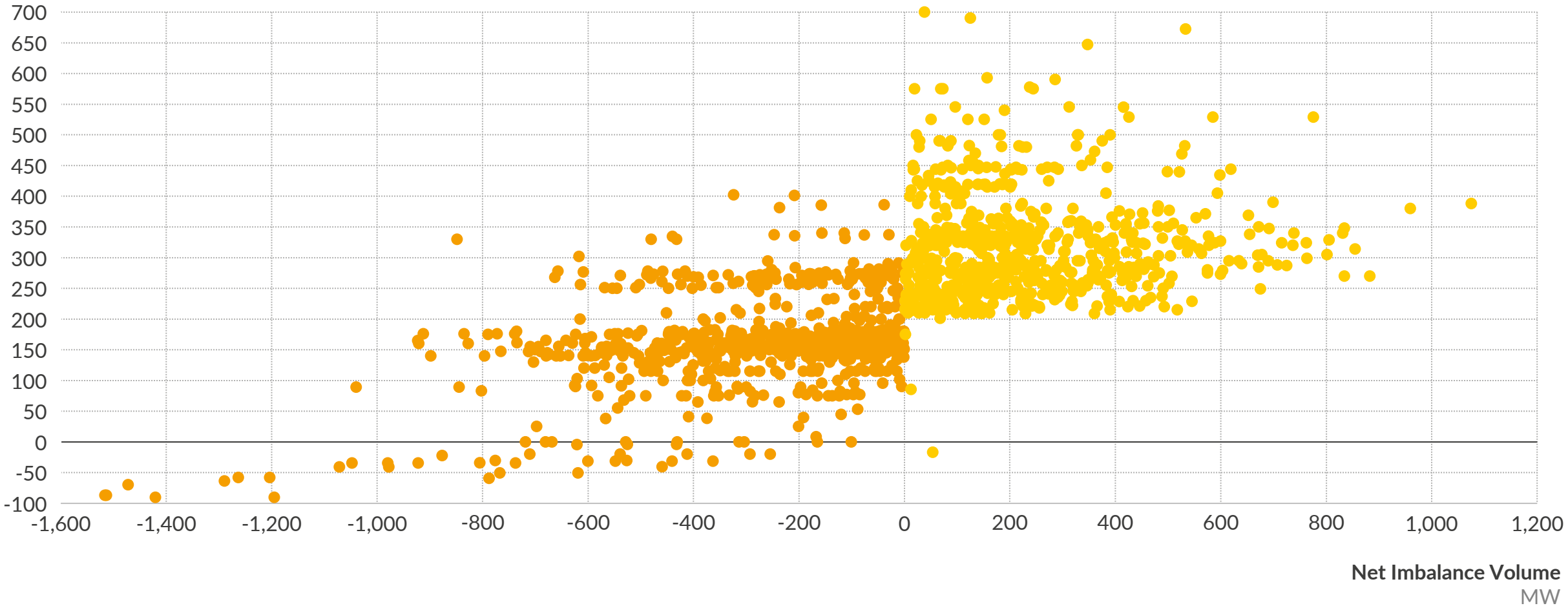


Sources: Aurora Energy Research, Elexon

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

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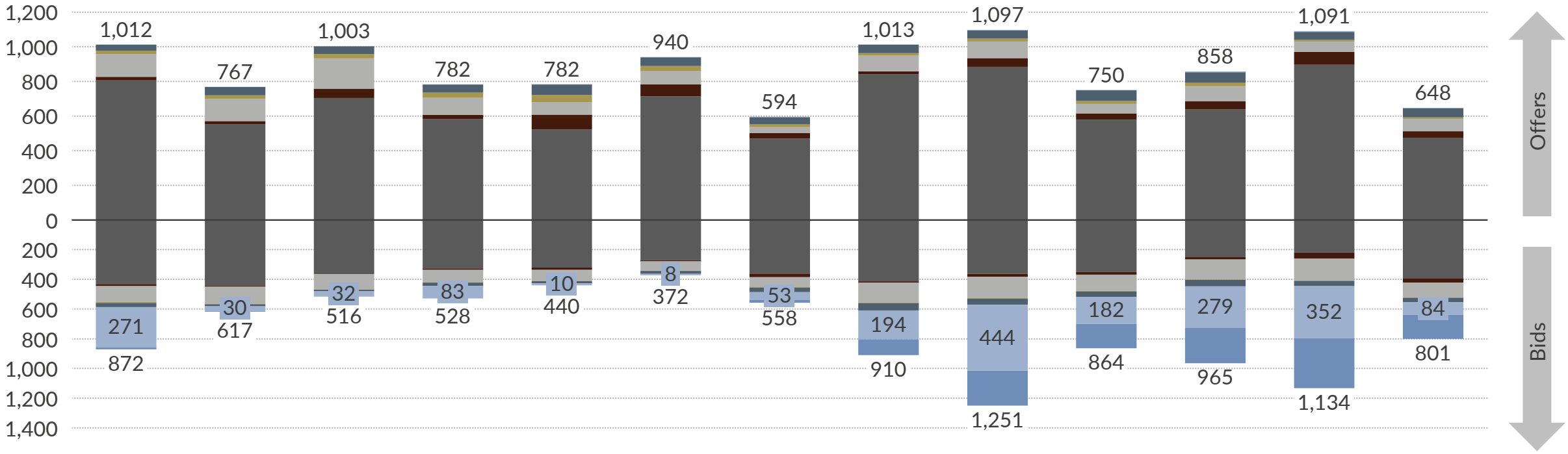
**Accepted offer[1] volumes**
GWh




**Accepted bid[2] volumes**
GWh

CCGT Coal Other[3] Peaking[4] Storage[5] Onshore Wind Offshore Wind

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, Elexon

# Appendix

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## 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.

Source: Aurora Energy Research

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