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ENERGY RESEARCH

GB Wholesale Market Summary January 2022

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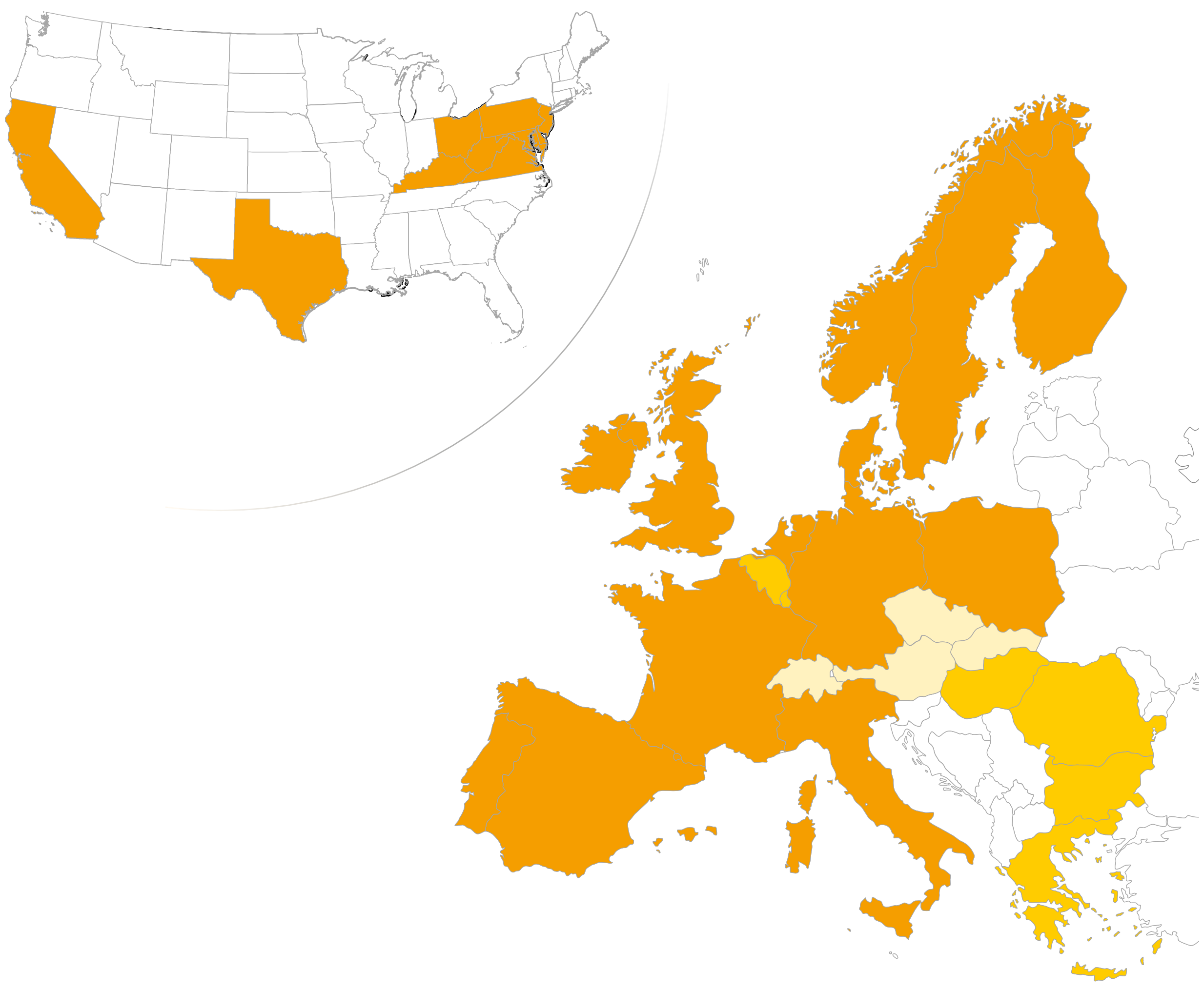

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- Power market forecast reports
- Forecast data in Excel
- Analyst support

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- Market forecast reports
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- Strategic insight reports
- Regular subscriber group meetings
- Policy updates
- Bilateral workshops
- Analyst support

Source: Aurora Energy Research

Executive Summary

- The average power price in January was £185.3 /MWh, an 18% decrease since December 2021
- The month-on-month decrease in power prices, was primarily driven by the 27% fall in gas prices, offsetting upward pressure from higher carbon prices and transmission demand
- The UK-ETS traded at an average of £77/tCO_2 in January, a 3% increase relative to December
- Average CCGT load factors remained similar at 41% from December to January, as did those for offshore wind, at ~50%
- Consequently, domestic power sector emissions stayed similar, totalling 4.7 MtCO_2e

	Monthly value[1]	Month-on-month change	Year-on-year change	Slide reference(s)
Power prices *£/MWh*	185.3	-40.3 (17.9%)	+114.2 (160.4%)	5, 6
Gas prices *£/MWh*	67.9	-24.8 (26.7%)	+47.7 (236.5%)	7
Carbon[2] prices *£/tCO_2*	94.9	+2.9 (3.2%)	+47.2 (99.0%)	7
Transmission demand *TWh*	25.7	+0.6 (2.4%)	-0.2 (0.9%)	10
Low carbon[3] generation *TWh*	14.5	+0.3 (2.0%)	+1.9 (15.3%)	11, 12
Thermal[4] generation *TWh*	10.5	+0.2 (1.8%)	-1.7 (14.1%)	11, 12
Carbon emissions *MtCO_2e*	4.7	+0.0 (0.2%)	-1.1 (18.5%)	15
Grid carbon intensity *gCO_2e/kWh*	207.0	-4.5 (2.1%)	-46.8 (18.4%)	15
Wind load factors[5] *%*	38.1	+6.6 (20.8%)	+12.4 (44.9%)	27
Wind capture prices[5] *£/MWh*	164.3	-27.8 (14.5%)	+100.5 (157.7%)	28

1) Values averaged over the calendar month. 2) Includes CPS and EU-ETS, the UK-ETS auctions will commence form 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

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I. **System performance**

II. Company performance

III. Plant performance

Half-hourly EPEX spot price for January

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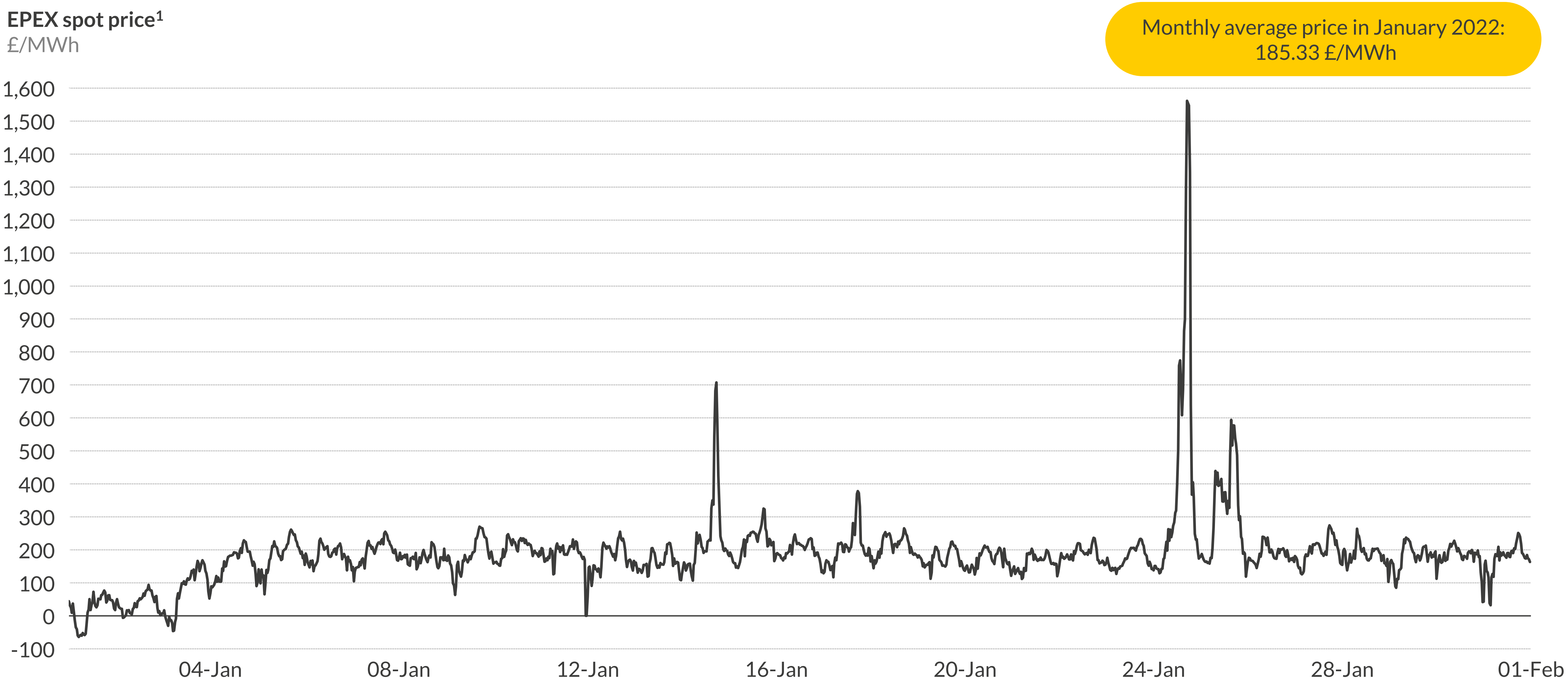

1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot

Sources: Aurora Energy Research, Thomson Reuters

Historic monthly average EPEX spot price

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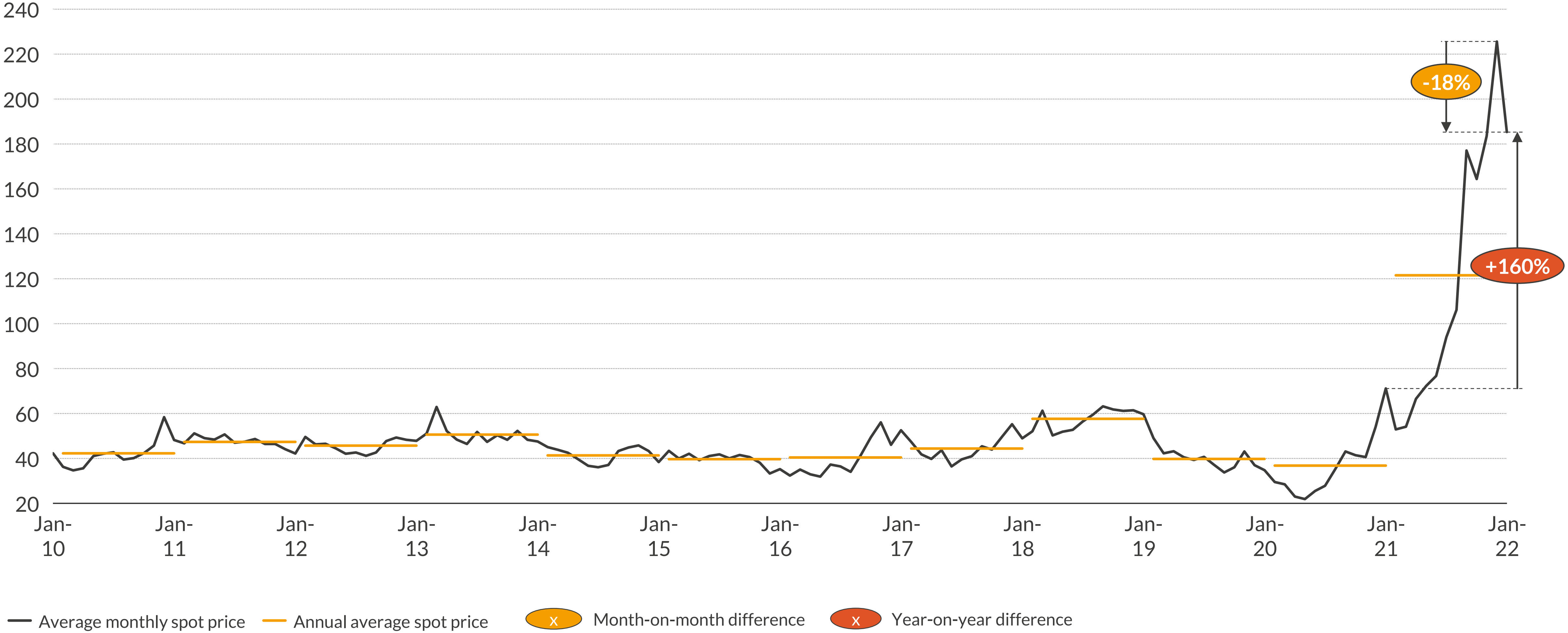
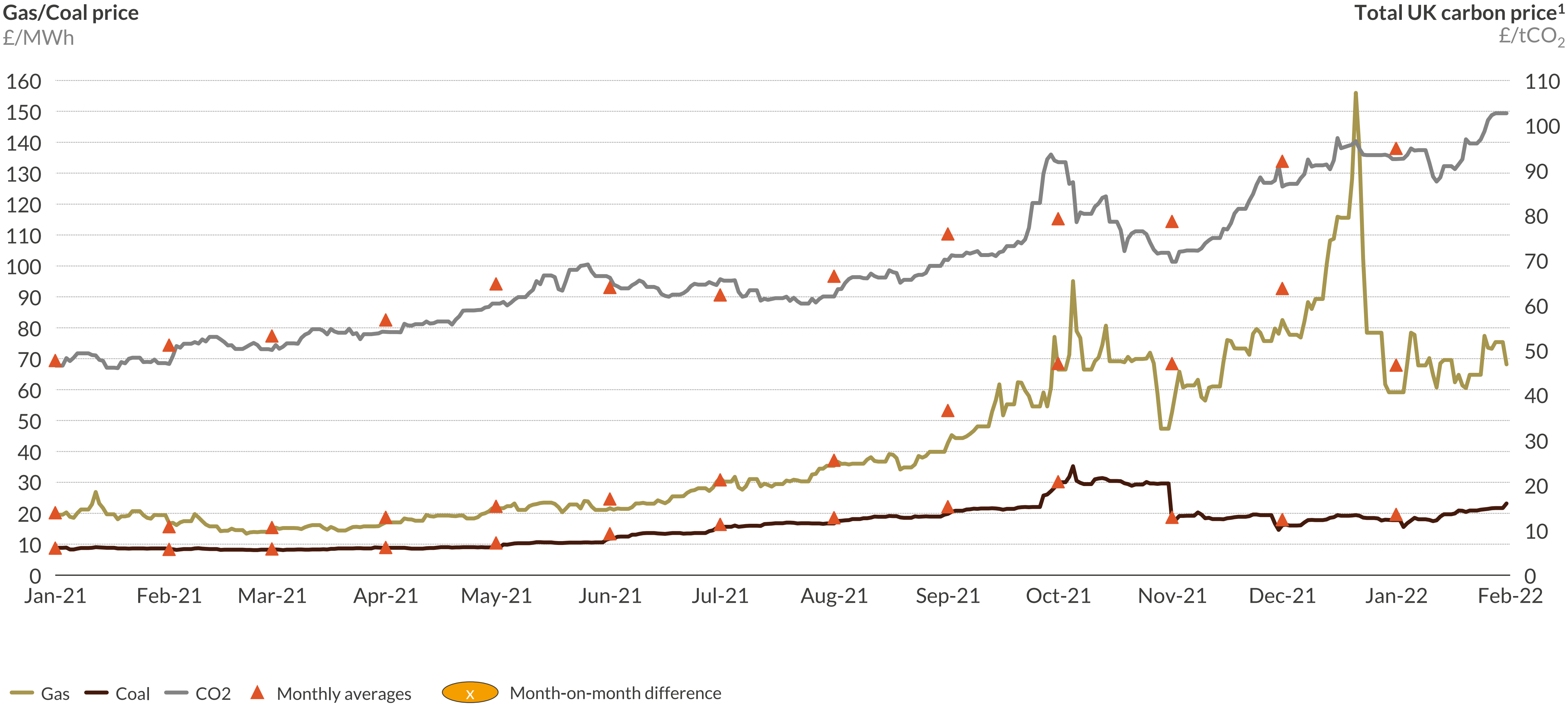
Average EPEX spot price[1]
£/MWh



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

Historic fuel prices
Gas, Coal and Carbon daily prices

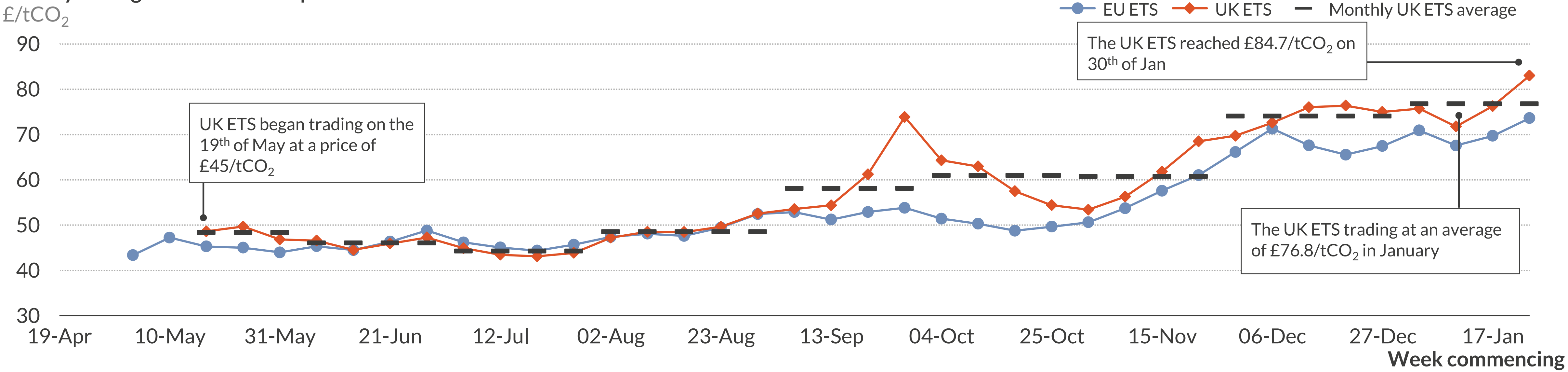


1) Includes CPS and EU ETS until 18th May 2021 and UK ETS from 19th May 2021 onwards.

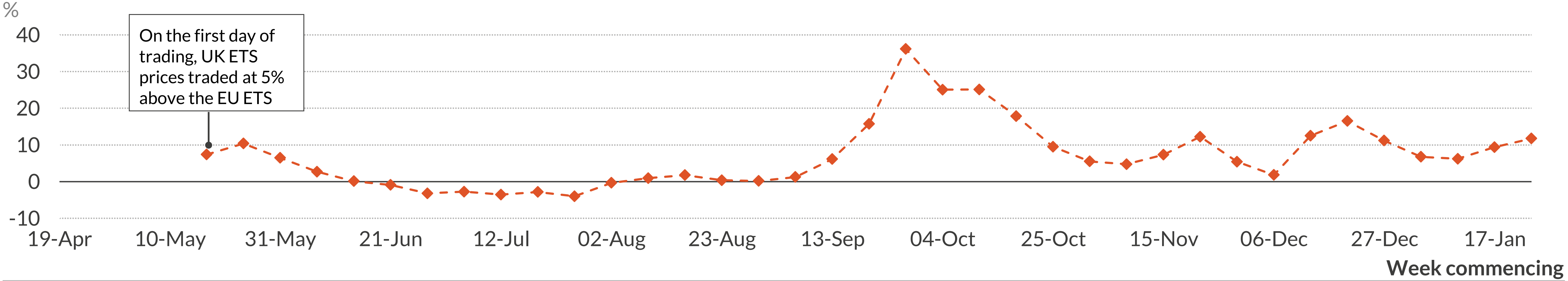
Sources: Aurora Energy Research, Thomson Reuters

Historic weekly UK ETS and EU ETS Prices

Weekly average EU and UK ETS prices

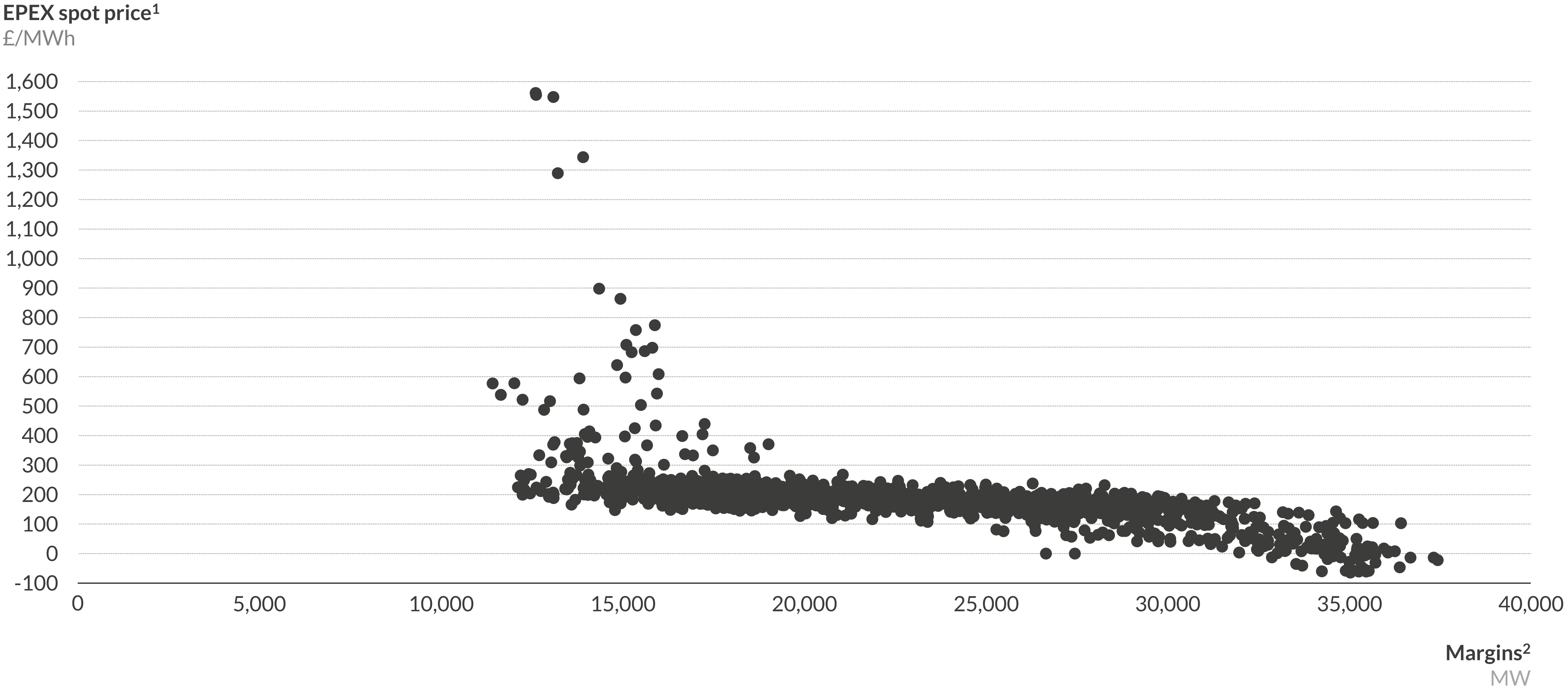


Relative difference between UK and EU ETS prices



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

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

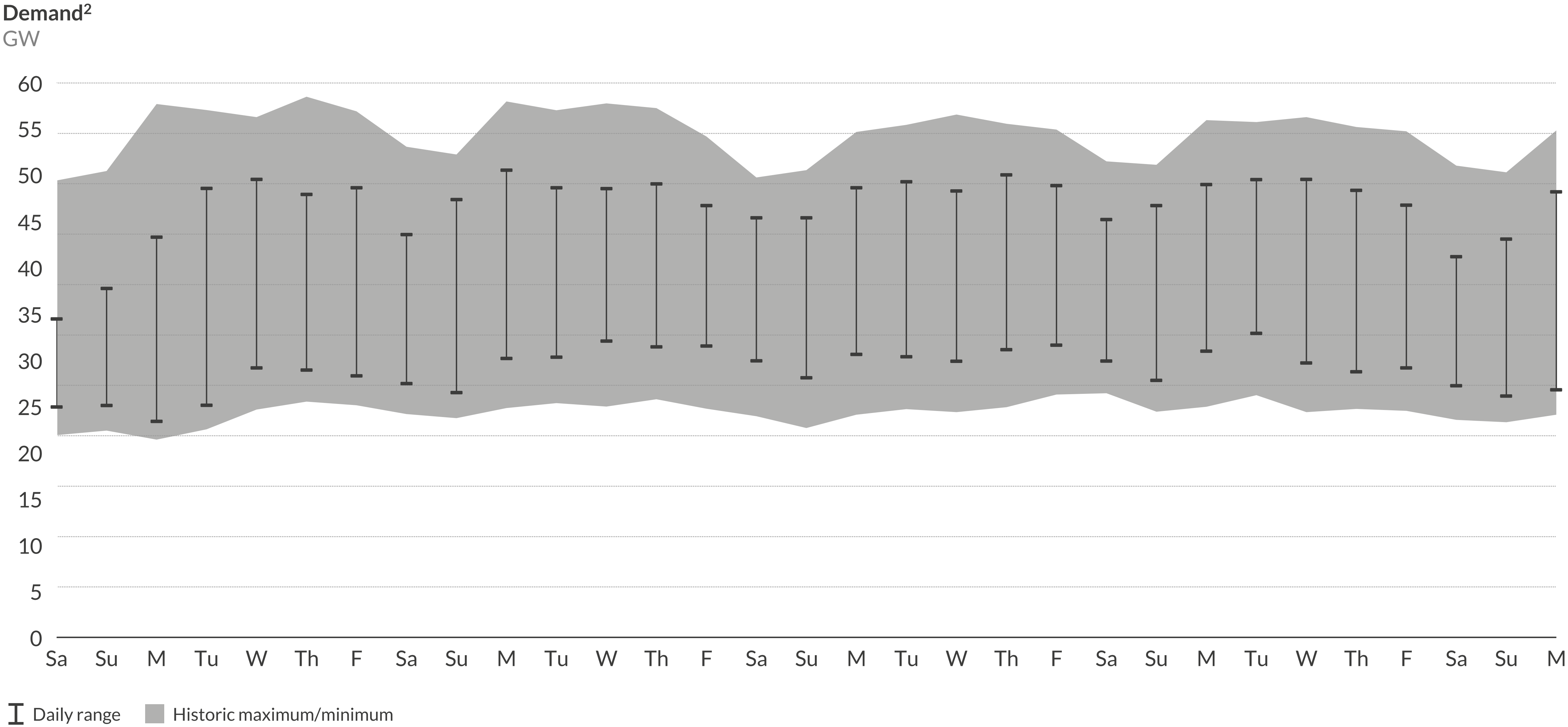


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include 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: Elexon, National Grid, Thomson Reuters, Aurora Energy Research

Daily January max and min demand

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



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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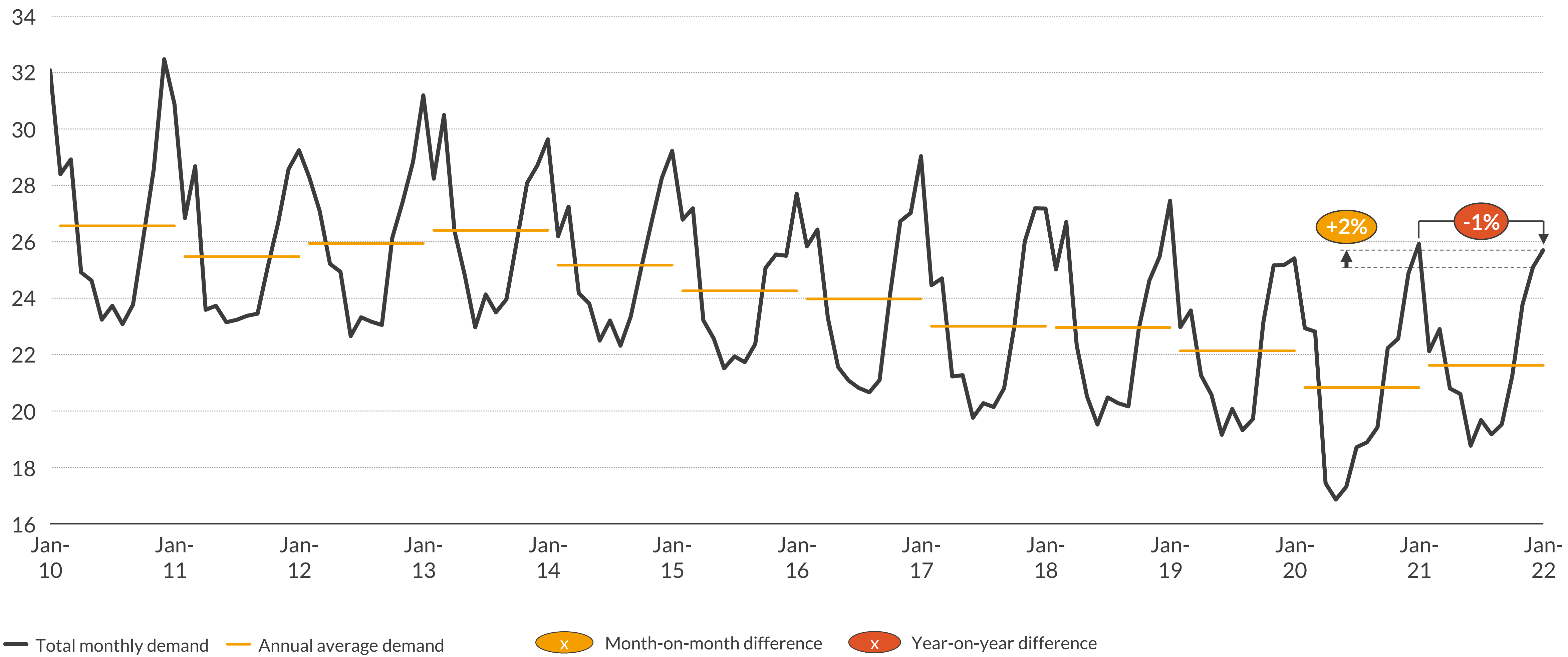
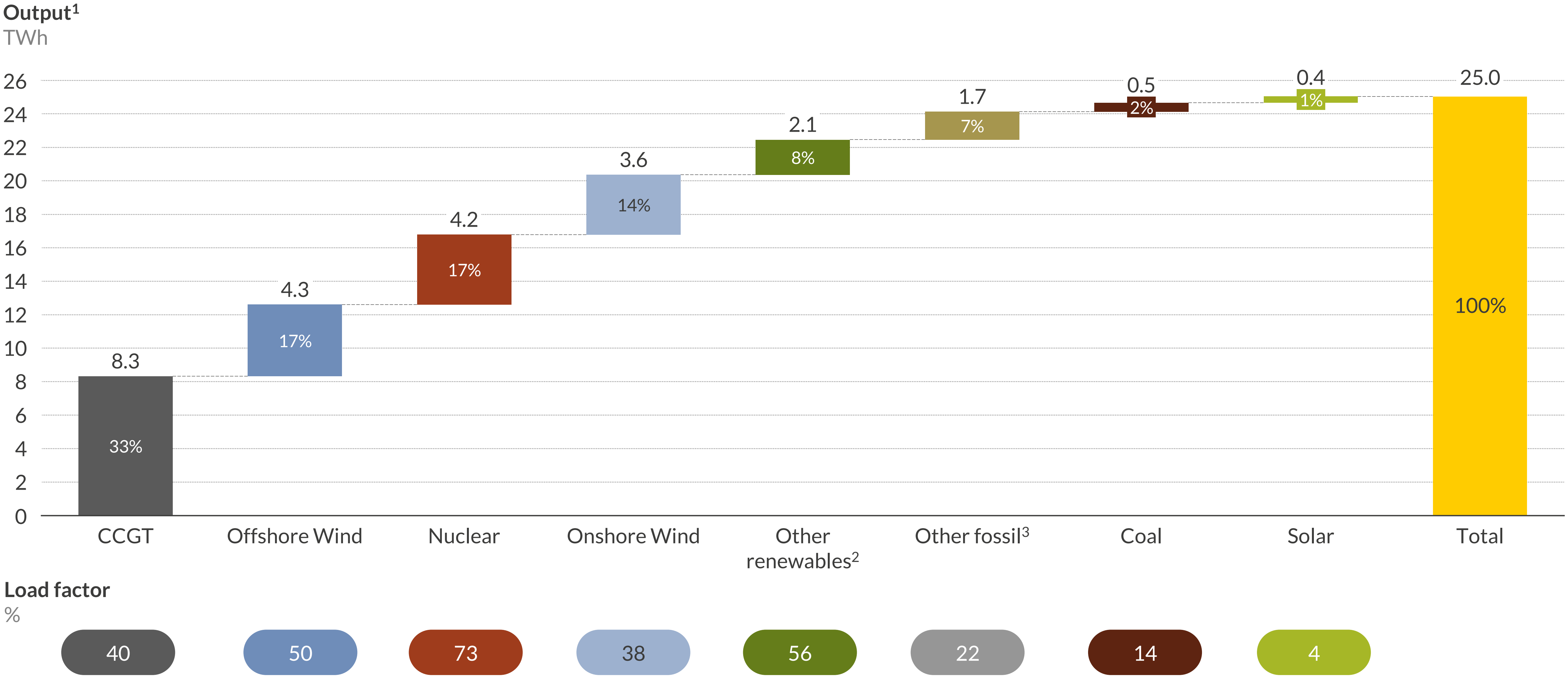
Total demand[1]
TWh



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

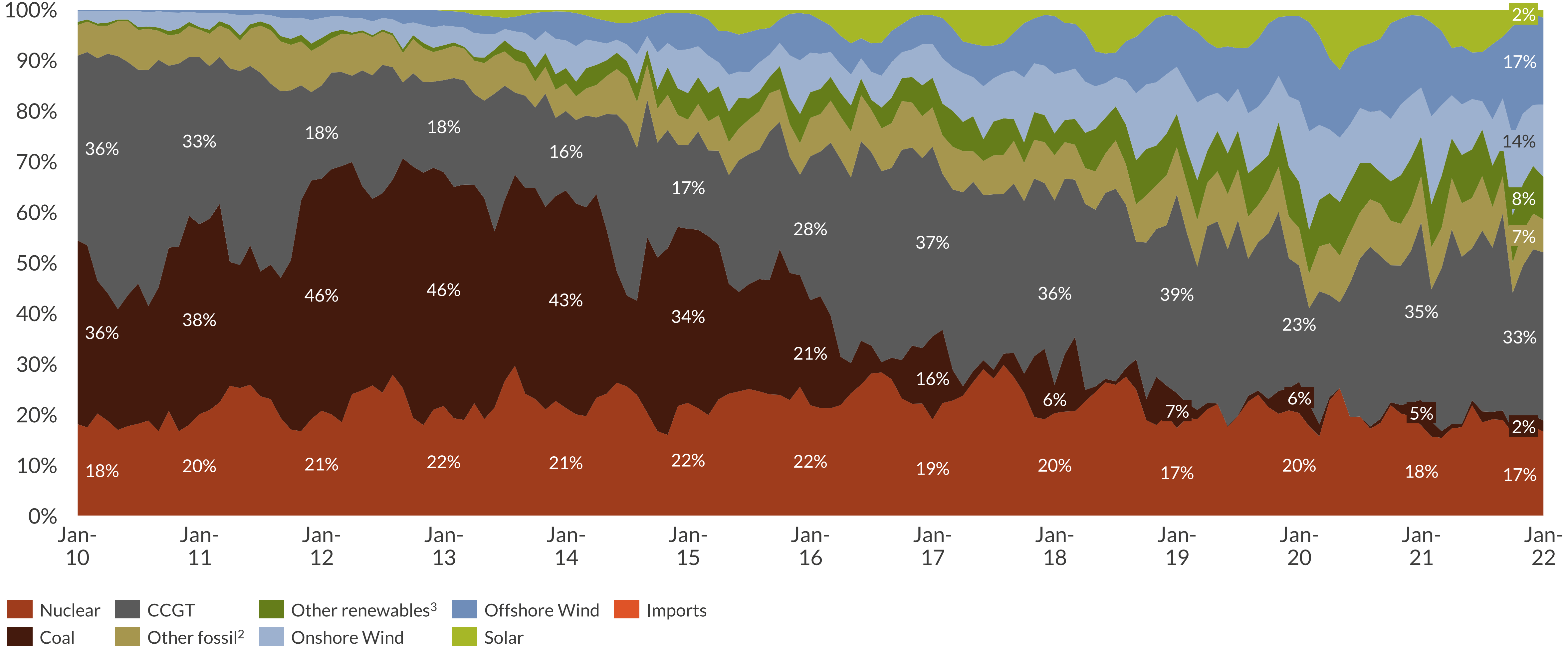


1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV assets. All numbers are rounded to 0.1 TWh which means that subtotals may not sum to total value. 2) Other renewables includes biomass and hydro. 3) Other fossil includes oil, CHP-CCGT and OCGT.

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

Historical fuel mix breakdown

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

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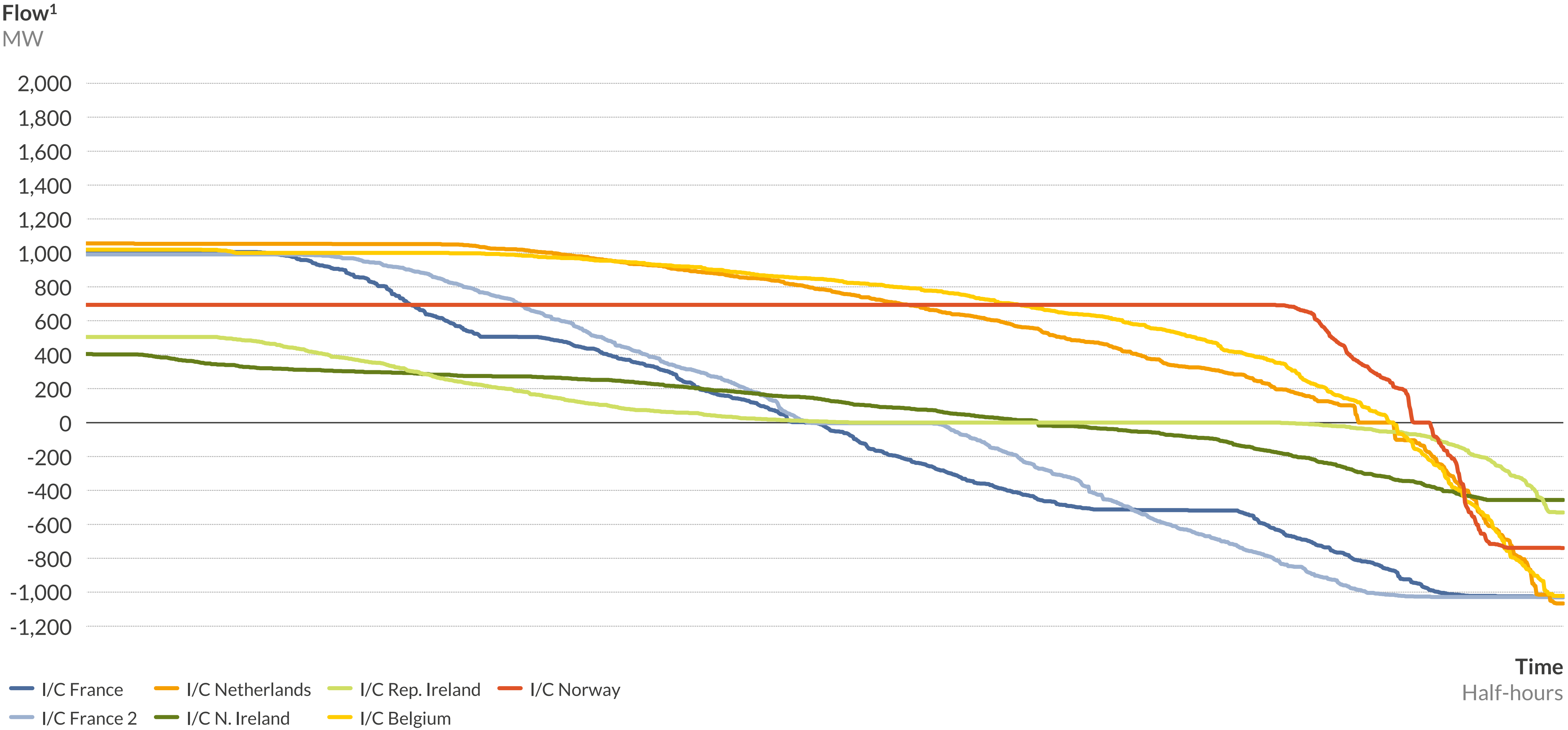
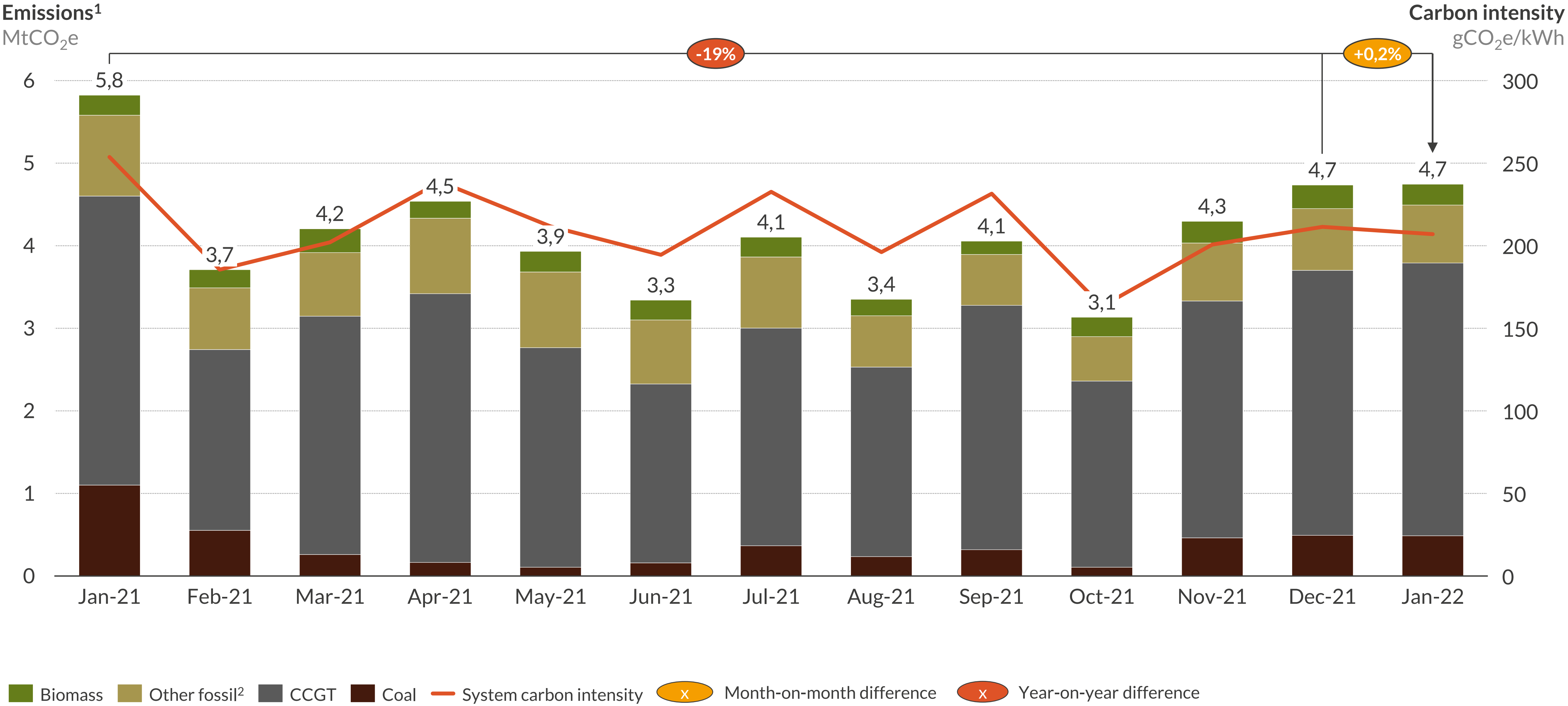


1) Positive flow is imports into GB, negative flow is exports.

Sources: Elexon, National Grid, Aurora Energy Research

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.

Sources: Elexon, Ofgem, Aurora Energy Research

Agenda

I. System performance

II. Company performance (subscriber only)

III. Plant performance

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I. System performance

II. Company performance

III. Plant performance

Plant utilisation – load factors by plant

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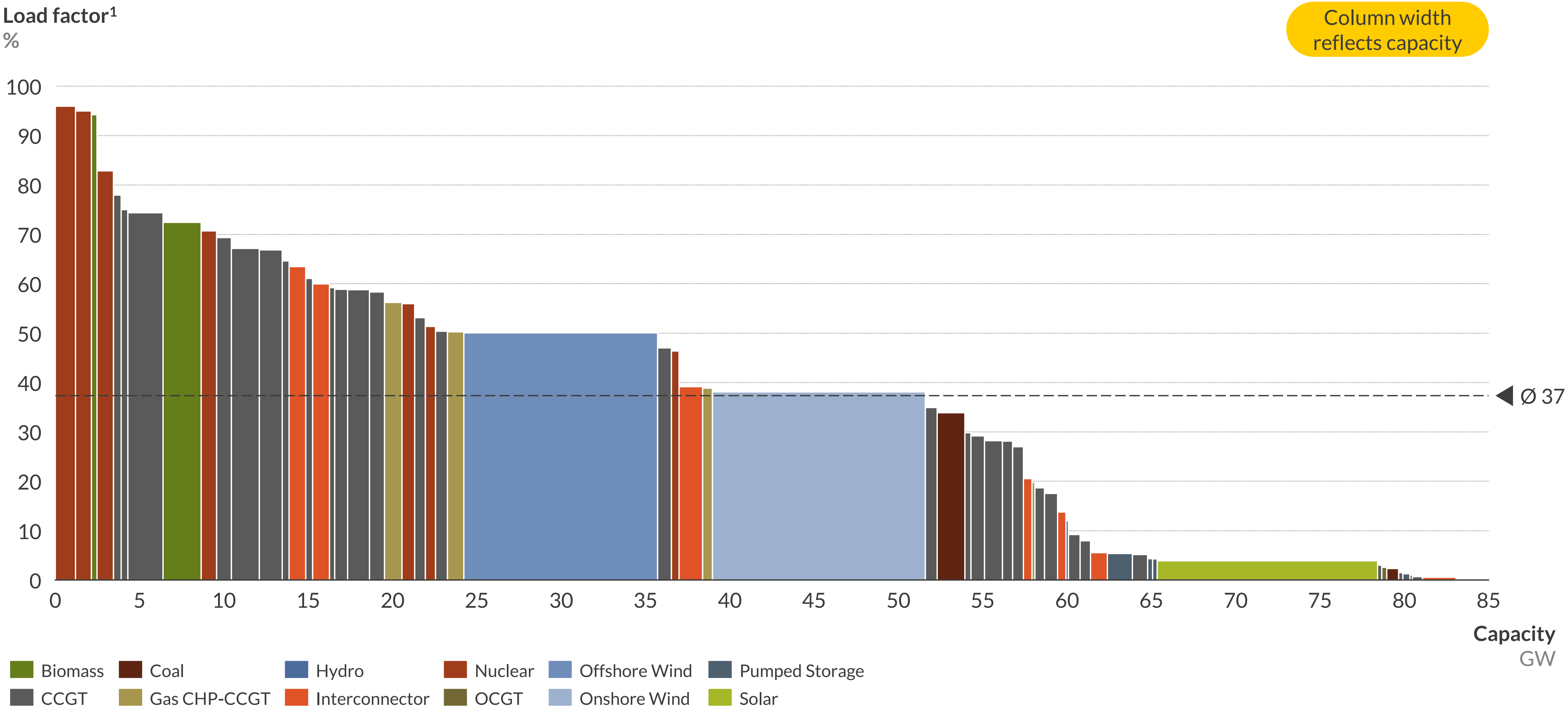

1) Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for wind and solar. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months. Please refer to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

Sources: Aurora Energy Research, Elexon, BEIS

CCGT plant utilisation – by plant

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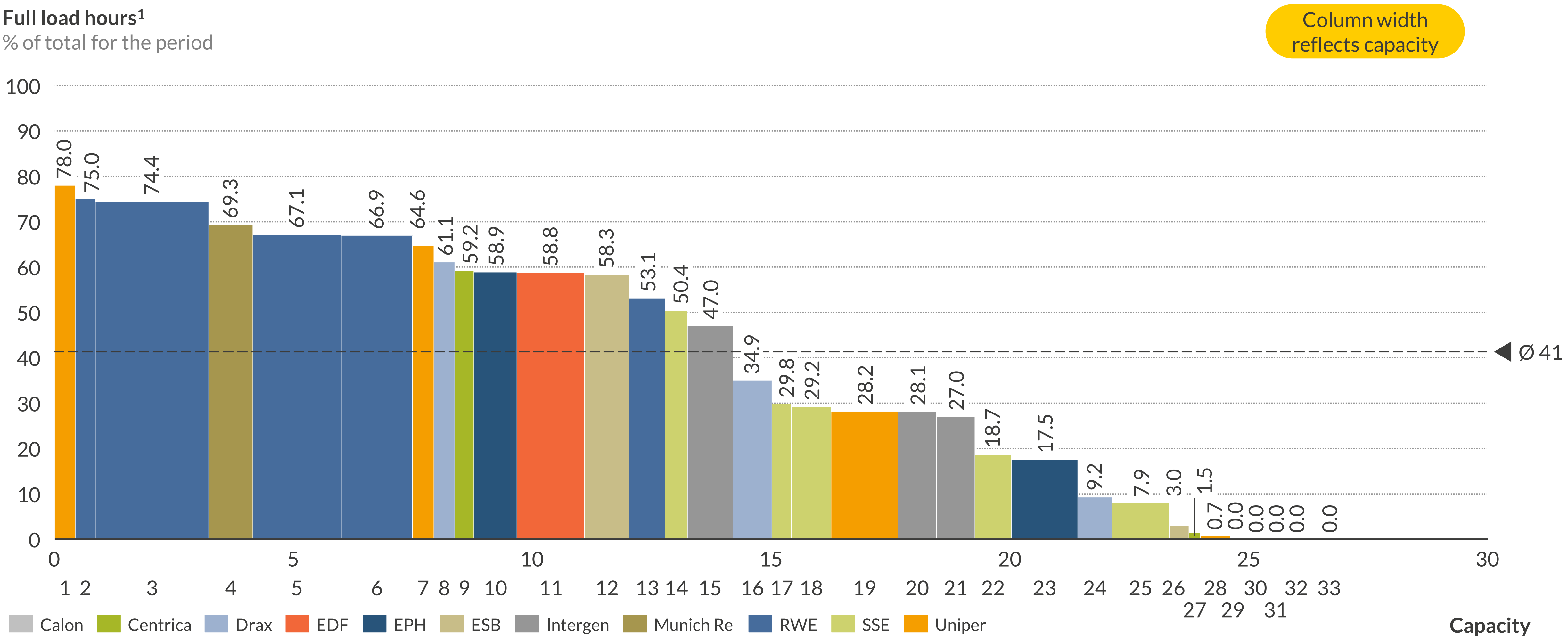
Full load hours[1]
% of total for the period

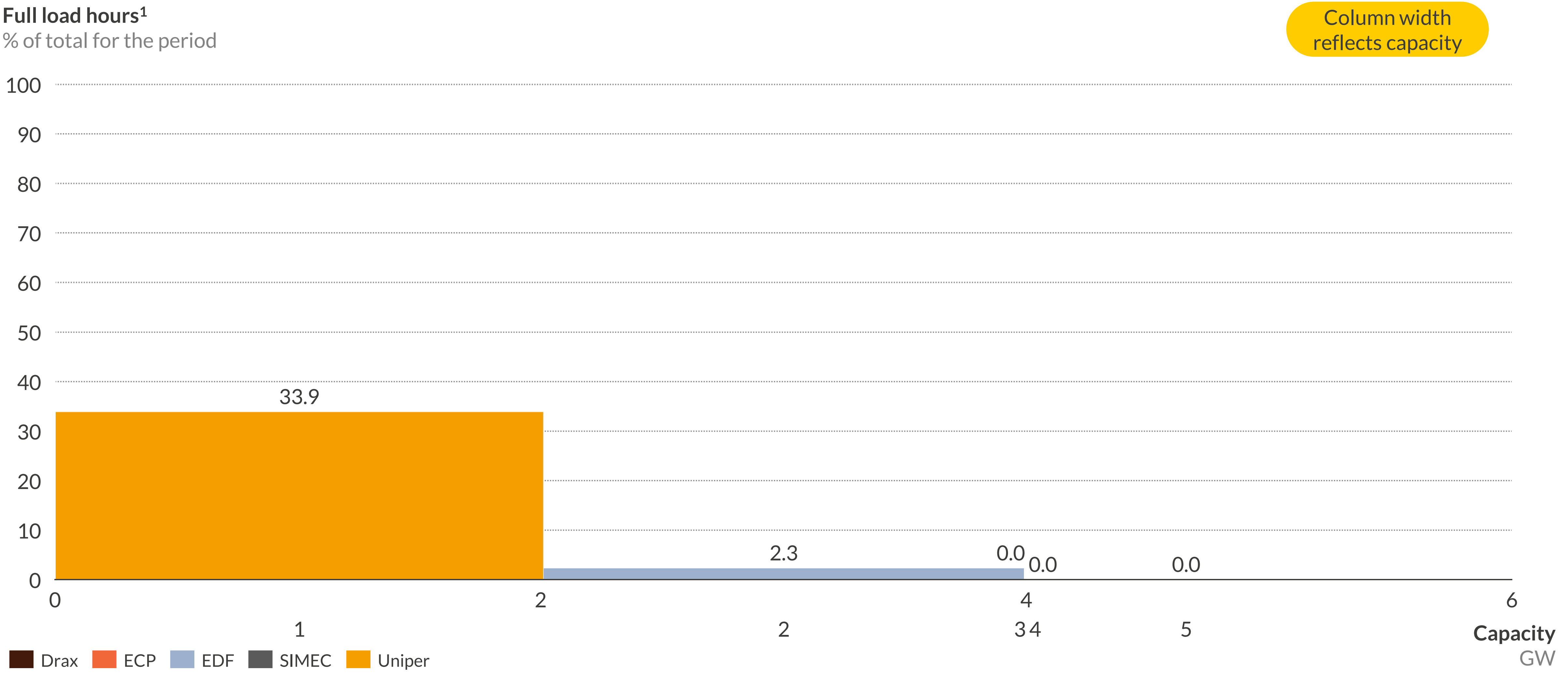


Plant Names: 1. Enfield Energy, 2. Great Yarmouth, 3. Pembroke, 4. Marchwood, 5. Staythorpe, 6. Didcot B, 7. Cottam Dvpt Centre, 8. Shoreham, 9. Kings Lynn, 10. Langage, 11. West Burton B, 12. Carrington, 13. Little Barford, 14. Medway, 15. Spalding, 16. Damhead Creek, 17. Seabank 2, 18. Seabank 1, 19.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



Plant Names: 1. Ratcliffe, 2. West Burton, 3. Uskmouth, 4. Rugeley, 5. Drax Coal.

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

Sources: Aurora Energy Research, Elexon

Monthly load factors by technology

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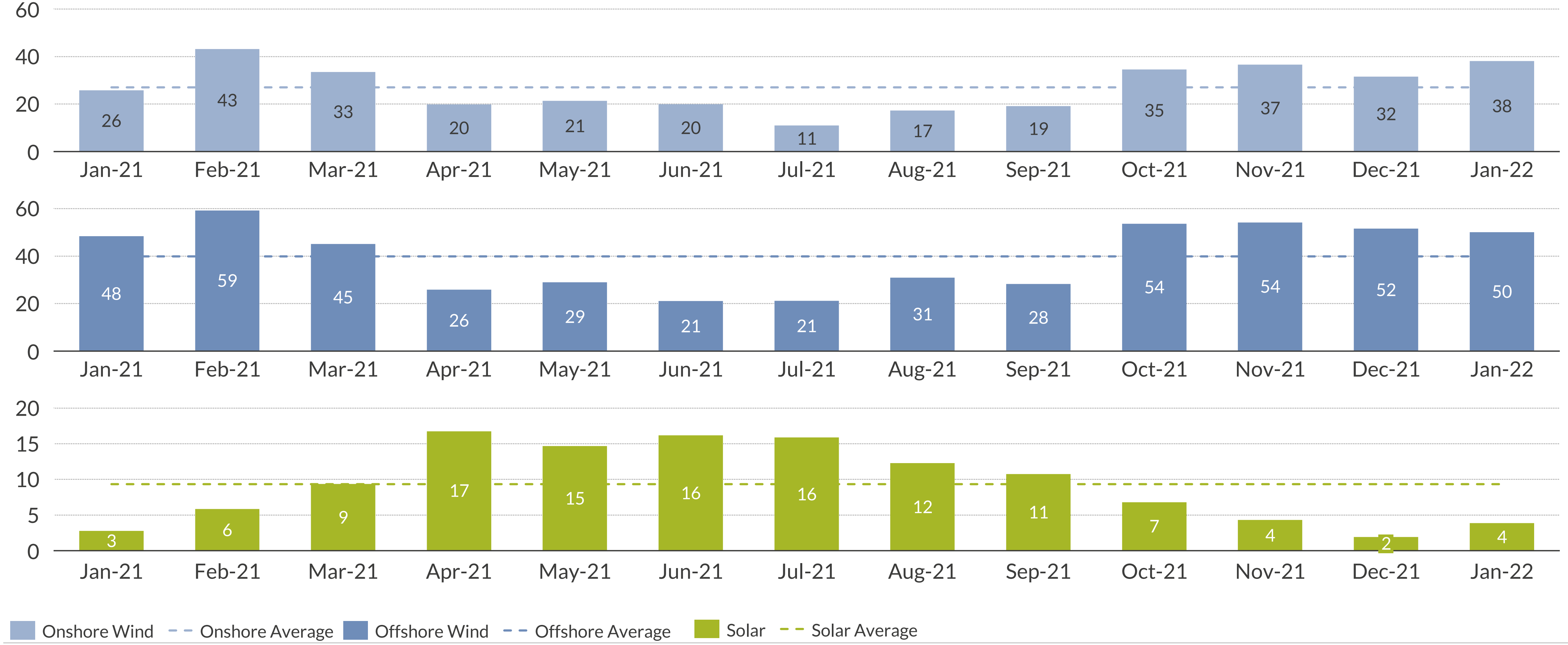
Average load factor[1]
%

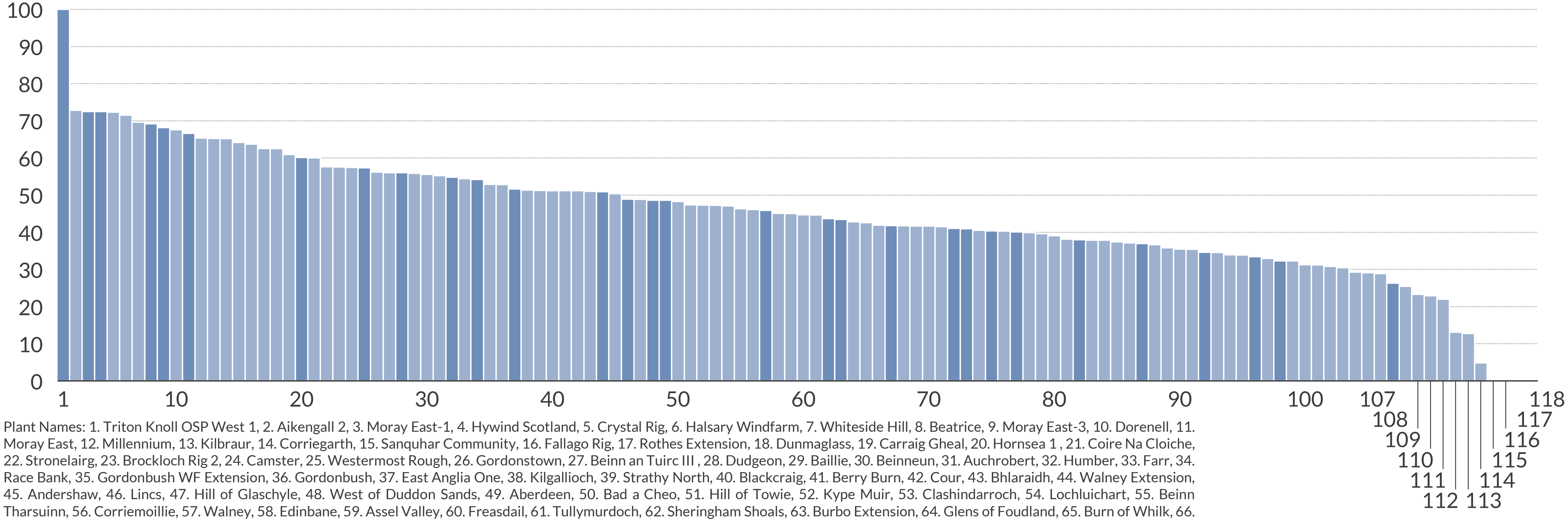


1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV

Sources: Aurora Energy Research, Elexon, Crown Estate

Wind farm utilisation – load factor by wind farm

Load factor[1]
%



Plant Names: 1. Triton Knoll OSP West 1, 2. Aikengall 2, 3. Moray East-1, 4. Hywind Scotland, 5. Crystal Rig, 6. Halsary Windfarm, 7. Whiteside Hill, 8. Beatrice, 9. Moray East-3, 10. Dorenell, 11. Moray East, 12. Millennium, 13. Kilbraur, 14. Corriegarth, 15. Sanquhar Community, 16. Fallago Rig, 17. Rothes Extension, 18. Dunmaglass, 19. Carraig Gheal, 20. Hornsea 1 , 21. Coire Na Cloiche, 22. Stronelairg, 23. Brockloch Rig 2, 24. Camster, 25. Westermost Rough, 26. Gordonstown, 27. Beinn an Tuirc III , 28. Dudgeon, 29. Baillie, 30. Beinneun, 31. Auchrobert, 32. Humber, 33. Farr, 34. Race Bank, 35. Gordonbush WF Extension, 36. Gordonbush, 37. East Anglia One, 38. Kilgallioch, 39. Strathy North, 40. Blackcraig, 41. Berry Burn, 42. Cour, 43. Bhlaraidh, 44. Walney Extension, 45. Andershaw, 46. Lincs, 47. Hill of Glaschyle, 48. West of Duddon Sands, 49. Aberdeen, 50. Bad a Cheo, 51. Hill of Towie, 52. Kype Muir, 53. Clashindarroch, 54. Lochluichart, 55. Beinn Tharsuinn, 56. Corriemoillie, 57. Walney, 58. Edinbane, 59. Assel Valley, 60. Freasdail, 61. Tullymurdoch, 62. Sheringham Shoals, 63. Burbo Extension, 64. Glens of Foudland, 65. Burn of Whilk, 66. Harburnhead, 67. Gwynt y Mor, 68. Clyde, 69. Braes of Doune, 70. Mid Hill, 71. Dersalloch, 72. Robin Rigg, 73. Galloper, 74. Griffin, 75. London Array, 76. Hare Hill Extension, 77. Greater Gabbard, 78. Galawhistle, 79. Minsca, 80. Beinn An Tuirc , 81. Tullo, 82. Barrow, 83. A Chruach, 84. Crossdykes WF-2, 85. Ewe Hill, 86. Middle Muir, 87. Rampion, 88. Crossdykes WF-1, 89. Afton, 90. Whitelee, 91. Tullo Extension, 92. Gunfleet Sands, 93. Dun Law Extension, 94. Toddleburn, 95. Minnygap, 96. Thanet, 97. Moy, 98. Burbo Bank, 99. Black Law, 100. Embedded Wind, 101. Dalswinton, 102. An Suidhe, 103. Mark Hill, 104. Pen y Cymoedd, 105. Harestanes, 106. Goole Fields, 107. Ormonde, 108. Hadyard Hill, 109. Glenchamber, 110. Arecleoch, 111. Craig, 112. Clachan Flats, 113. Glen App, 114. Airies, 115. Brownieleys, 116. Triton Knoll OSP East 1, 117. Keith Hill, 118. Kincardine.

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

Sources: Aurora Energy Research, Elexon, Crown Estate

RES capture price versus baseload price

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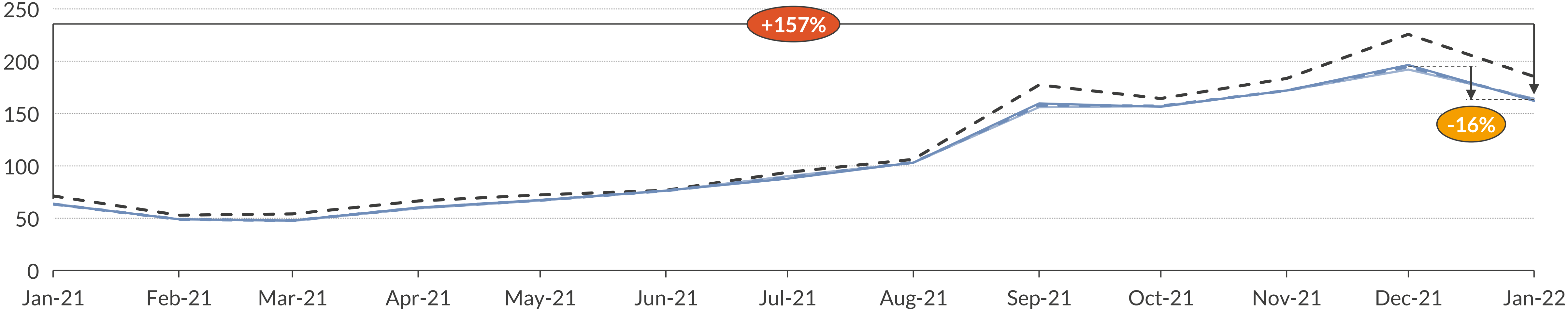
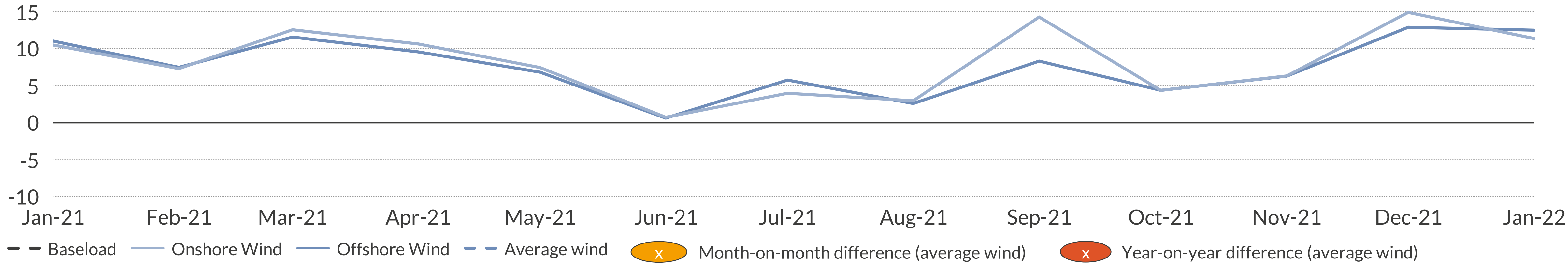
Baseload and capture price[1,2]
£/MWh



Technology capture discount[2,3] to baseload
%



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

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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