AURORA ENERGY RESEARCH

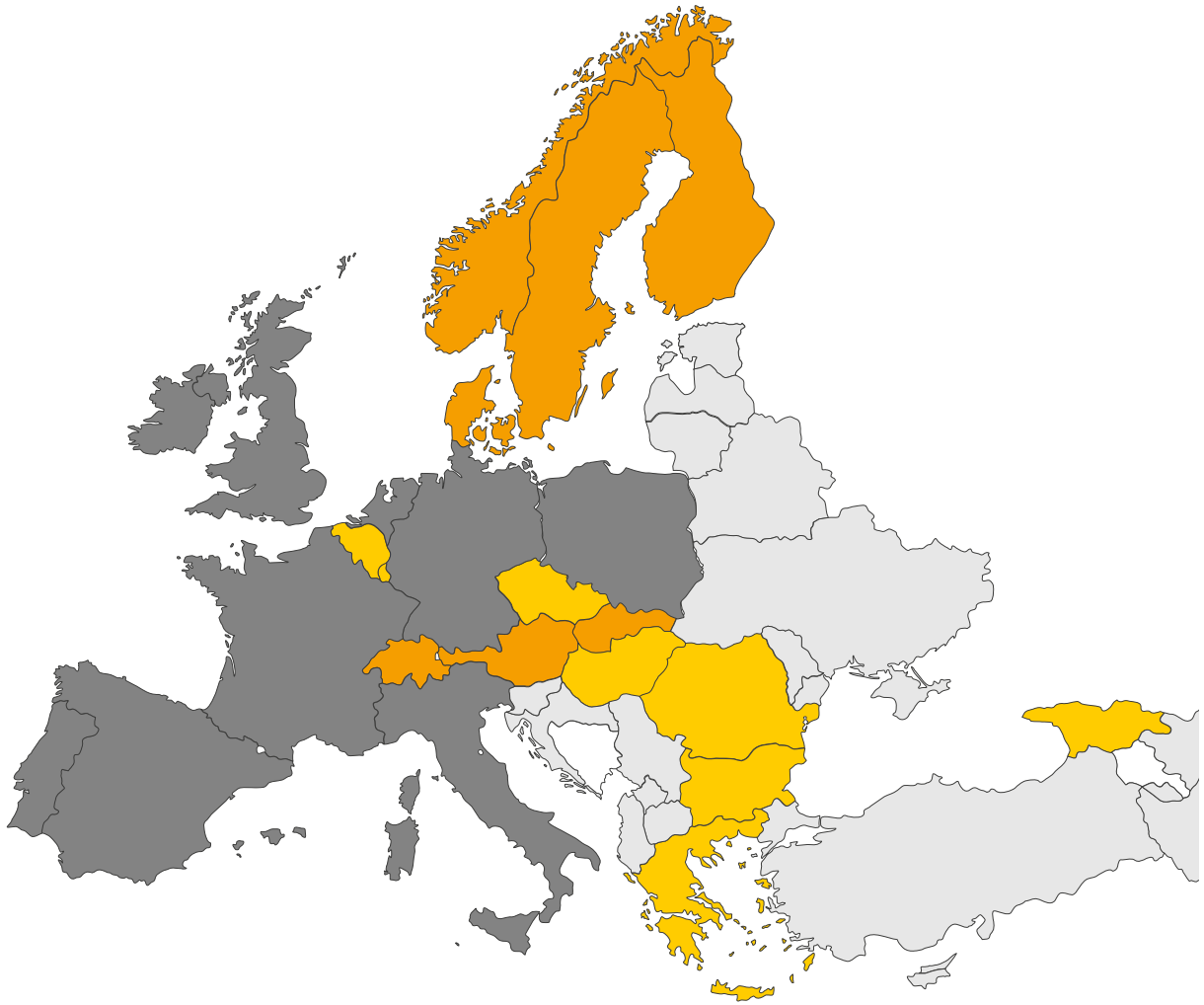
GB Wholesale Market Summary February 2021

Published March 2021

Executive Summary

1. A combination of lower fuel prices and demand caused the monthly average power price in February 2021 to fall to £52.9/MWh - an £18.3/MWh (or 26%) decrease from January 2021. However, this is still a year-on-year increase of £23.4/MWh (or 79%). See slides 5, 6, and 7.
2. February saw continued periods of tight system margins due to a combination of weather-related factors and limited thermal generator availability. Consequently, these periods saw wholesale prices in excess of £300/MWh. See slide 5.
3. Driven by higher temperatures, the monthly transmission power demand in February fell by 3.8 TWh (or 15%) decrease relative to January, while the share of low carbon generation rose by 12 p.p. to 63% of total generation in February. See slides 10 and 11.
4. Monthly thermal generation in February decreased by 4.4 TWh relative to January as demand fell, and renewables output increased. Consequently, carbon emissions decreased by 2.1 $MtCO_2e$ (or 36%) compared to January. See slides 11 and 14.
5. Profitability of wind assets in February remained similar to January as the notable decrease in wind capture prices (£14.5/MWh or 23% relative to January) was mitigated by load factors increasing by 14 p.p. (or to a monthly average of 51%). See slides 20 and 22.

Aurora offers power market forecasts and market intelligence spanning Europe's key markets & Australia



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- Strategic insight reports
- Regular subscriber group meetings
- Bilateral workshops
- Analyst support

Power Market Forecast Reports

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

Bespoke forecasts

- Aurora can provide power market forecasts upon request

Source: Aurora Energy Research

Agenda

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I. System performance

II. Company performance (available to subscribers only)

III. Plant performance

Half-hourly APX spot price for February

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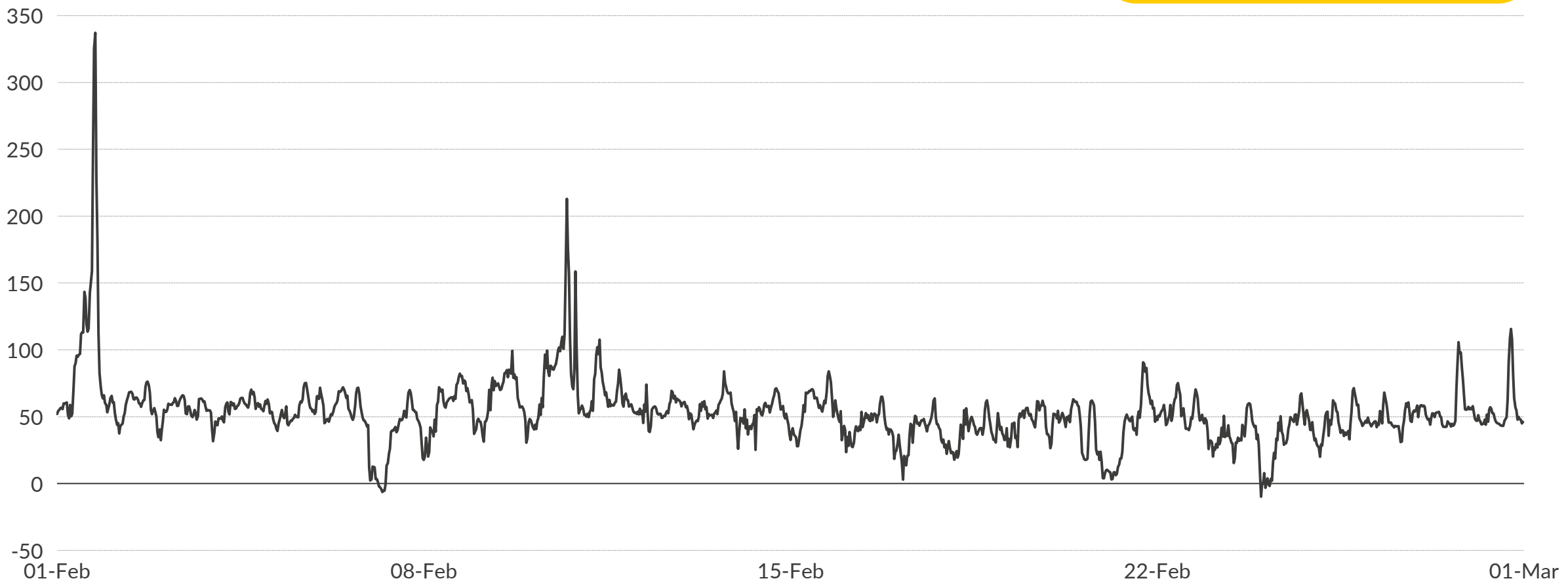
APX spot price[1]
£/MWh

Monthly average price in February 2021: £52.91/MWh

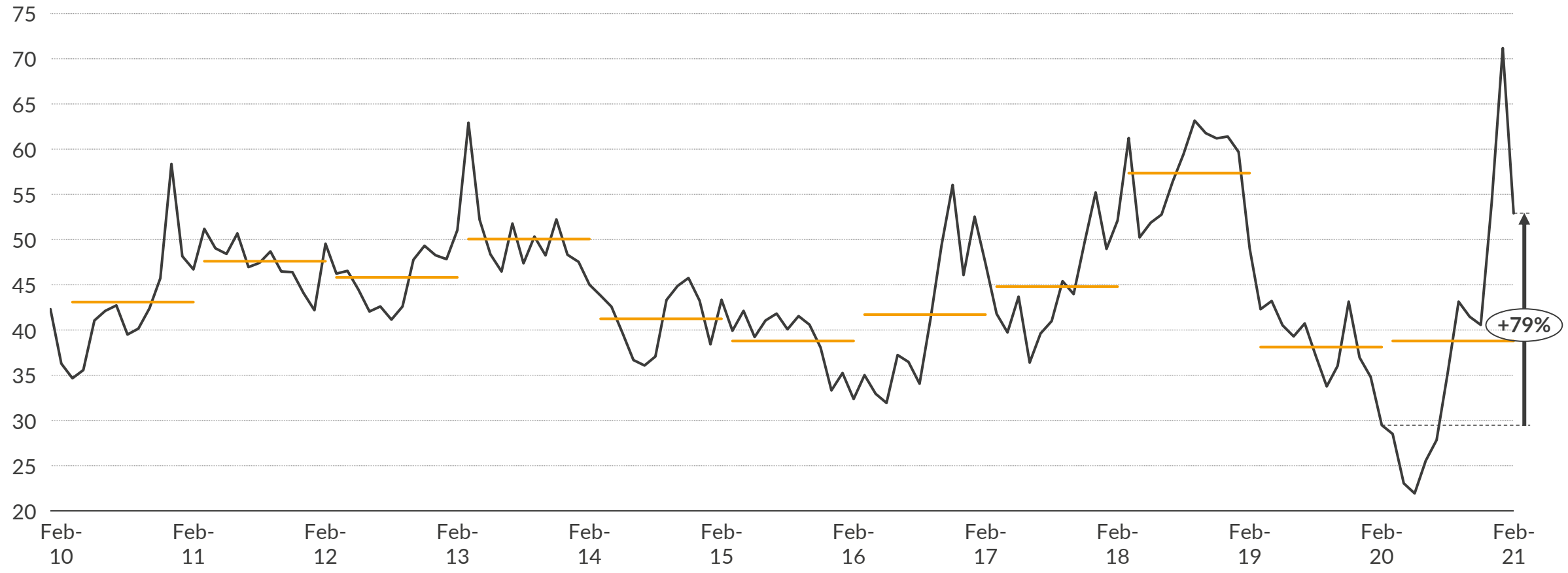


1) Half-hourly APX is the volume-weighted reference price over that half-hour interval, as provided by APX Power UK

Sources: Aurora Energy Research, Thomson Reuters

Historic monthly average APX spot price

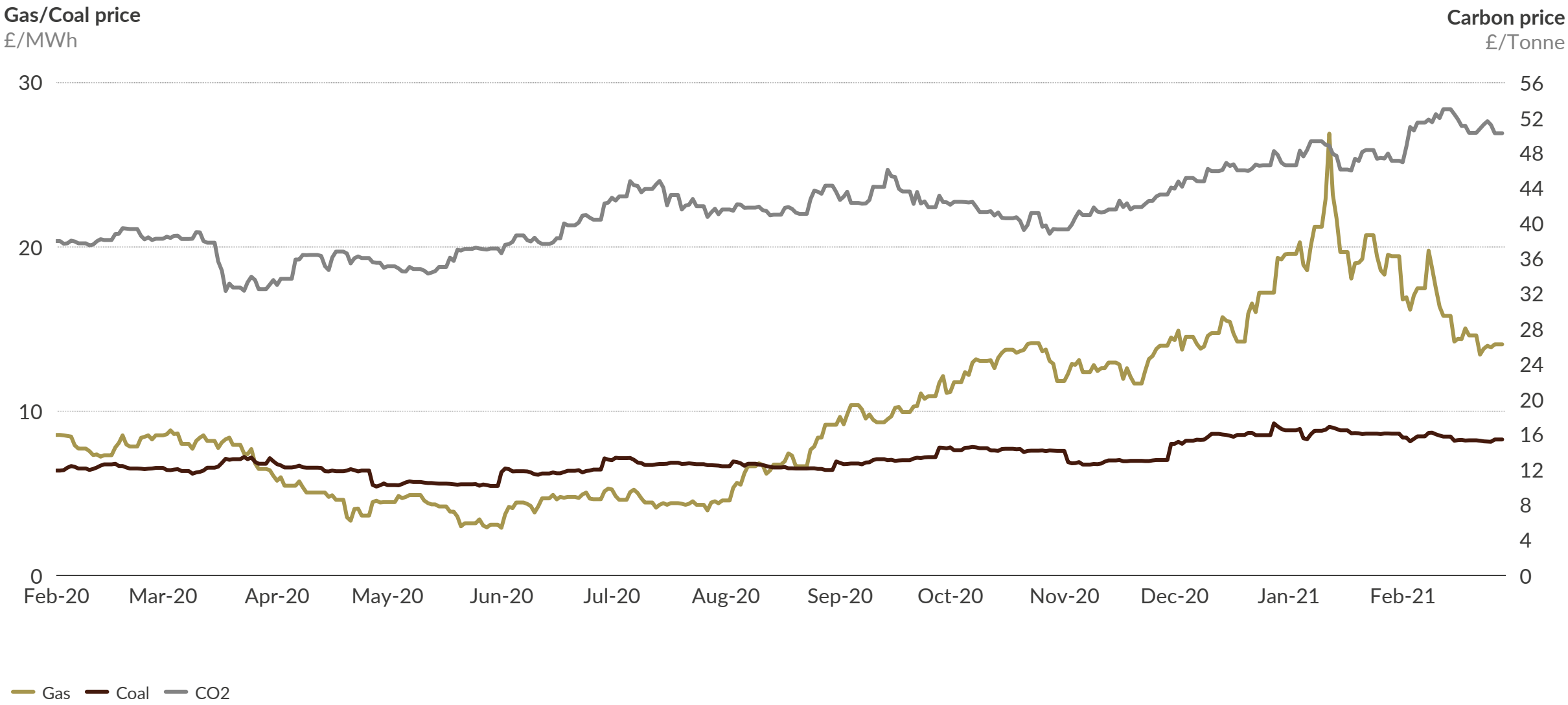
Average APX spot price[1],
£/MWh



1) Average monthly APX 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



Sources: Aurora Energy Research, Thomson Reuters

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

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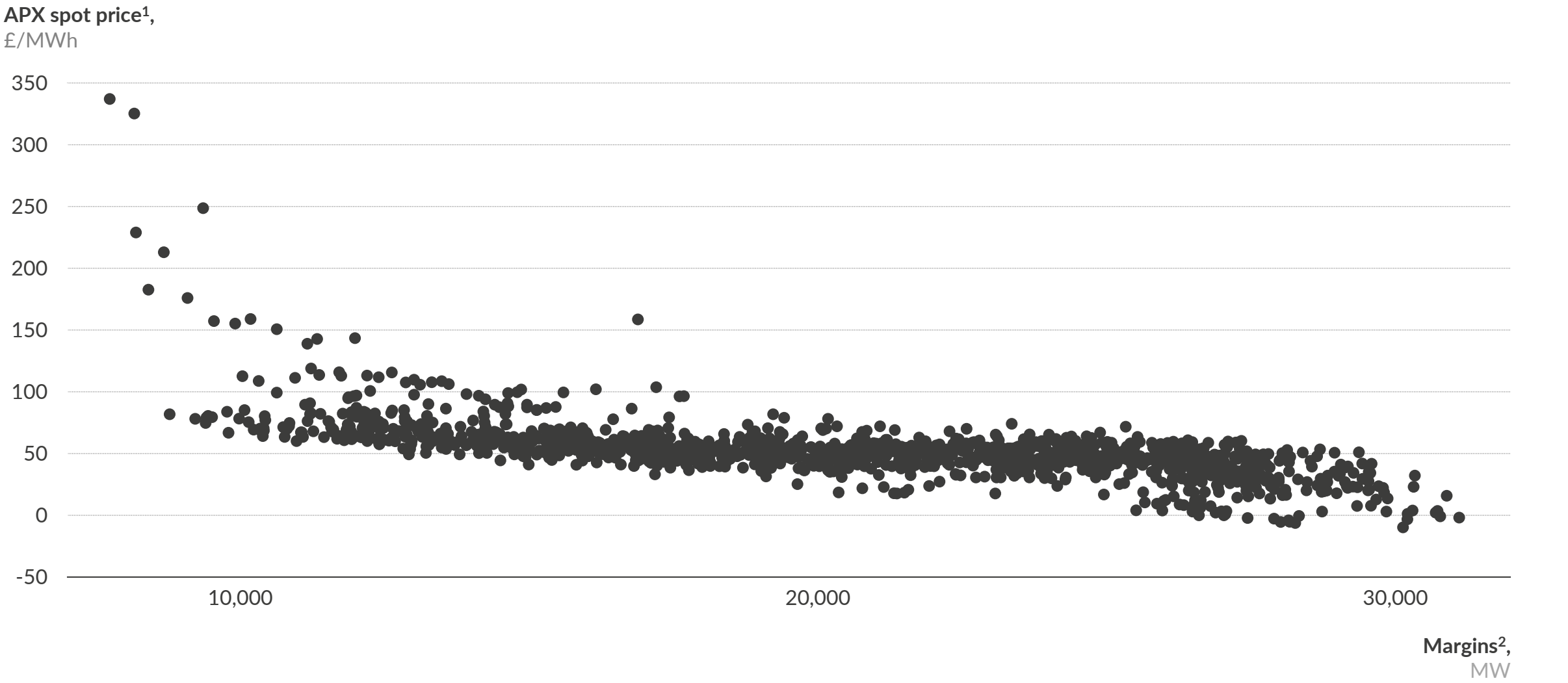
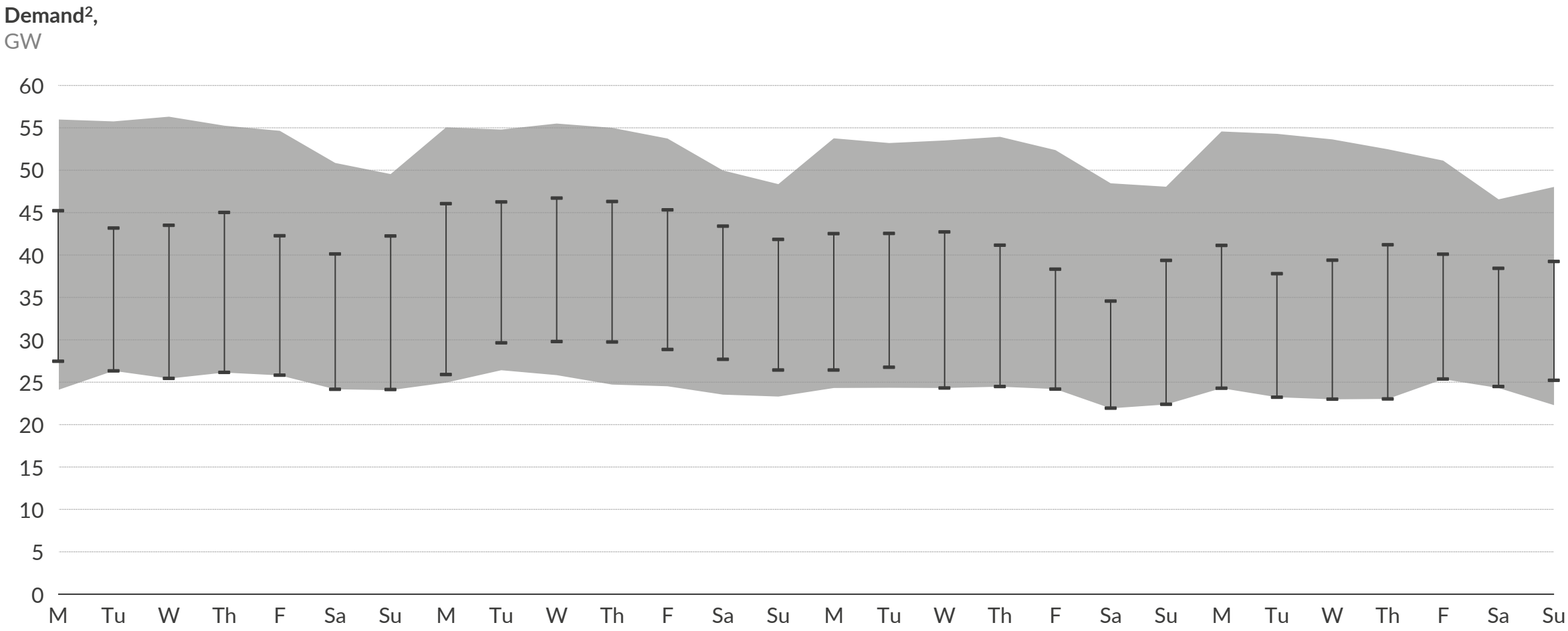


1) Half-hourly APX is the volume-weighted reference price over that half-hour interval, as provided by APX Power UK. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include 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 February max and min demand

Relative to historic February 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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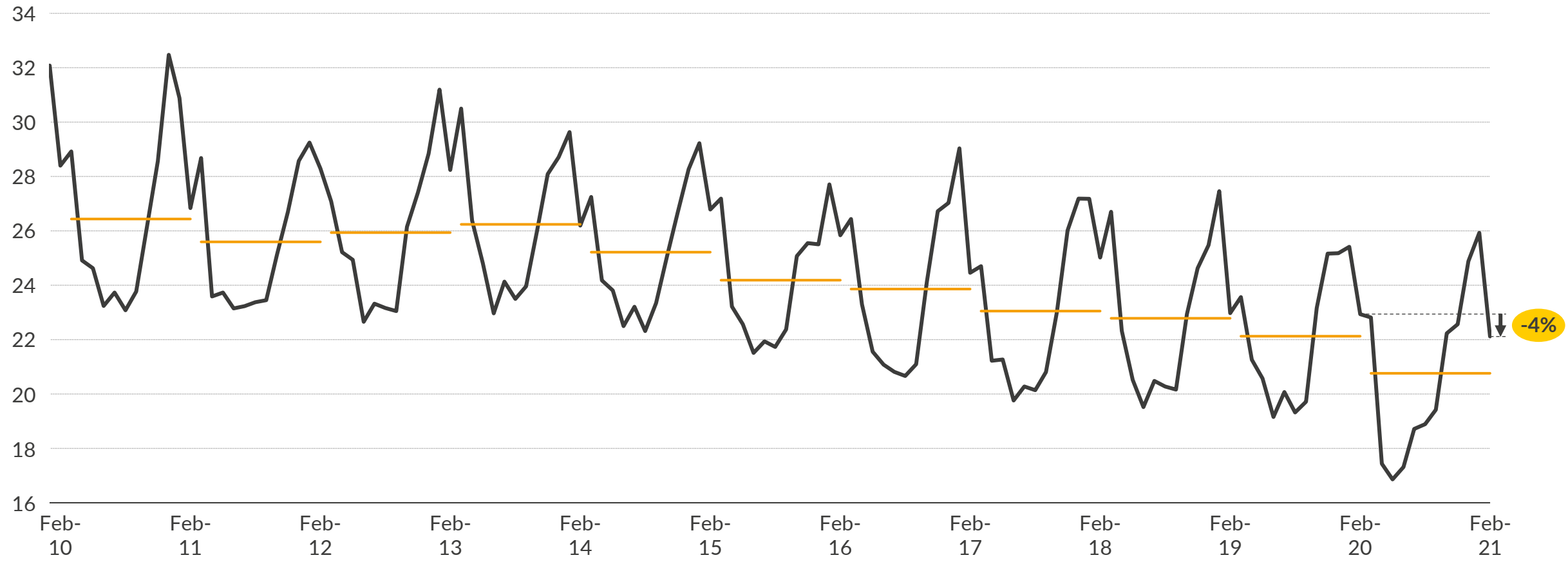
Total demand[1],
TWh



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

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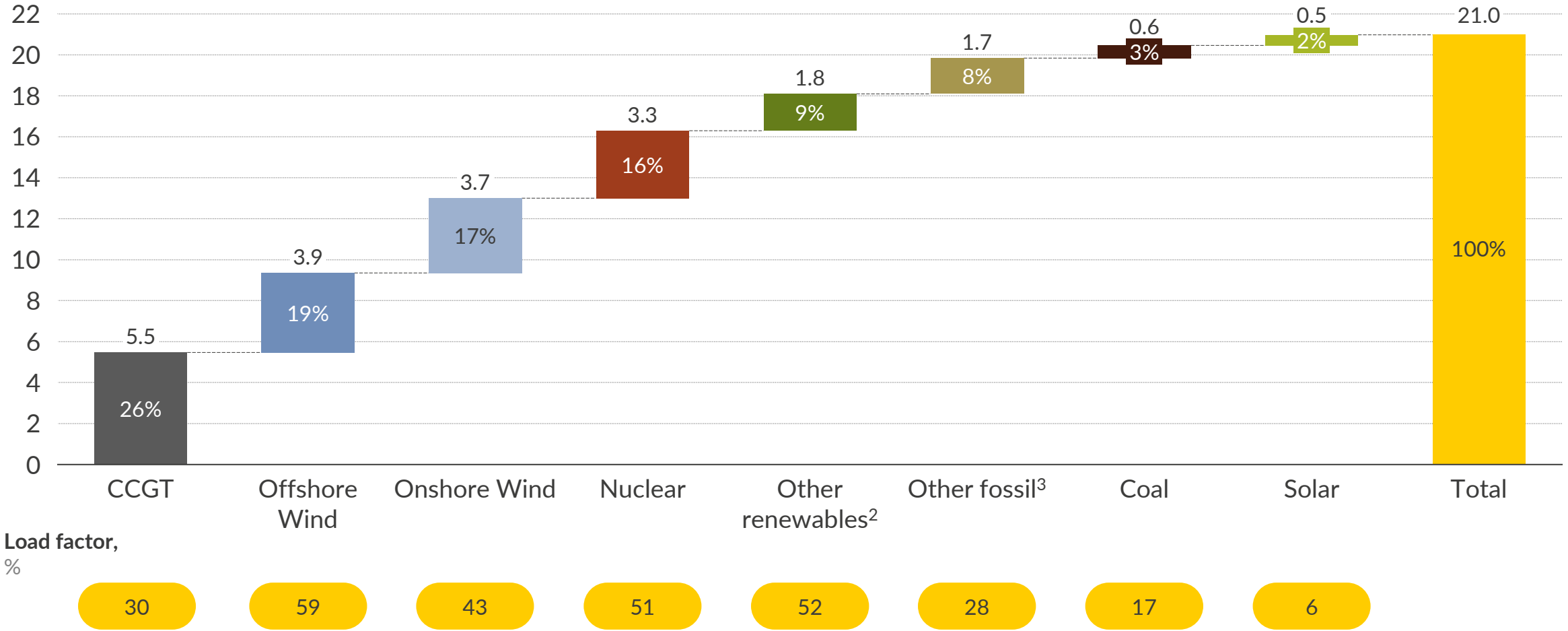
Output[1]
TWh



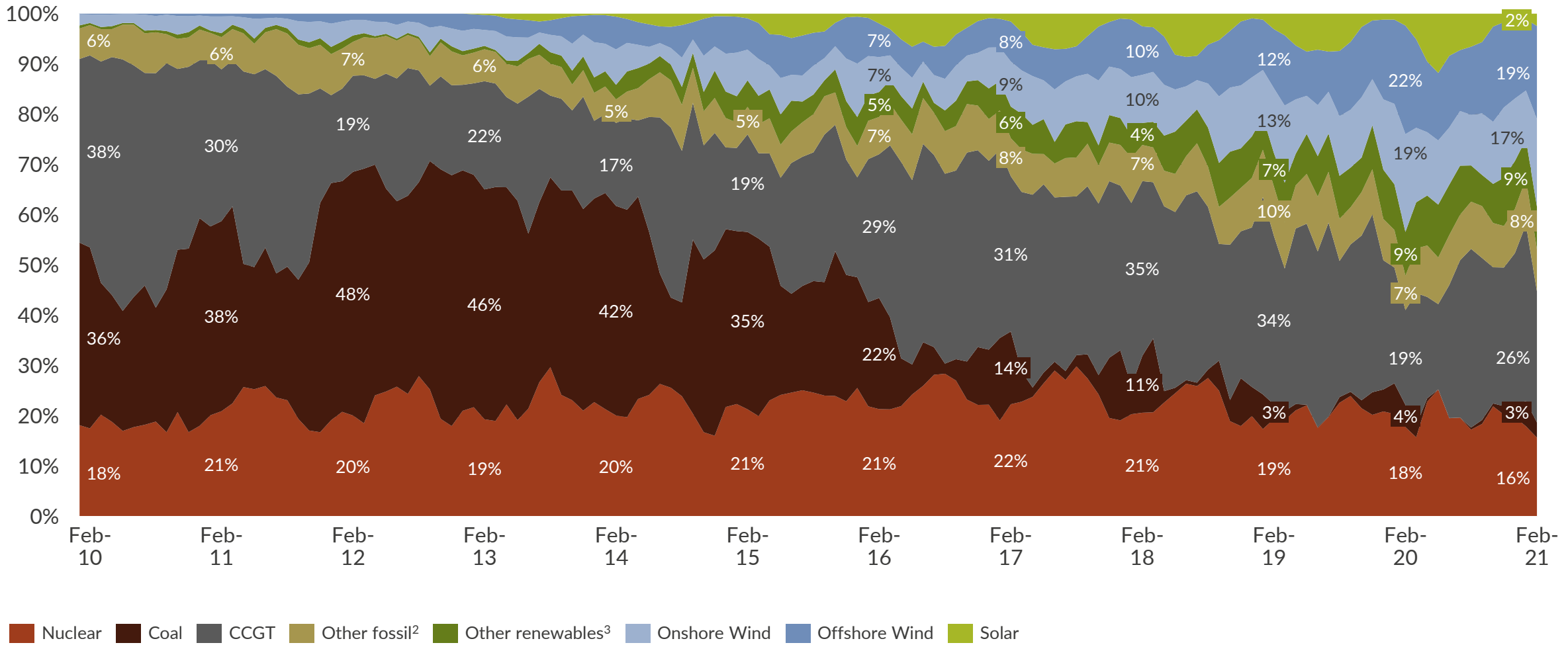
Load factor,
%

CCGT	Offshore Wind	Onshore Wind	Nuclear	Other renewables[2]	Other fossil[3]	Coal	Solar
30	59	43	51	52	28	17	6

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

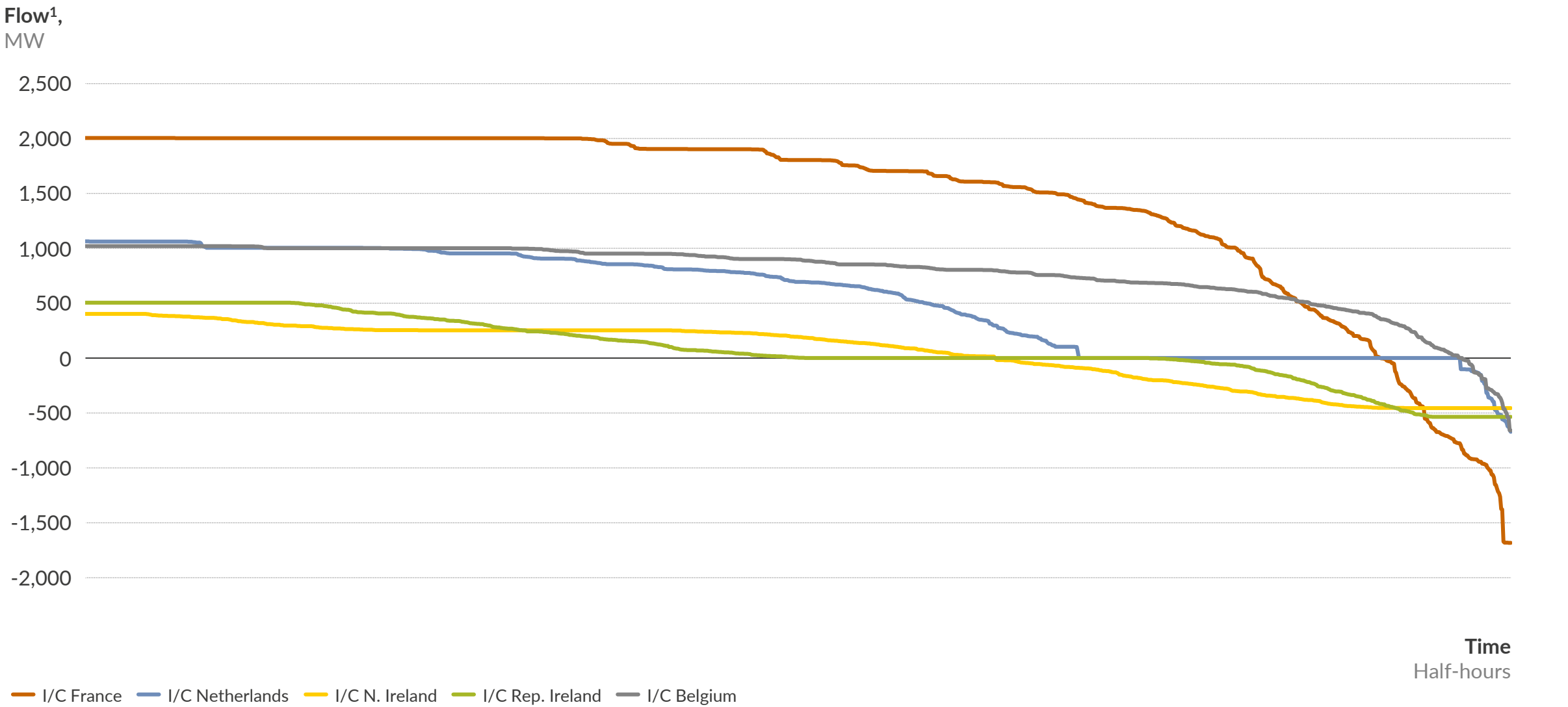
Output[1]
% of total



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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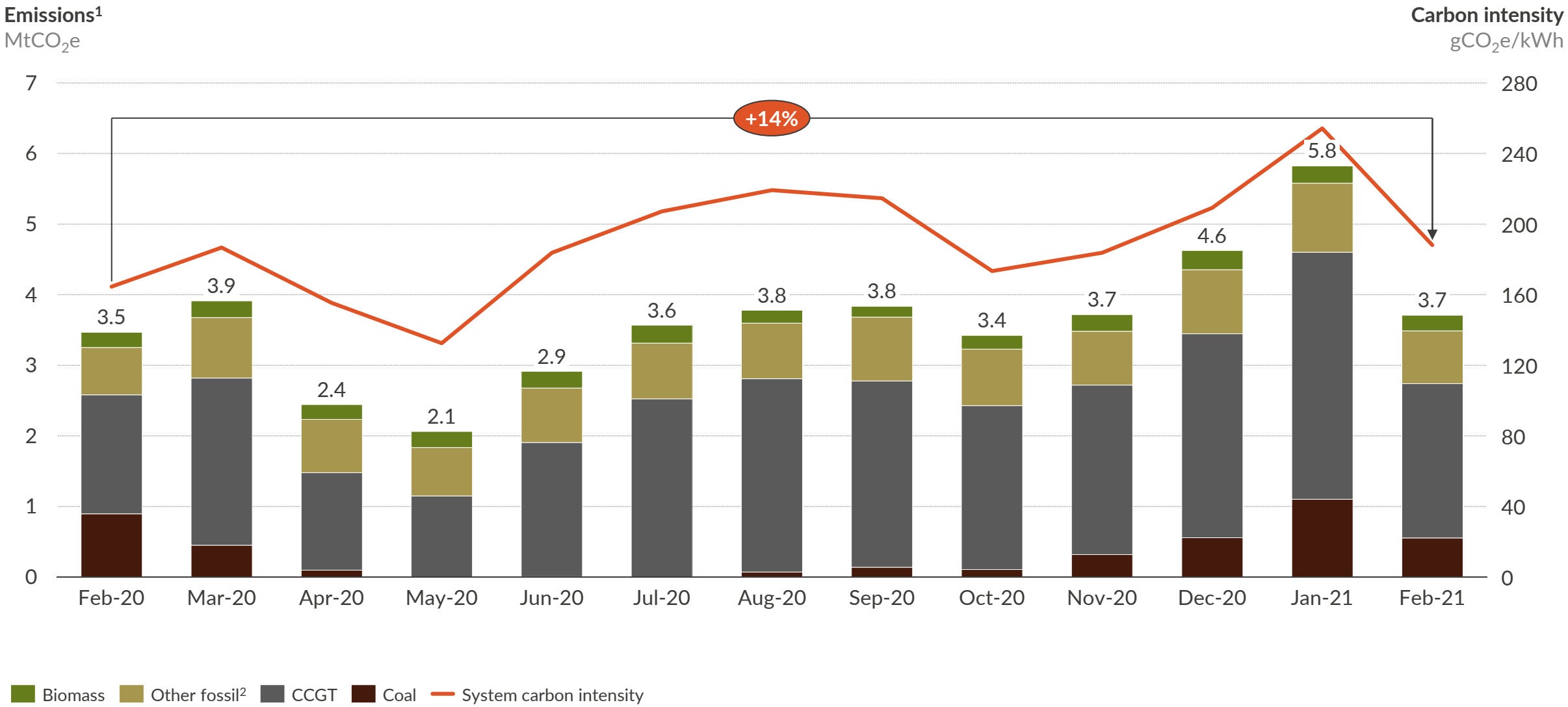

1) Please refer to Appendix for details of methodology employed to calculate emission amounts. Includes all Balancing Mechanism plants. 2) Other fossil includes oil, OCGT and gas CHP-CCGT.

Sources: Elexon, Ofgem, Aurora Energy Research

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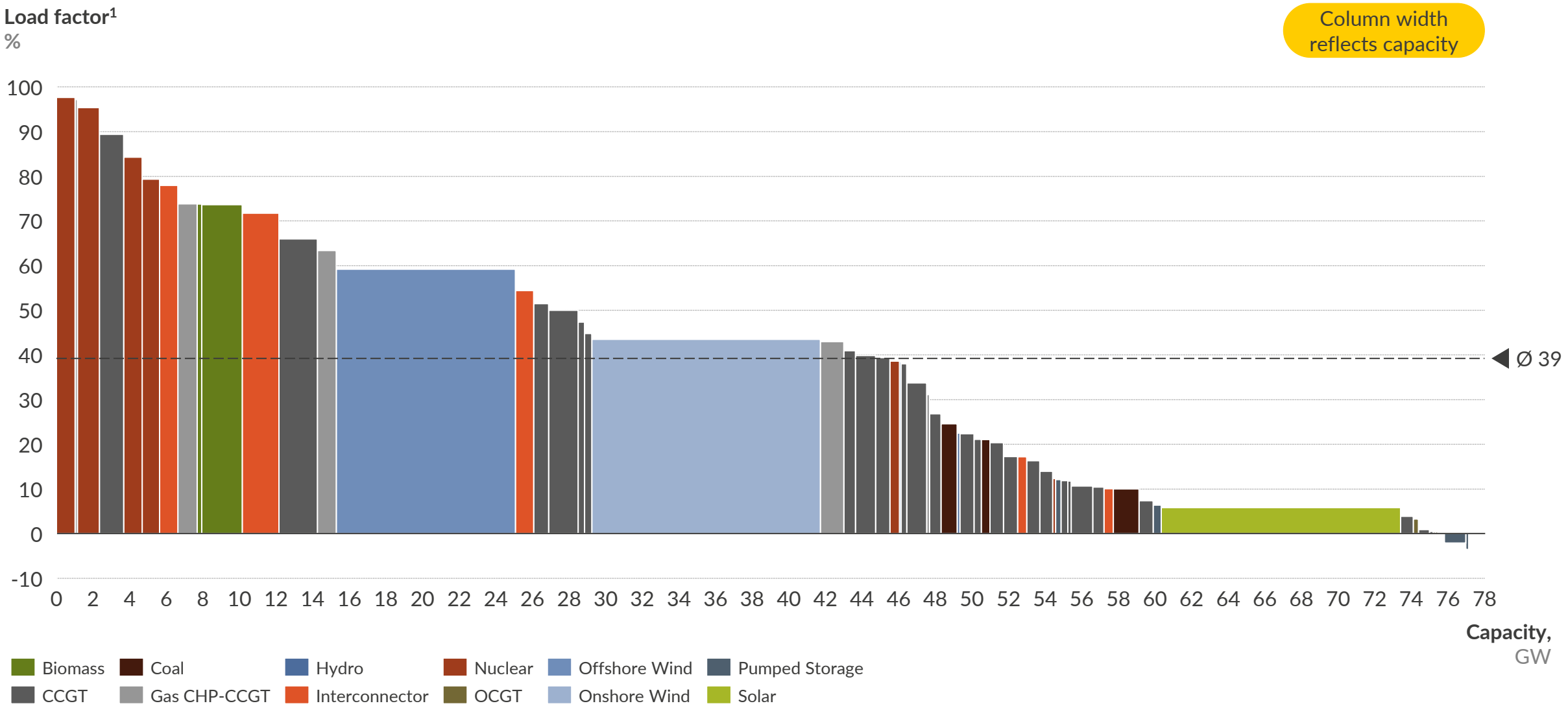
Plant utilisation – load factors by plant



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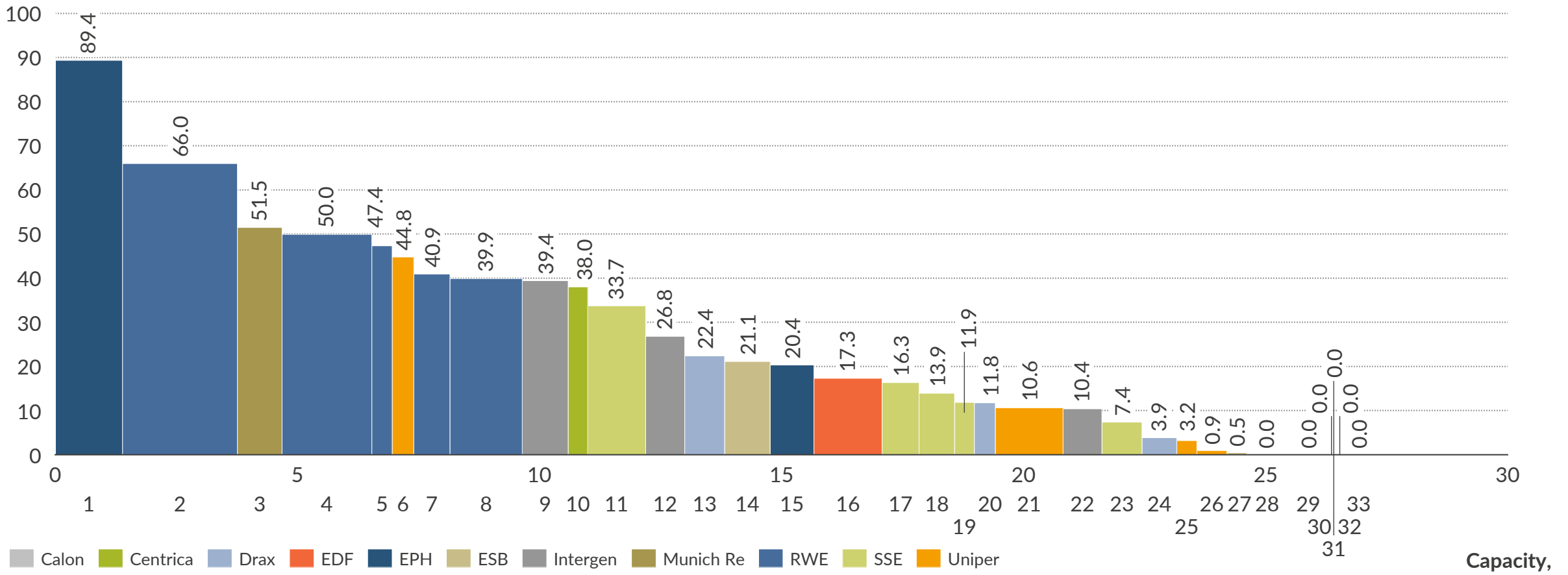
Full load hours[1]
% of total for the period

Column width reflects capacity



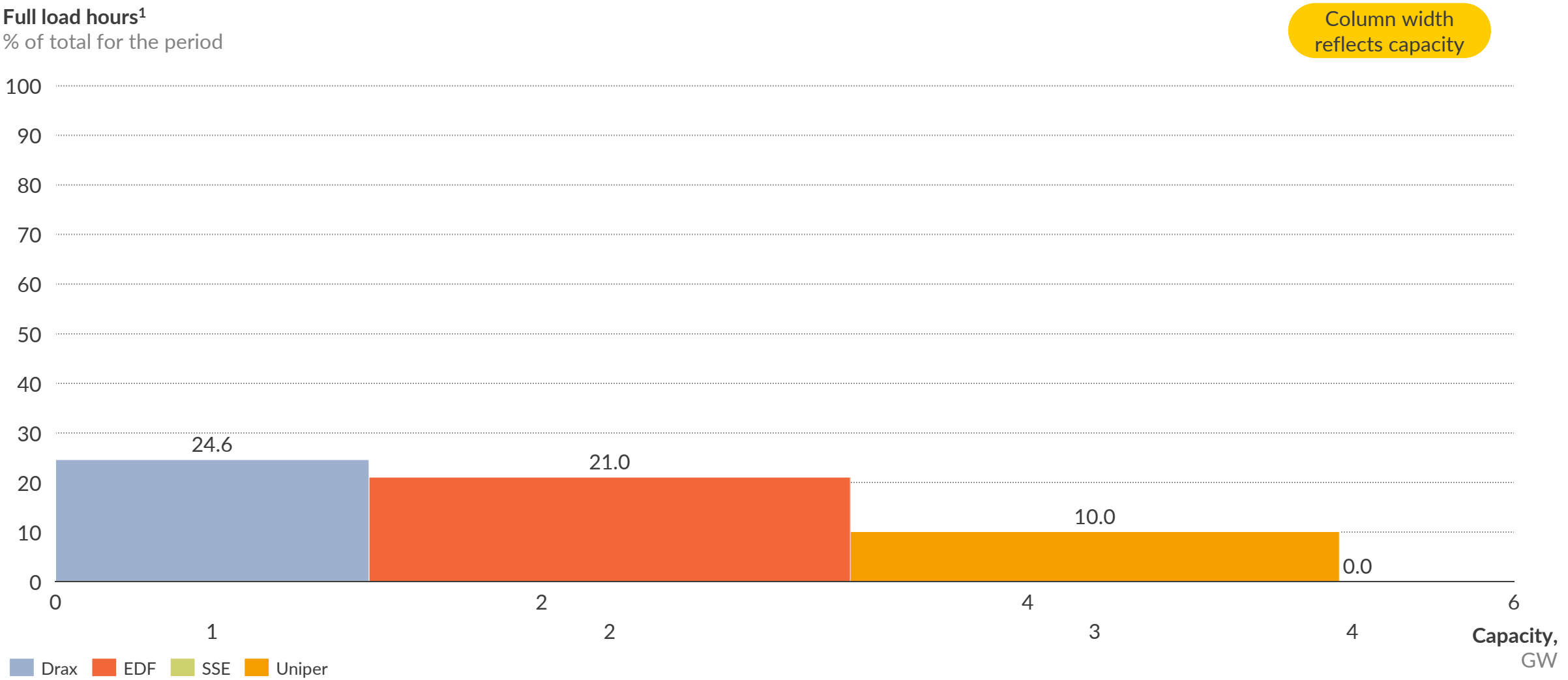
Plant Names: 1. South Humber Bank, 2. Pembroke, 3. Marchwood, 4. Staythorpe, 5. Great Yarmouth, 6. Cottam Dvpt Centre, 7. Little Barford, 8. Didcot B, 9. Spalding, 10. Kings Lynn, 11. Peterhead, 12. Rocksavage, 13. Damhead Creek, 14. Carrington, 15. Langage, 16. West Burton B, 17. Keadby, 18. Medway,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

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



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

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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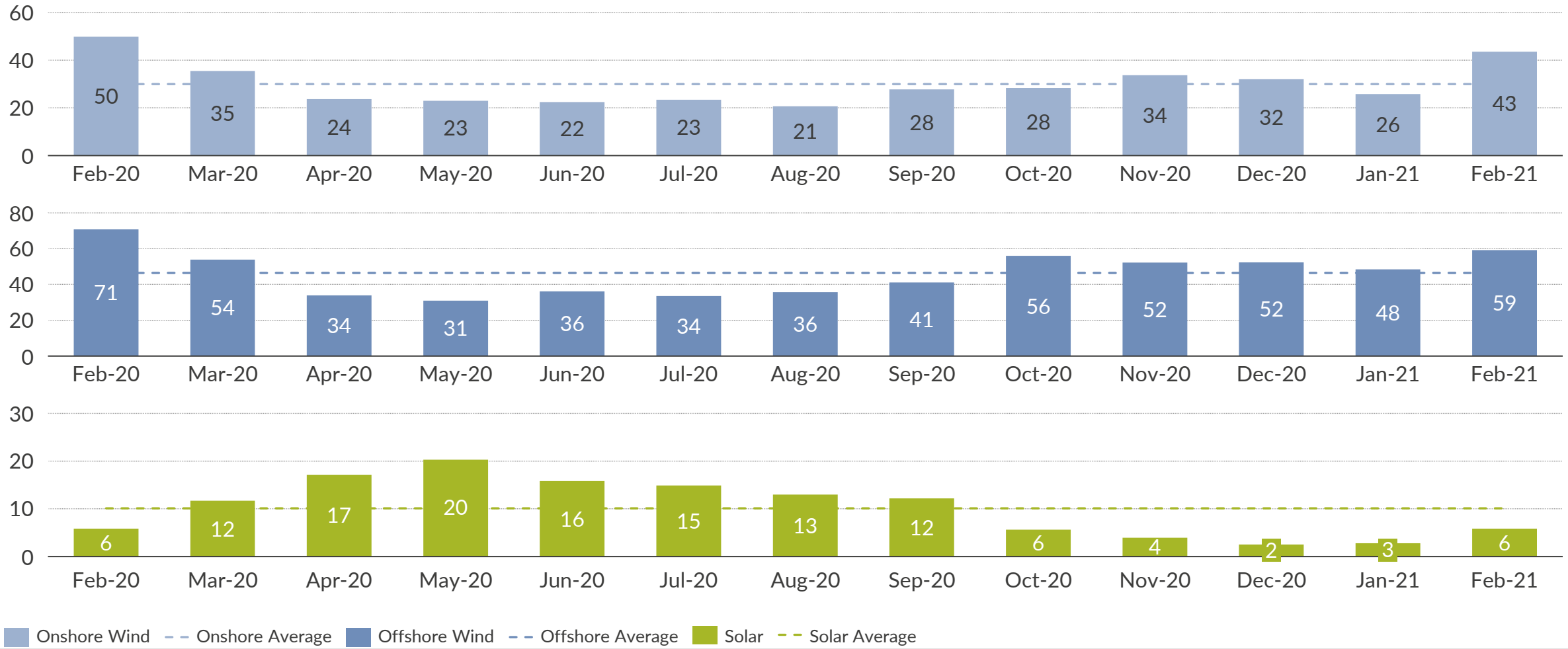
Average load factor[1]

%



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

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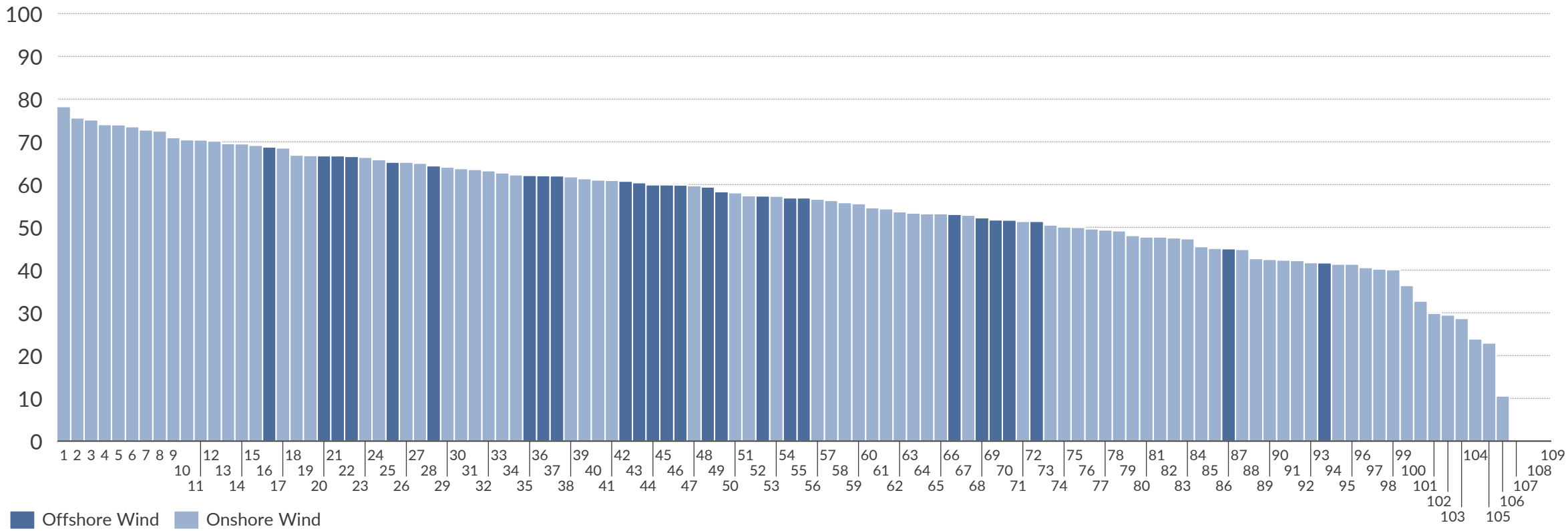
Load factor[1]

%



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

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

Wind capture price versus baseload price

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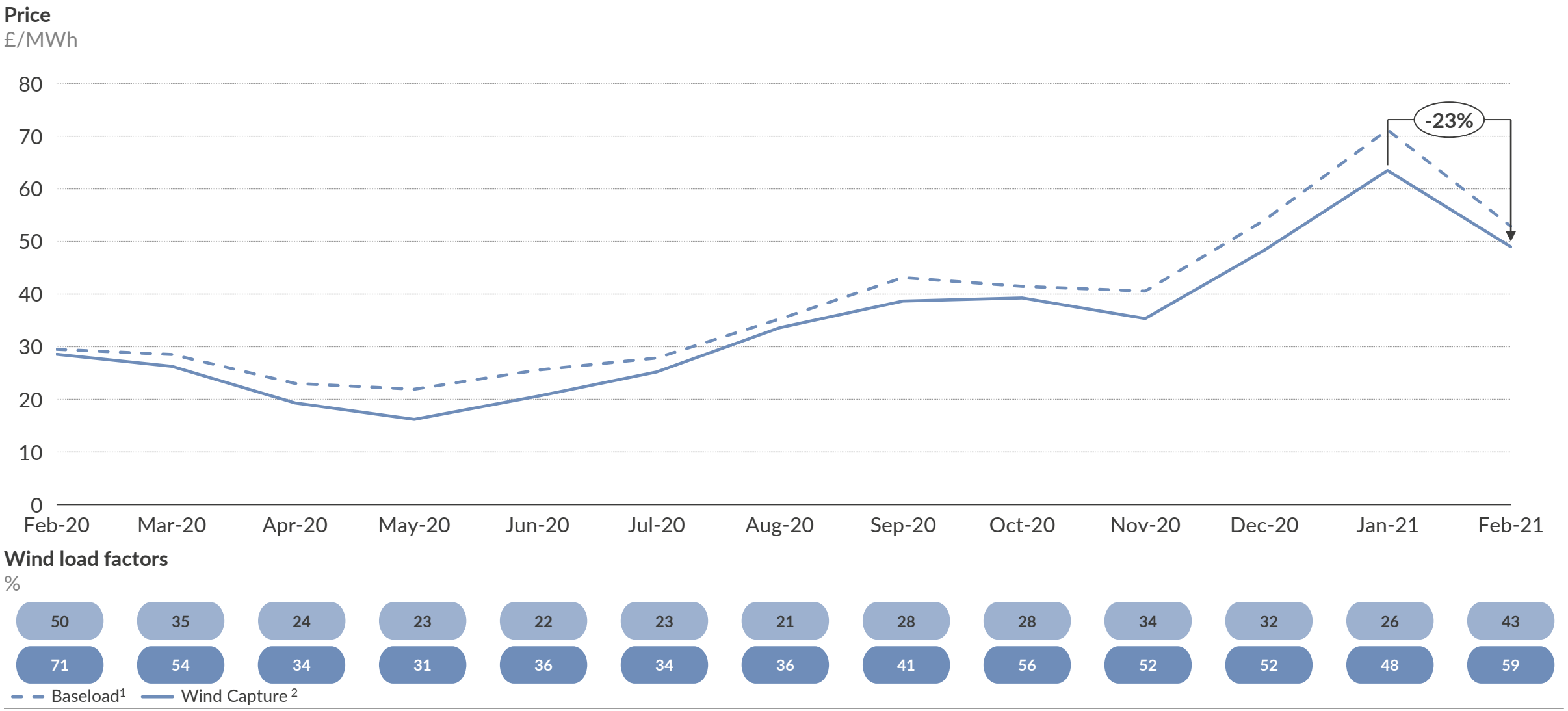

1) Baseload price is the average monthly APX price; 2) Wind capture price is the load-weighted monthly average APX price across all wind Balancing Mechanism plants for all half-hourly periods

Sources: Aurora Energy Research, Elexon, Thomson Reuters

Appendix

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 APX 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 APX 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 APX 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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