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GB Wholesale Market Summary April 2021

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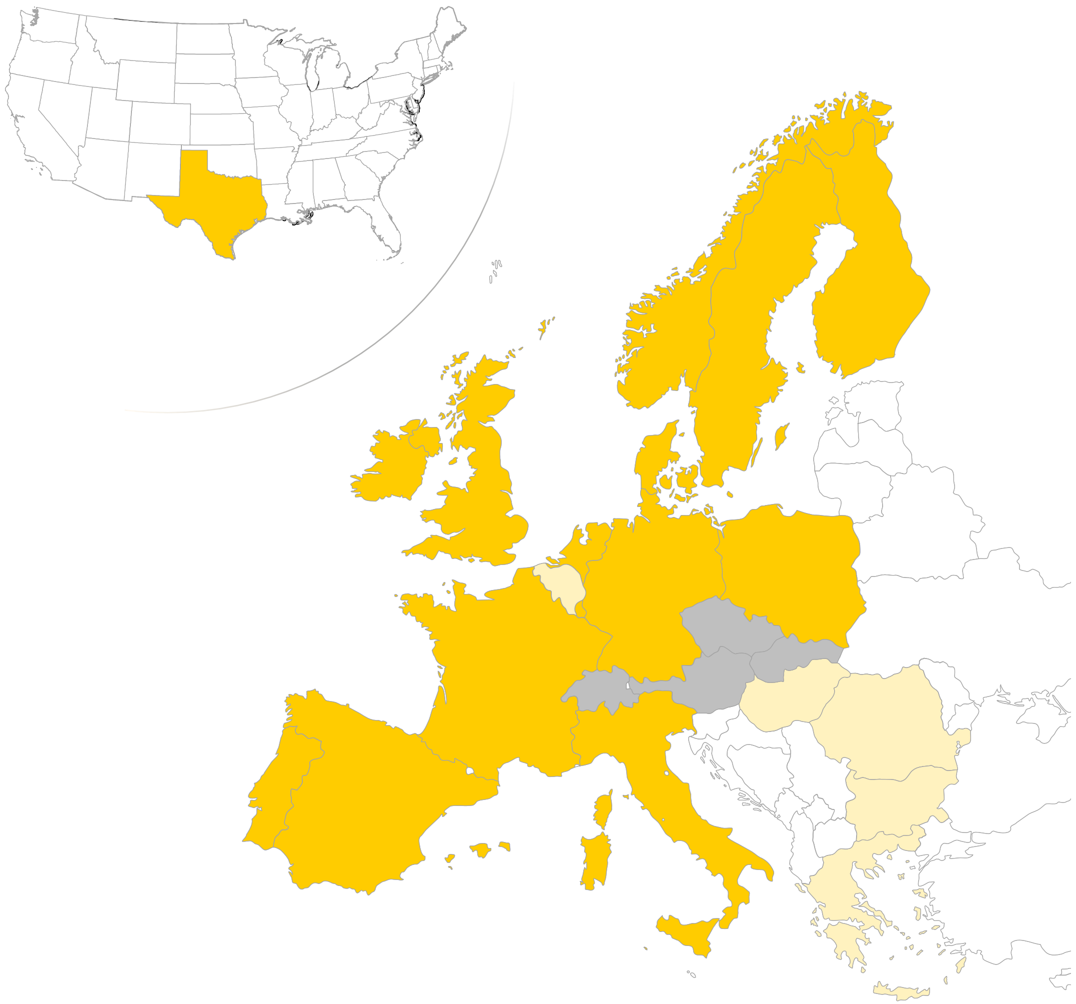

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Market forecast reports	Power market forecast reports	Aurora can provide power market forecasts upon request
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Global energy market forecast reports	Analyst support	
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Analyst support		

Source: Aurora Energy Research

Executive Summary

- April saw power prices rise to £67/MWh driven by increased gas and carbon prices
- Monthly transmission power demand in April decreased to 21 TWh due to warmer temperatures
- Despite lower demand and higher gas and carbon prices, thermal generation in April increased to 11 TWh due to lower renewables output
- Higher thermal generation thus resulted in a rise in emissions to 5 $MtCO_2e$

	Monthly value[1]	Month-on-month change	Year-on-year change	Slide reference(s)
Power prices *£/MWh*	66.6	+ 12.4 (23.0%)	+ 43.5 (188.9%)	5, 6
Gas prices *£/MWh*	18.5	+ 3.1 (20.3%)	+ 13.8 (291.4%)	7
Carbon[2] prices *£/tCO_2*	56.5	+ 3.4 (6.4%)	+ 21.0 (58.9%)	7
Transmission demand *TWh*	20.8	- 2.1 (9.2%)	+ 3.4 (19.3%)	10
Low carbon[3] generation *TWh*	10.8	- 1.0 (8.5%)	- 0.9 (7.6%)	11, 12
Thermal[4] generation *TWh*	10.4	+ 1.1 (11.8%)	+ 5.14 (97.7%)	11, 12
Carbon emissions *$MtCO_2e$*	4.5	+ 0.3 (7.9%)	+ 2.1 (85.7%)	14
Grid carbon intensity *gCO_2e/kWh*	239.9	+ 33.9 (16.5%)	+ 84.5 (54.4%)	14
Wind load factors[5] *%*	24.0	- 16 p.p.	- 5 p.p	20
Wind capture prices[5] *£/MWh*	59.8	+ 12.2 (25.7%)	+ 40.6 (210.3%)	22

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) Average of onshore and offshore wind

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

Agenda

I. System performance

II. Company performance (available to subscribers only)

III. Plant performance

Half-hourly EPEX spot price for April

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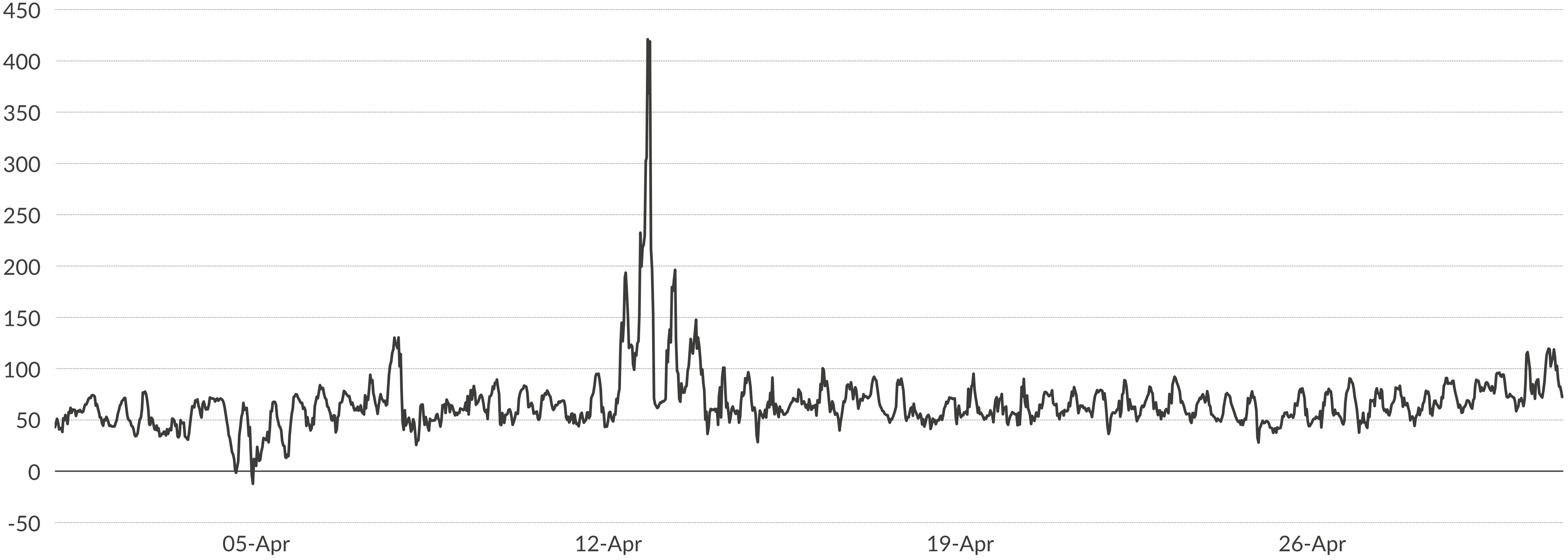
EPEX spot price[1]
£/MWh

Monthly average price in April 2021: £66.57/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 monthly average EPEX spot price

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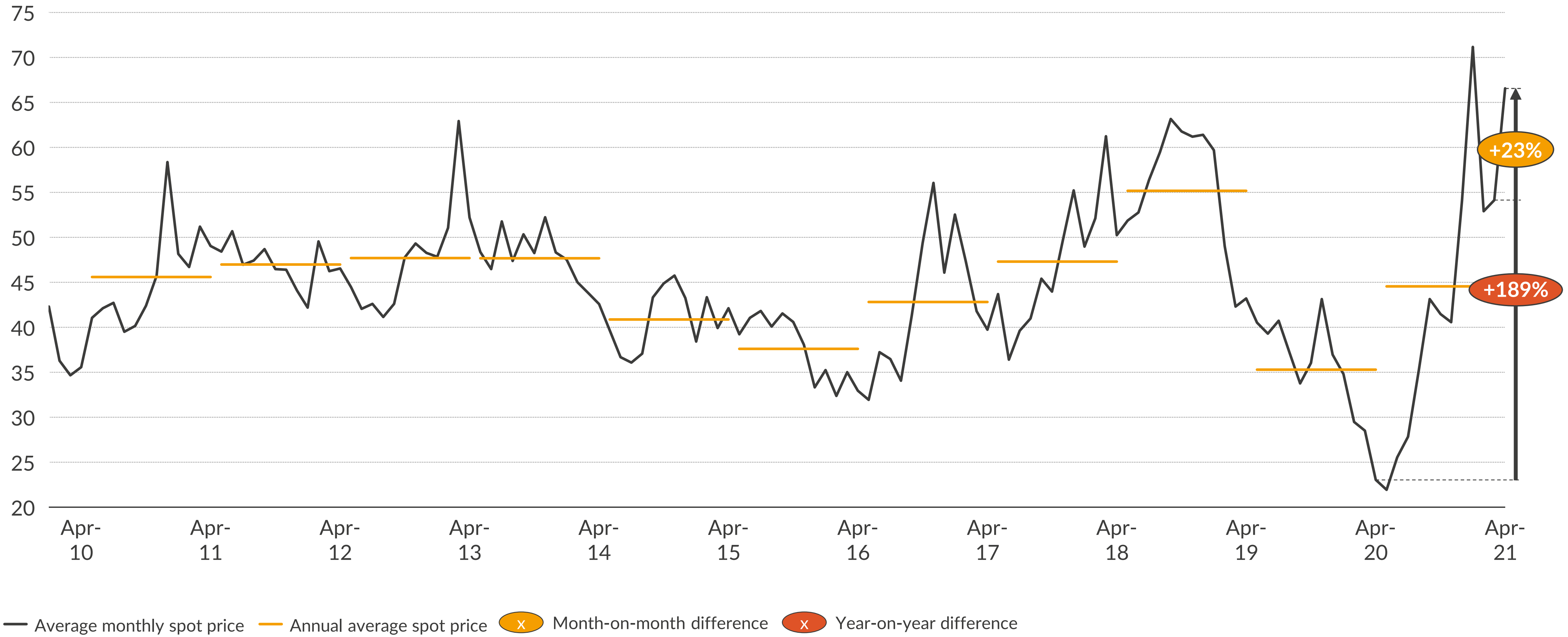
Average EPEX spot price[1],
£/MWh



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

Sources: Aurora Energy Research, Thomson Reuters

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

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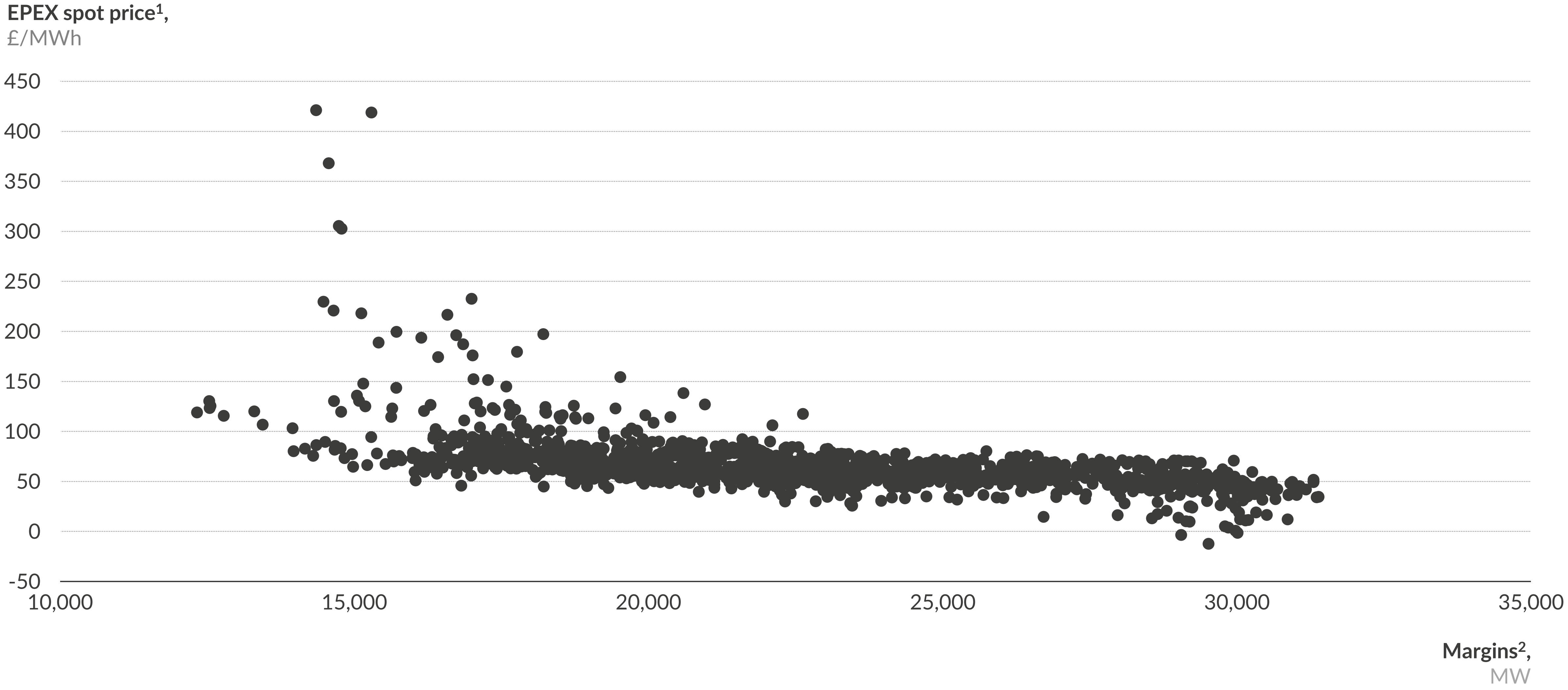
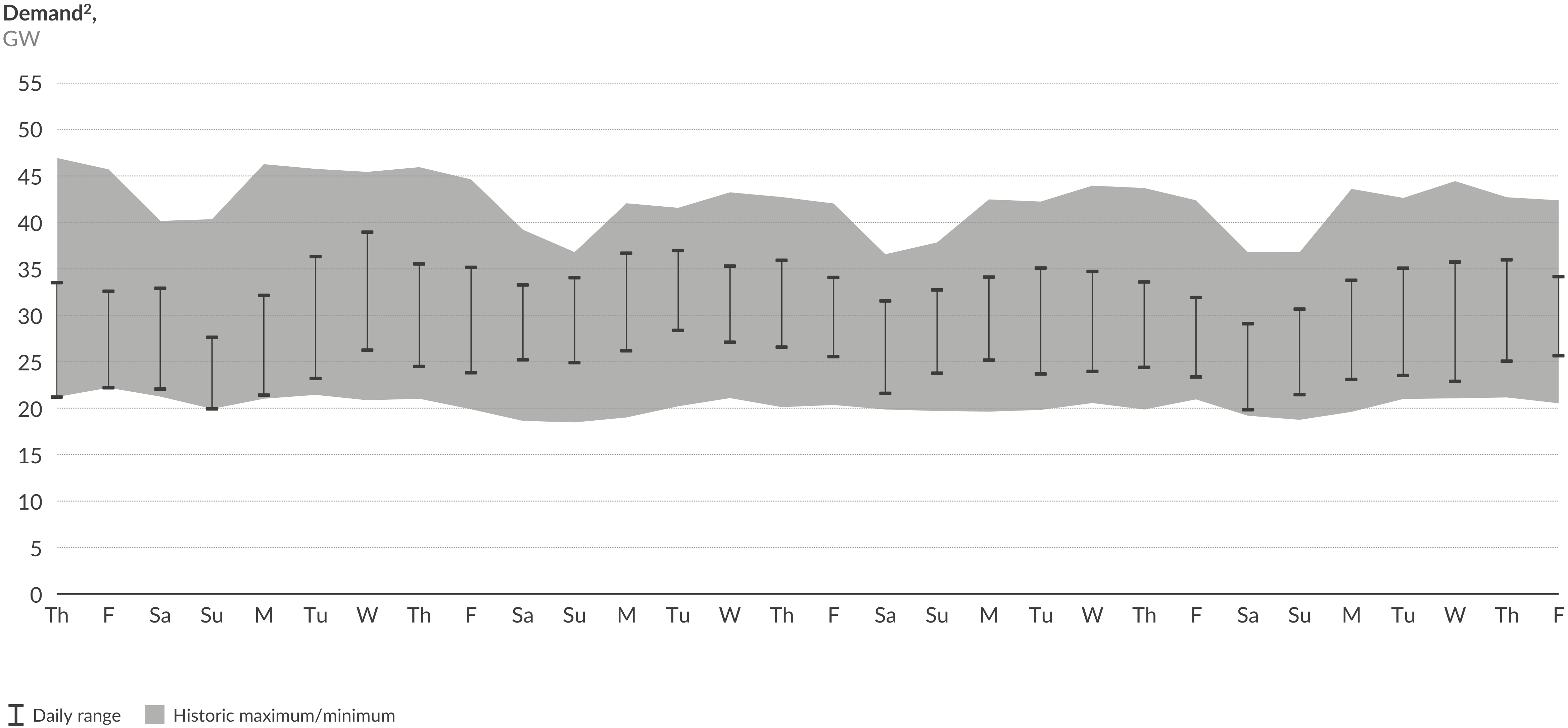


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include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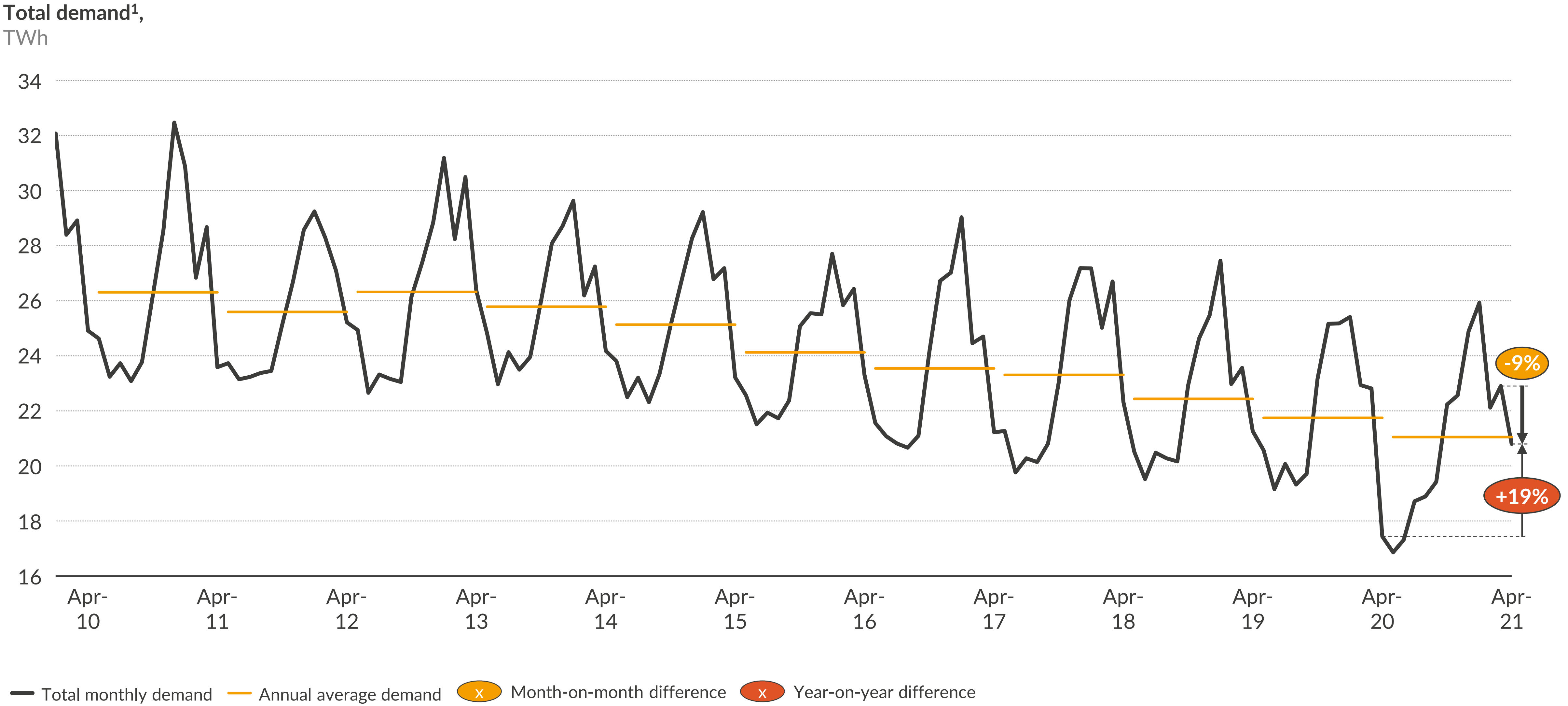
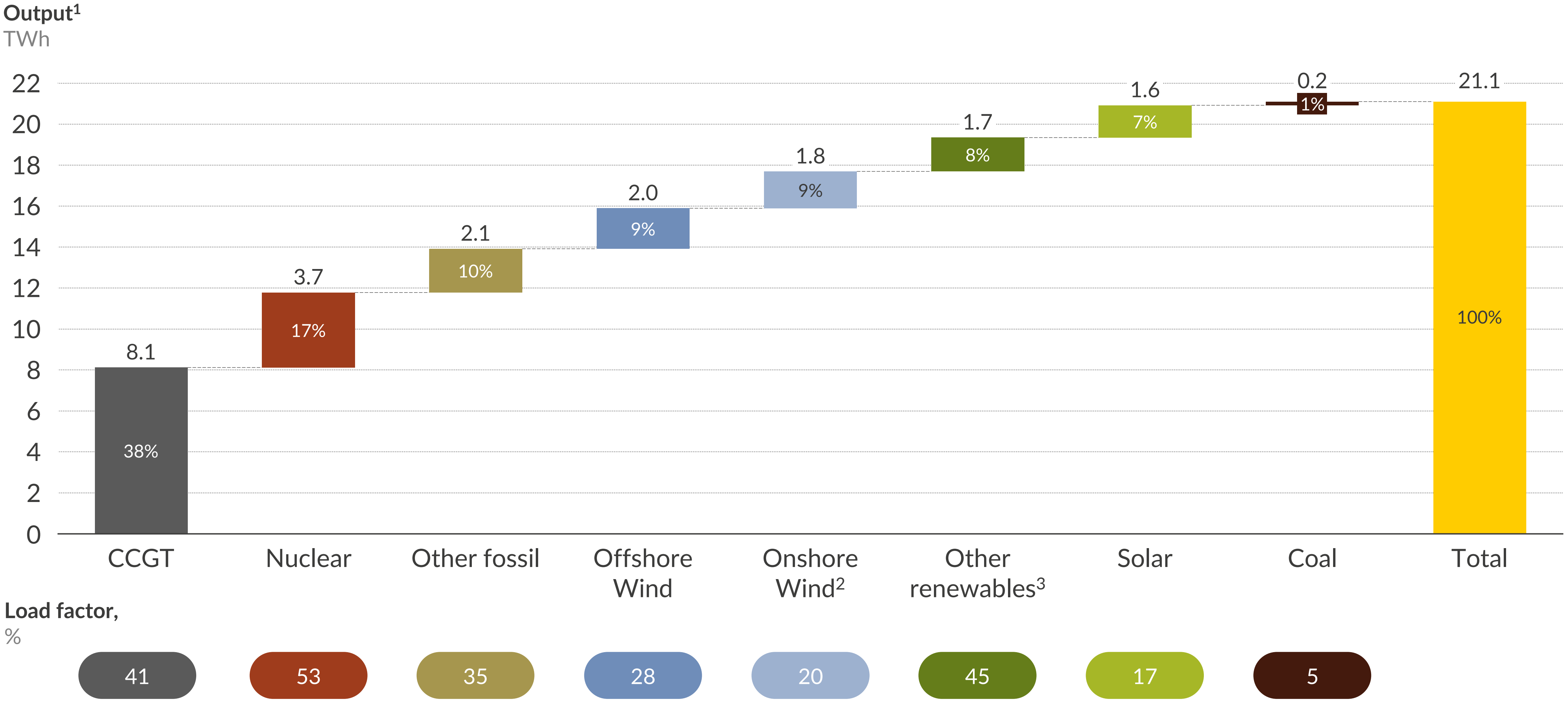


1) Demand data presented here is Initial Transmission System Demand Out-Turn, and includes station transformer load, pumped storage demand and interconnector demand, but does not include embedded demand.

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 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

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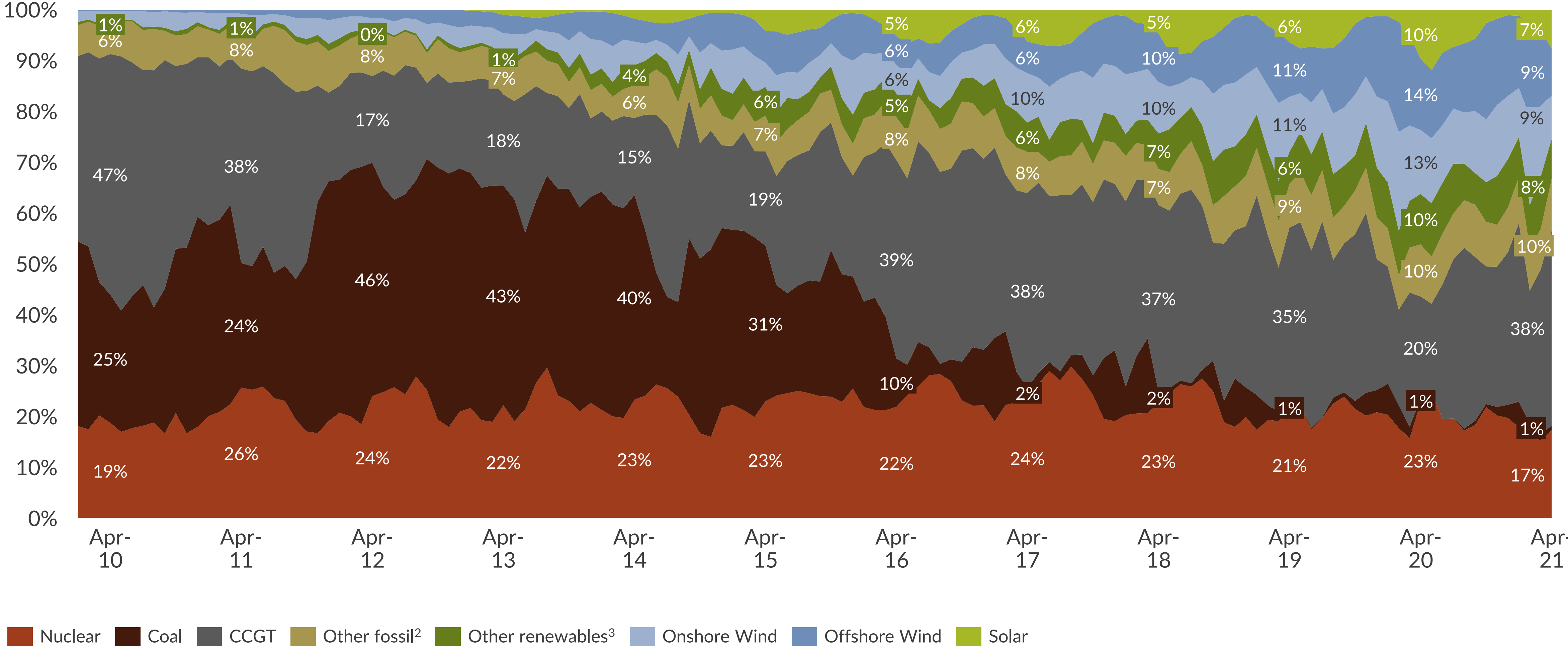
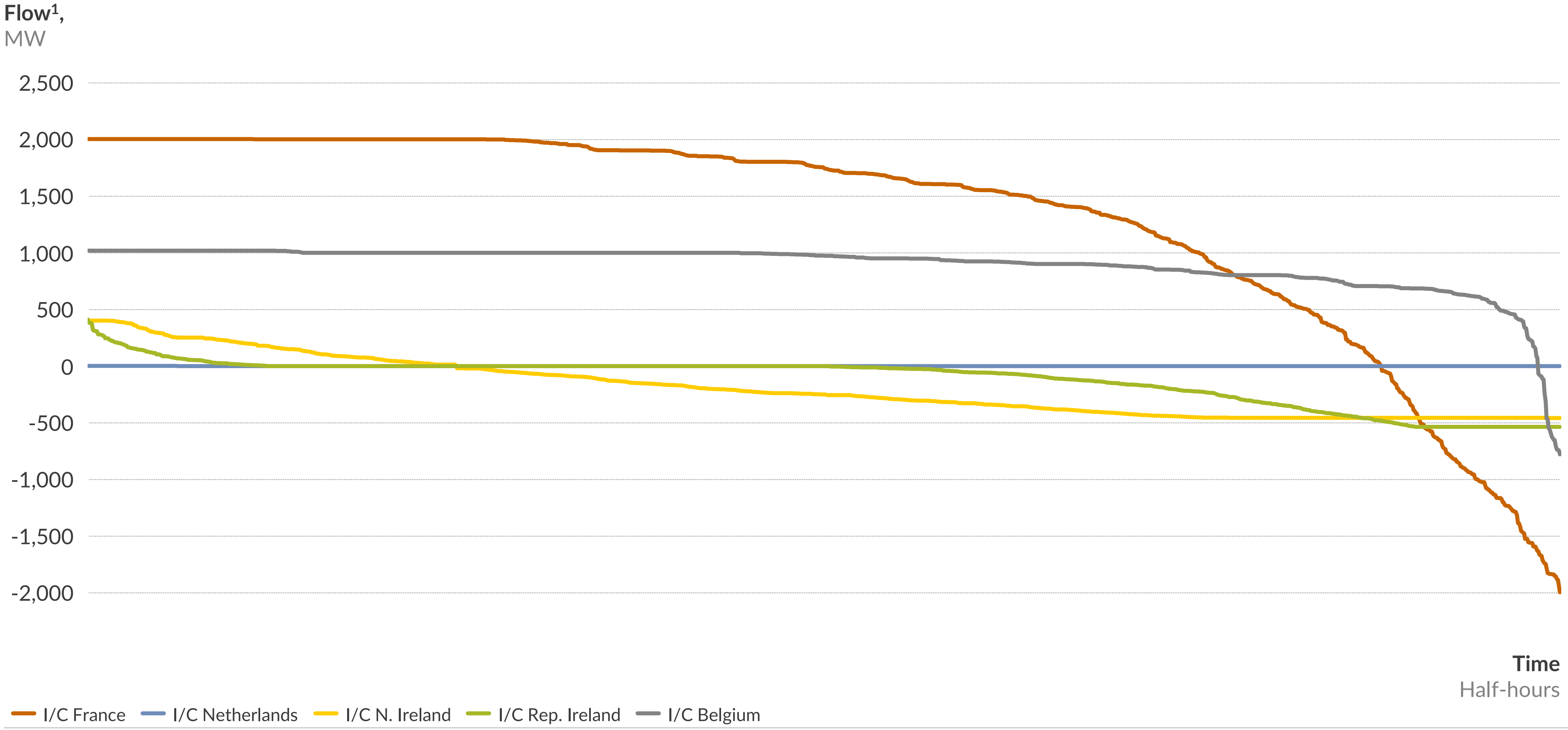
Output[1]
% of total



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

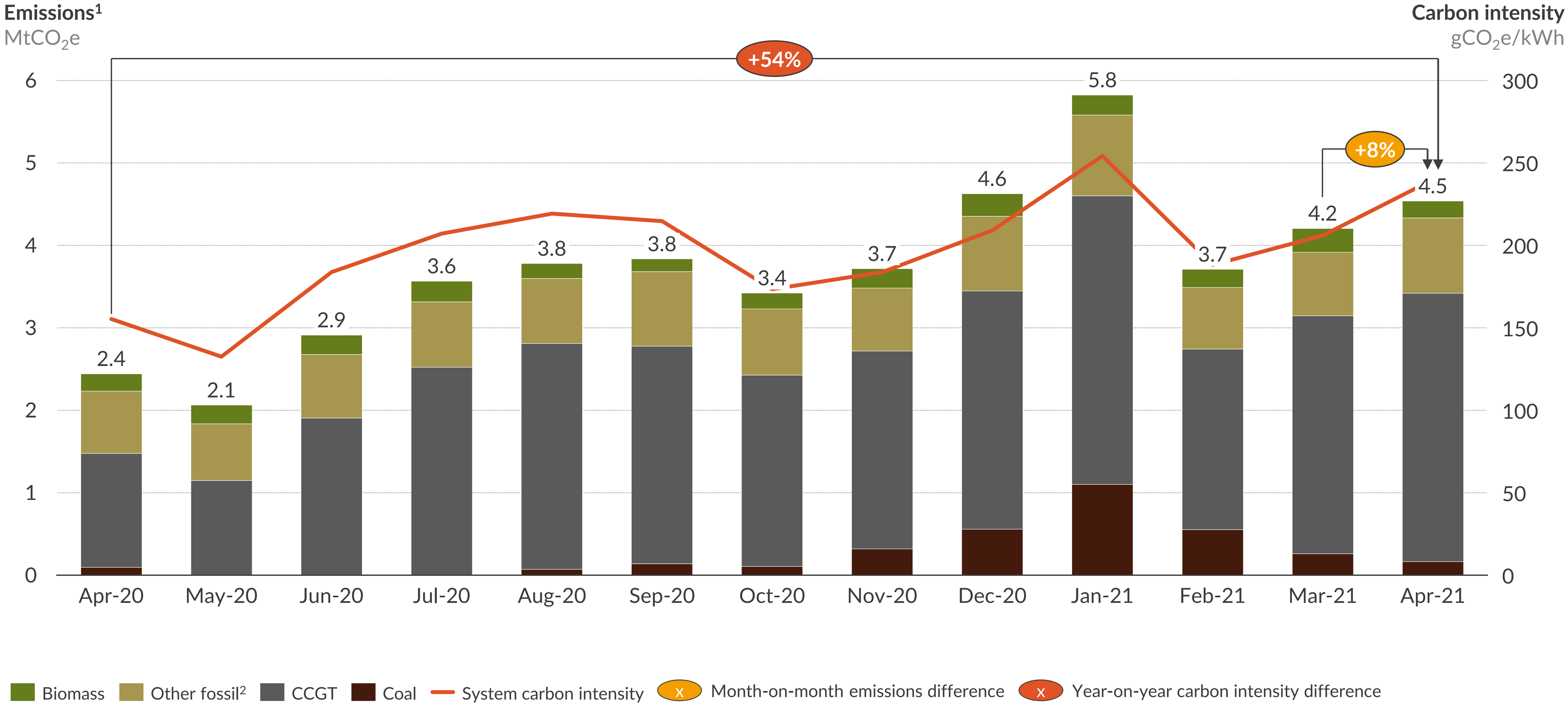
Monthly interconnector flow duration curve
Flow in each half-hour for GB interconnectors



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

Sources: Elexon, National Grid, Aurora Energy Research

Monthly emissions by technology



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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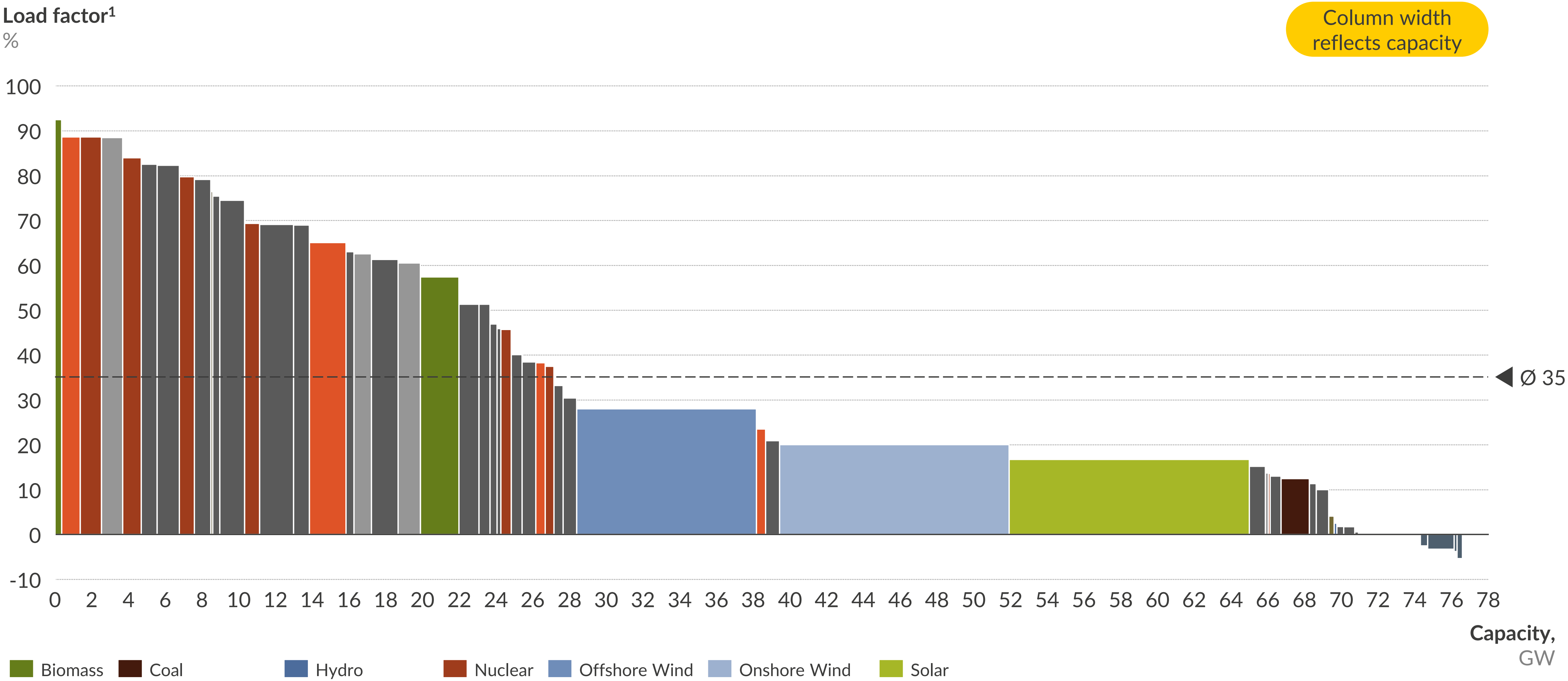
Plant utilisation – load factors by plant



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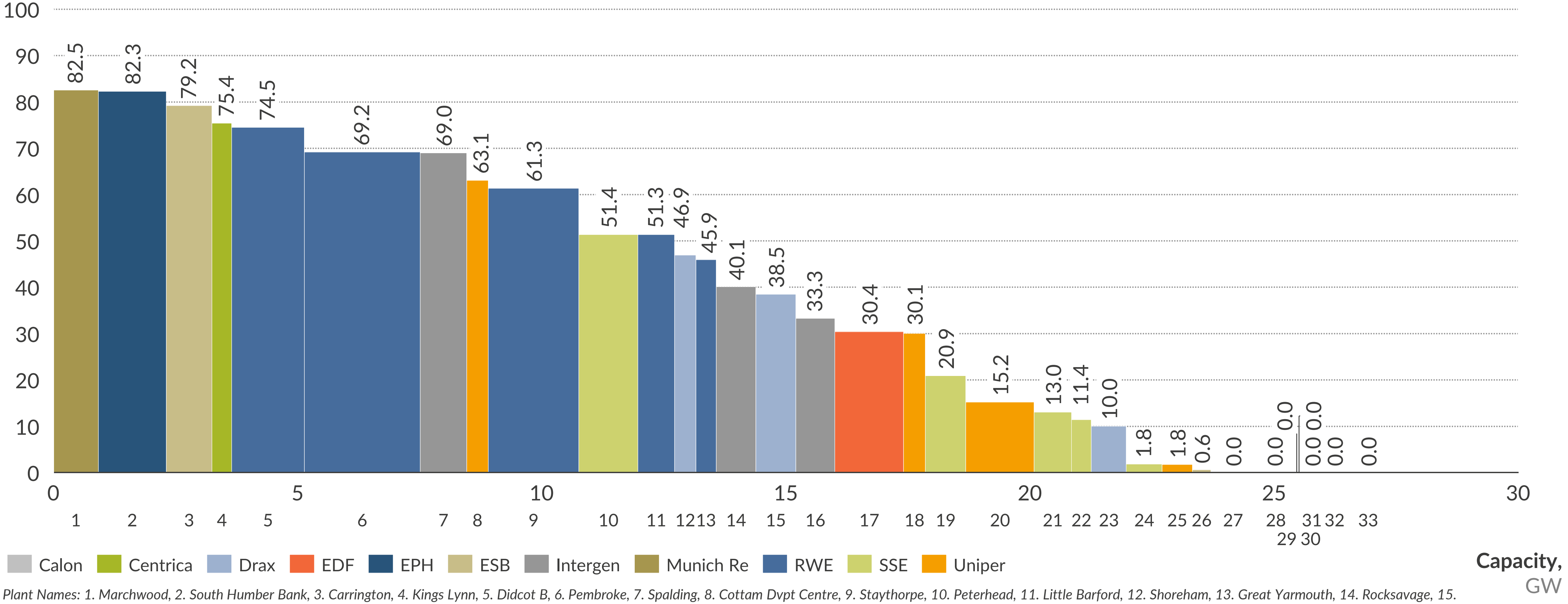
Full load hours[1]
% of total for the period

Column width reflects capacity



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

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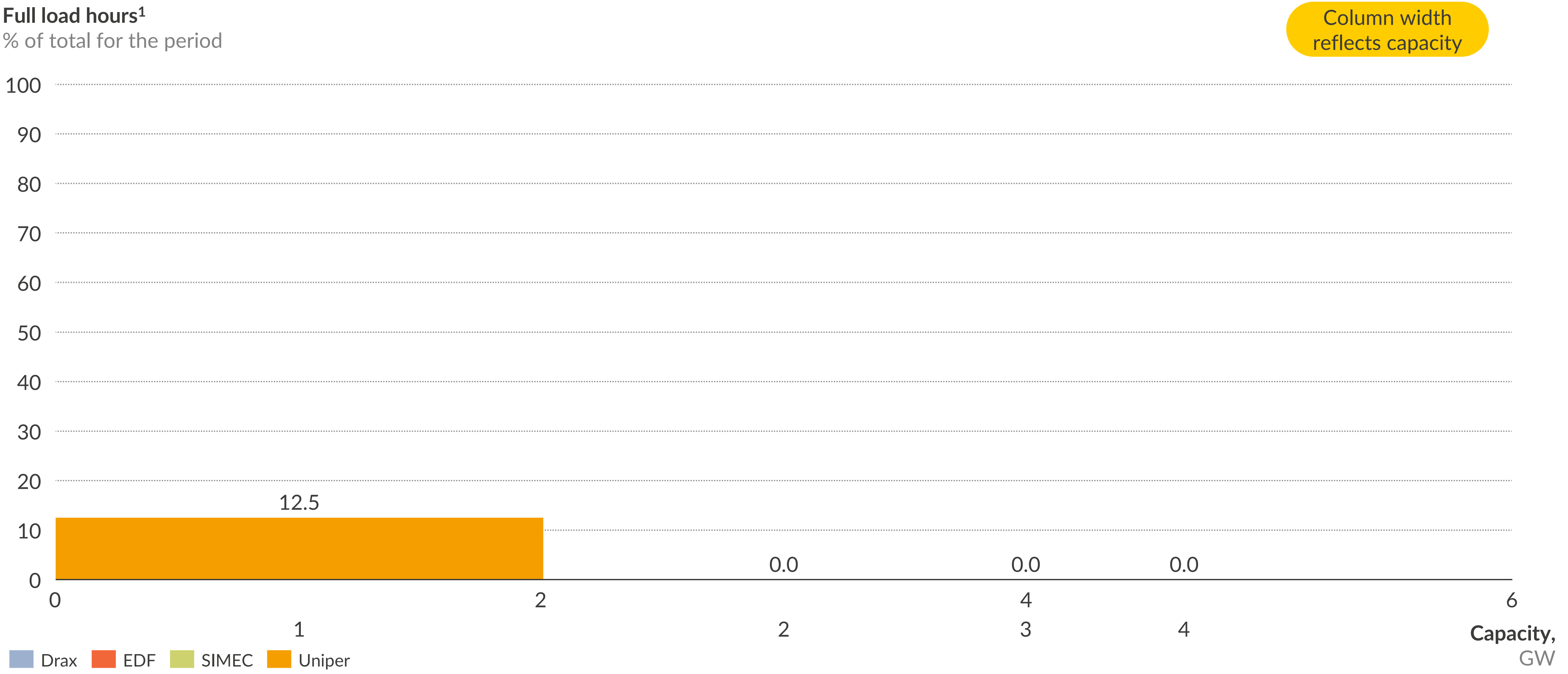

Plant Names: 1. Ratcliffe, 2. West Burton, 3. Uskmouth, 4. Drax Coal.

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

Sources: Aurora Energy Research, Elexon

Monthly load factors by technology

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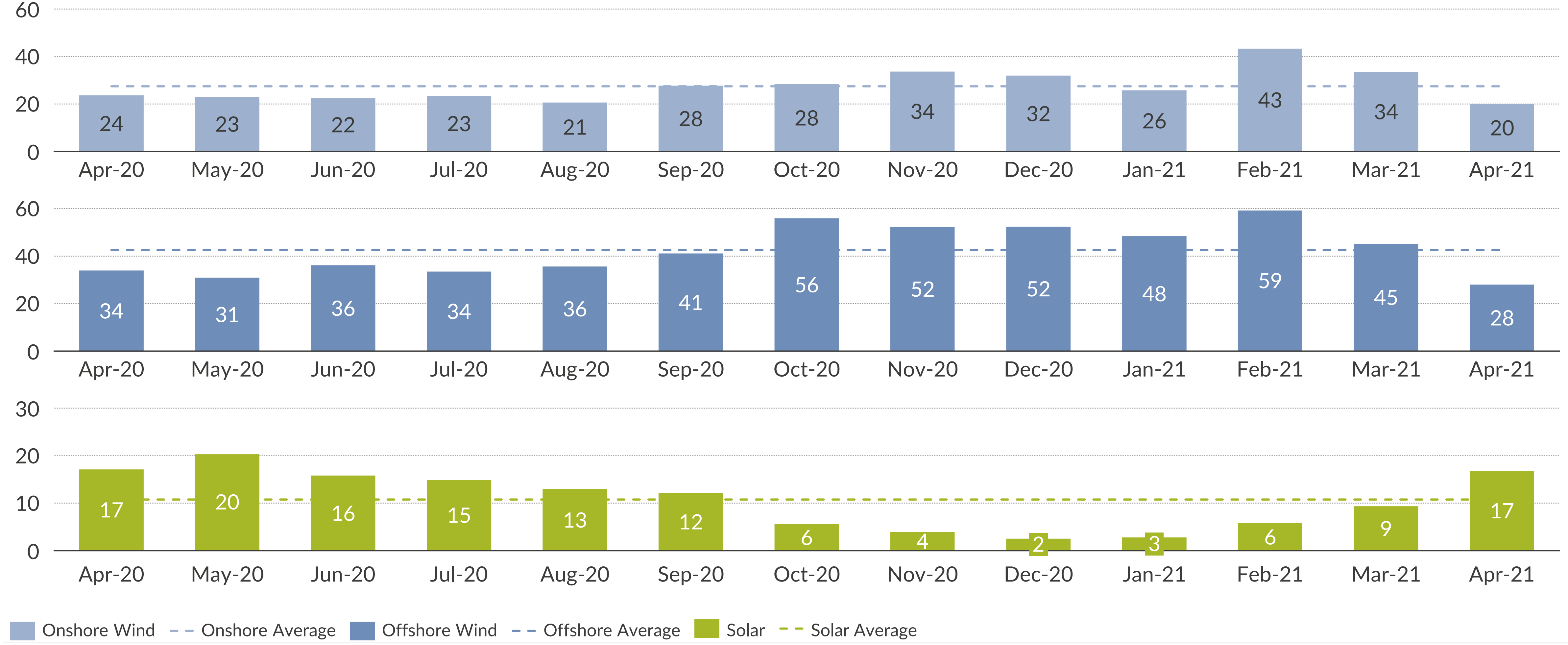
Average load factor[1]
%



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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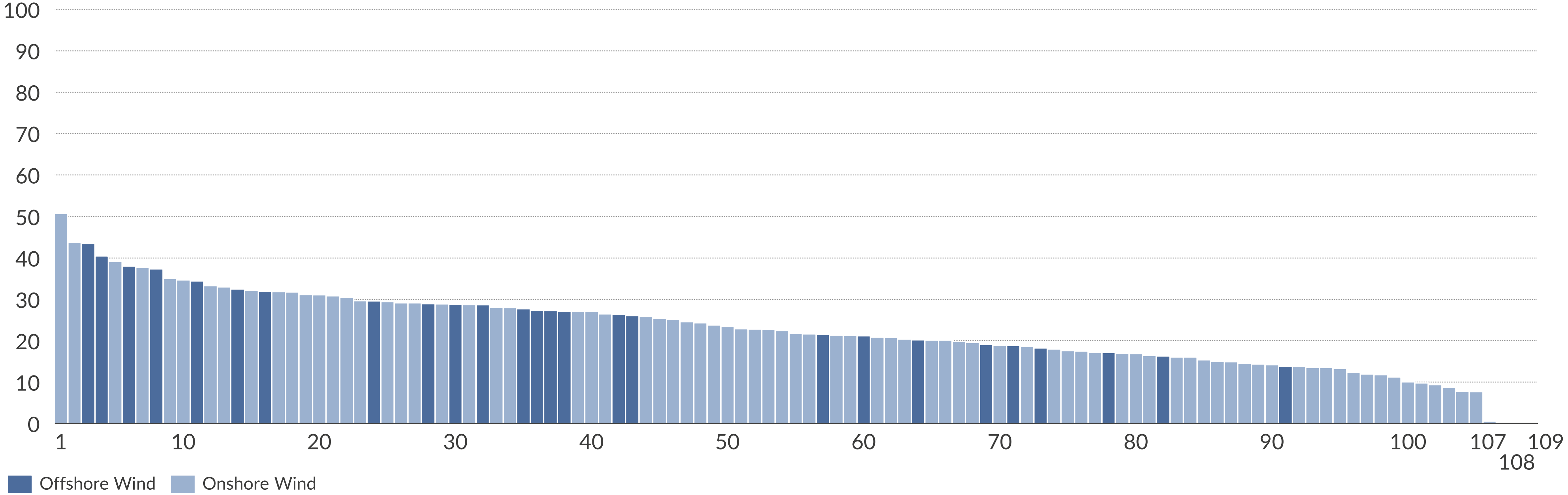
Load factor[1]
%



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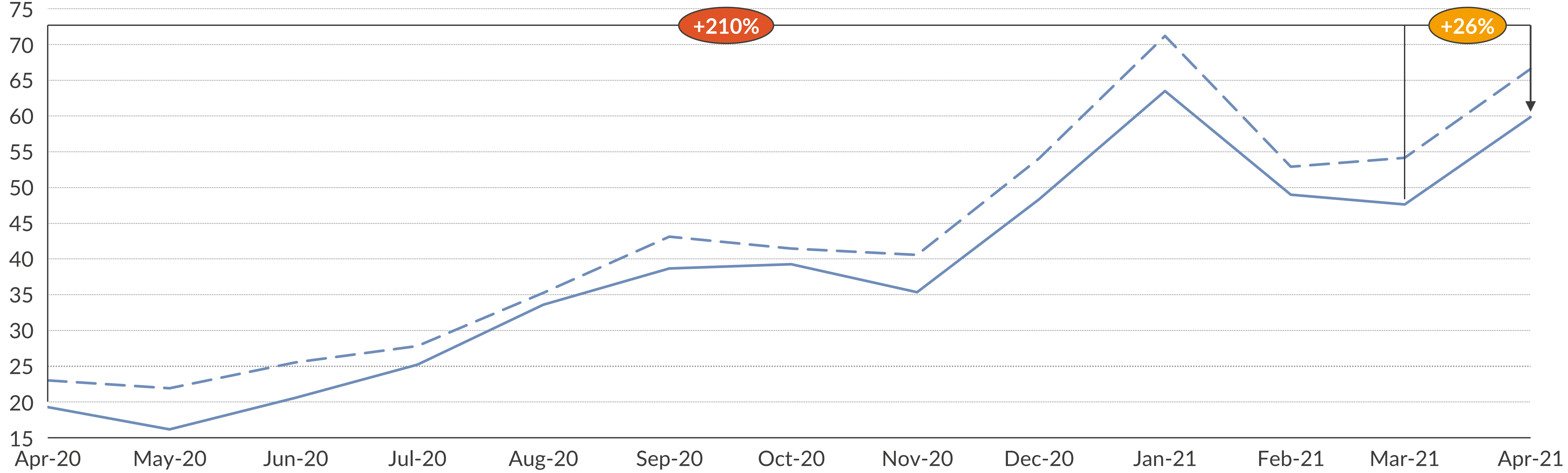
Price
£/MWh



Wind load factors
%

Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21
24	23	22	23	21	28	28	34	32	26	43	34	20
34	31	36	34	36	41	56	52	52	48	59	45	28

Baseload[1] Wind Capture [2] x Month-on-month difference x Year-on-year difference

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

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 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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