AURORA ENERGY RESEARCH

GB Wholesale Market Summary
October 2020

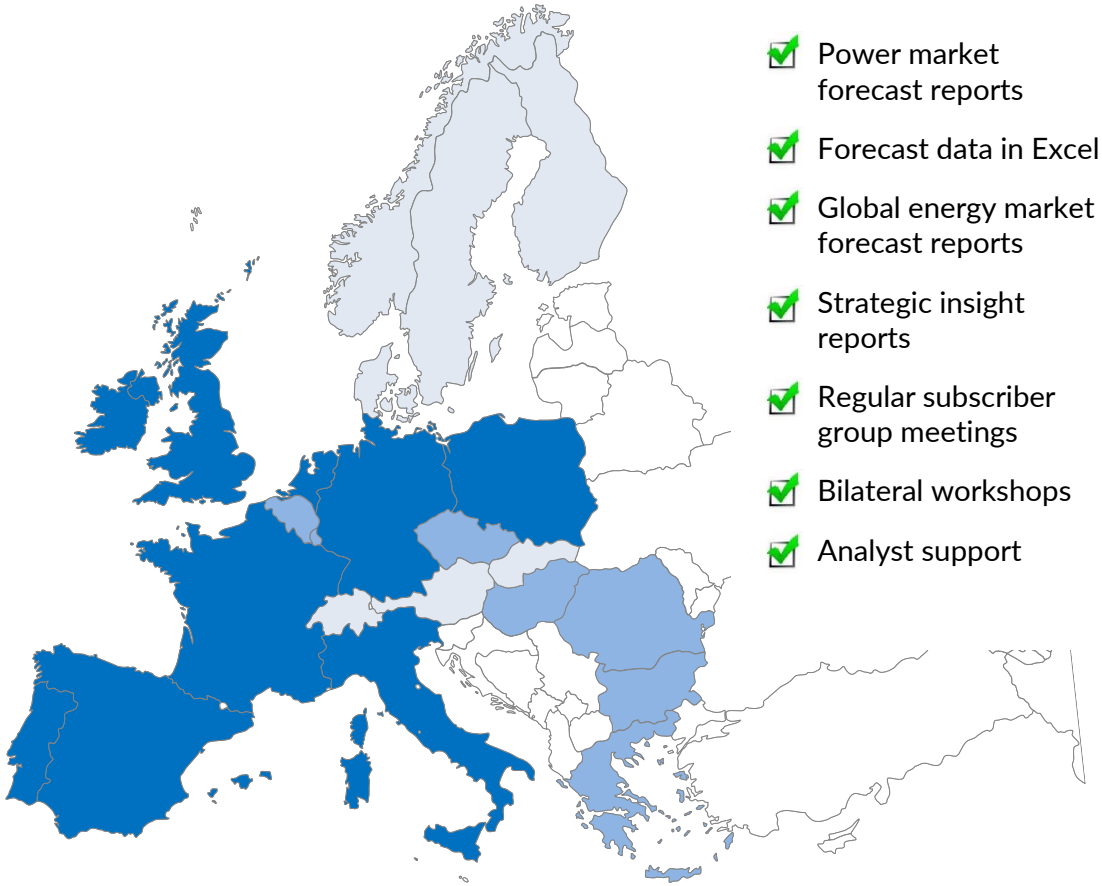
Published November 2020

Executive summary

1. Despite a rise in gas prices and demand, the decrease in carbon prices and increase in low marginal cost generation[1] led to a dip in October's average power price to £41.5/MWh, or £1.7/MWh (or 4%) lower than September. See slides 5, 6, and 7.
2. Lower temperatures caused monthly power demand in October to increase by 2.8 TWh (or 15%) relative to September. See slide 10.
3. Despite a rise in demand, thermal generation[2] fell by 1.1 TWh (or 12%) relative to September as low marginal cost generation[1] increased by 6% (to 63% of total generation). Consequently, total emissions fell by 0.4 $MtCO_2$ (or 11%) compared to September. See slides 12 and 14.
4. Wind assets saw an increase in their profitability in October as wind capture prices increased by £1.0/MWh (or 2%) alongside an increase in load factors of 7.5 p.p (to 42%) relative to September. See slides 20 and 22.

1) Includes nuclear and renewables. 2) Includes CCGTs, coal and other fossil generation

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



Comprehensive Power Market Services	Power Market Forecast Reports	Bespoke forecasts
✓ Power market forecast reports	✓ Power market forecast reports	✓ Aurora can provide power market forecasts upon request
✓ Forecast data in Excel	✓ Forecast data in Excel	
✓ Global energy market forecast reports	✓ Analyst support	
✓ Strategic insight reports		
✓ Regular subscriber group meetings		
✓ Bilateral workshops		
✓ Analyst support		

Source: Aurora Energy Research

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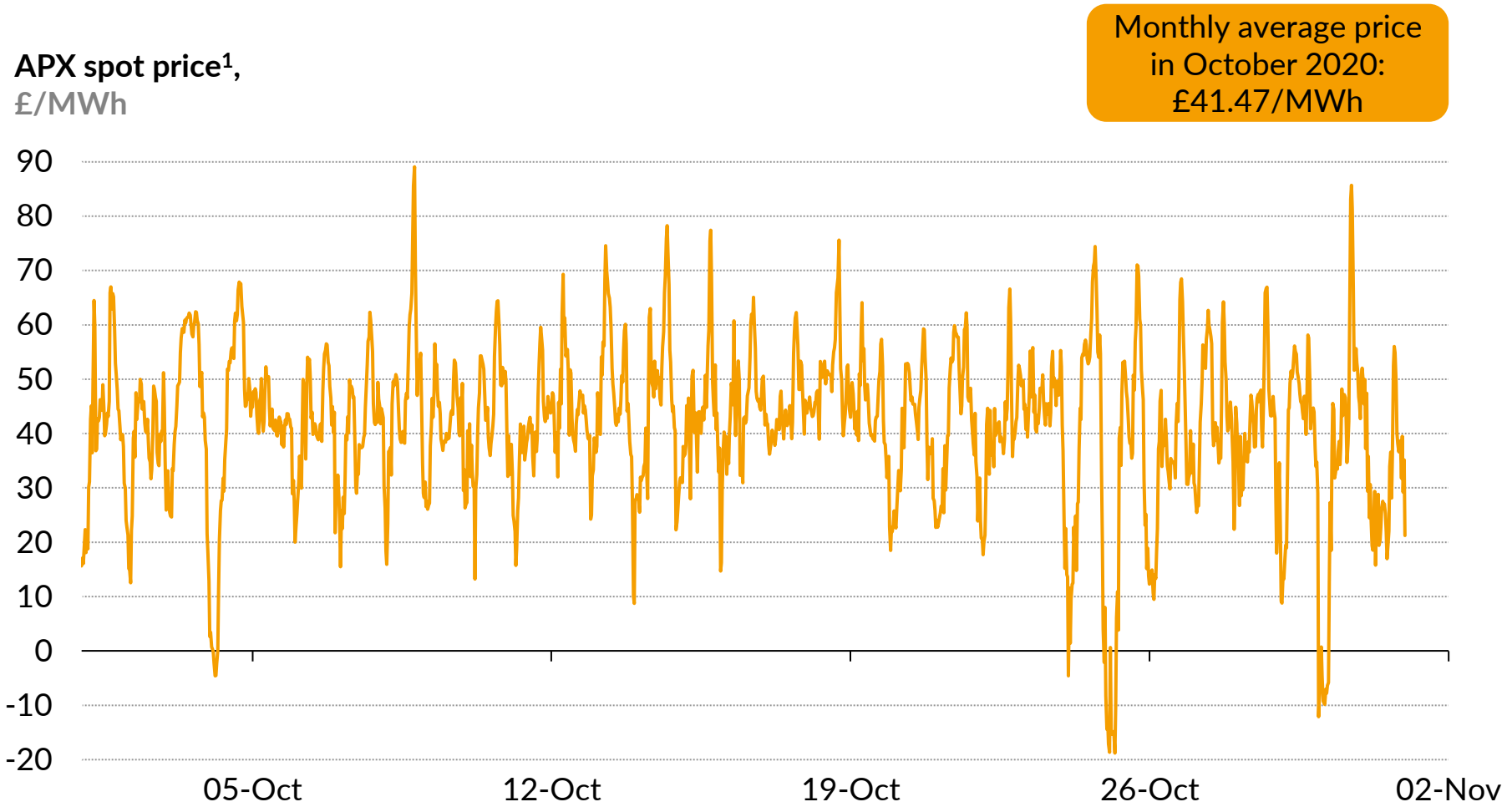
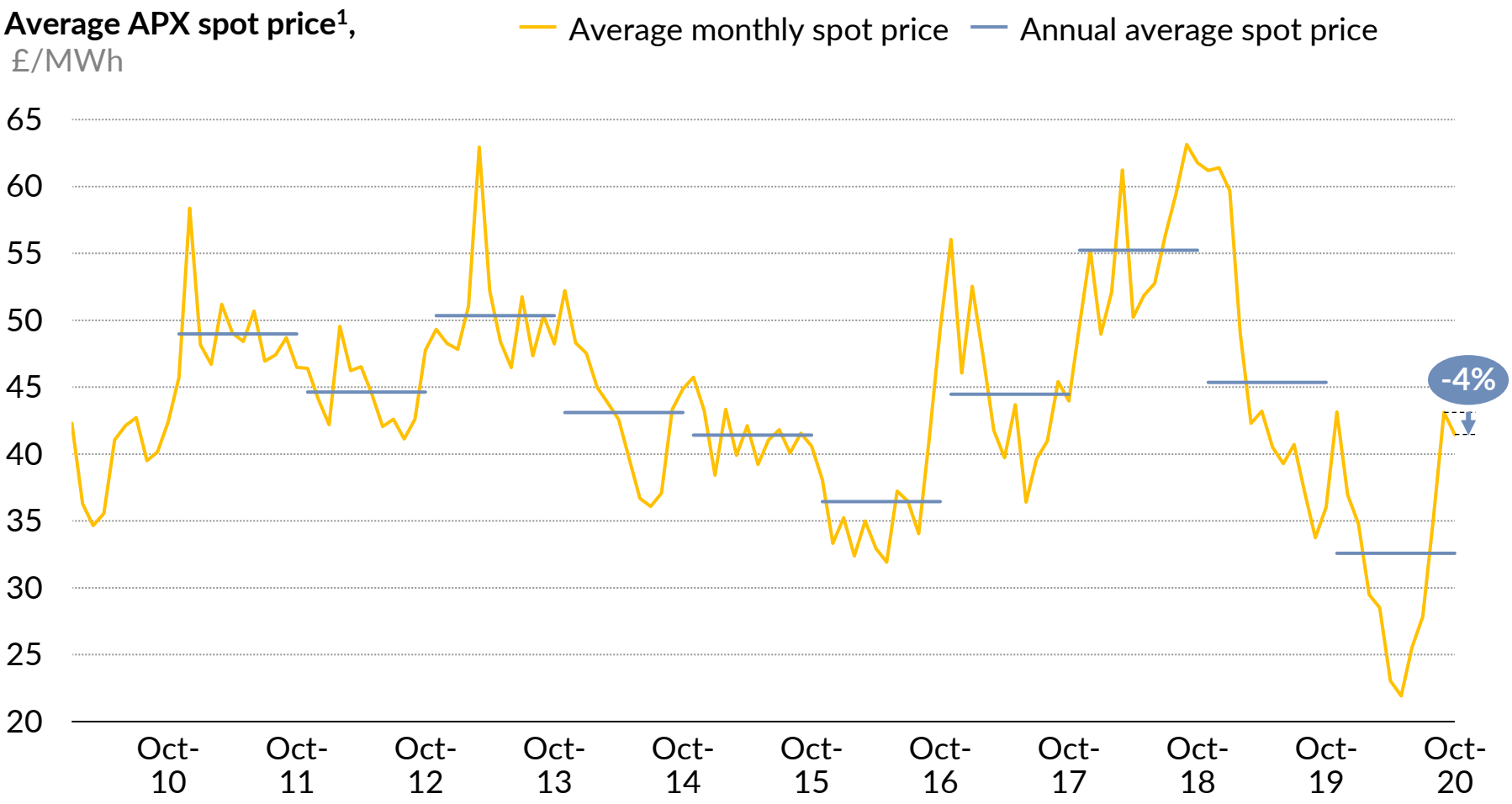
Half-hourly APX spot price for October



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

Source: Thomson Reuters

Historic monthly average APX spot price

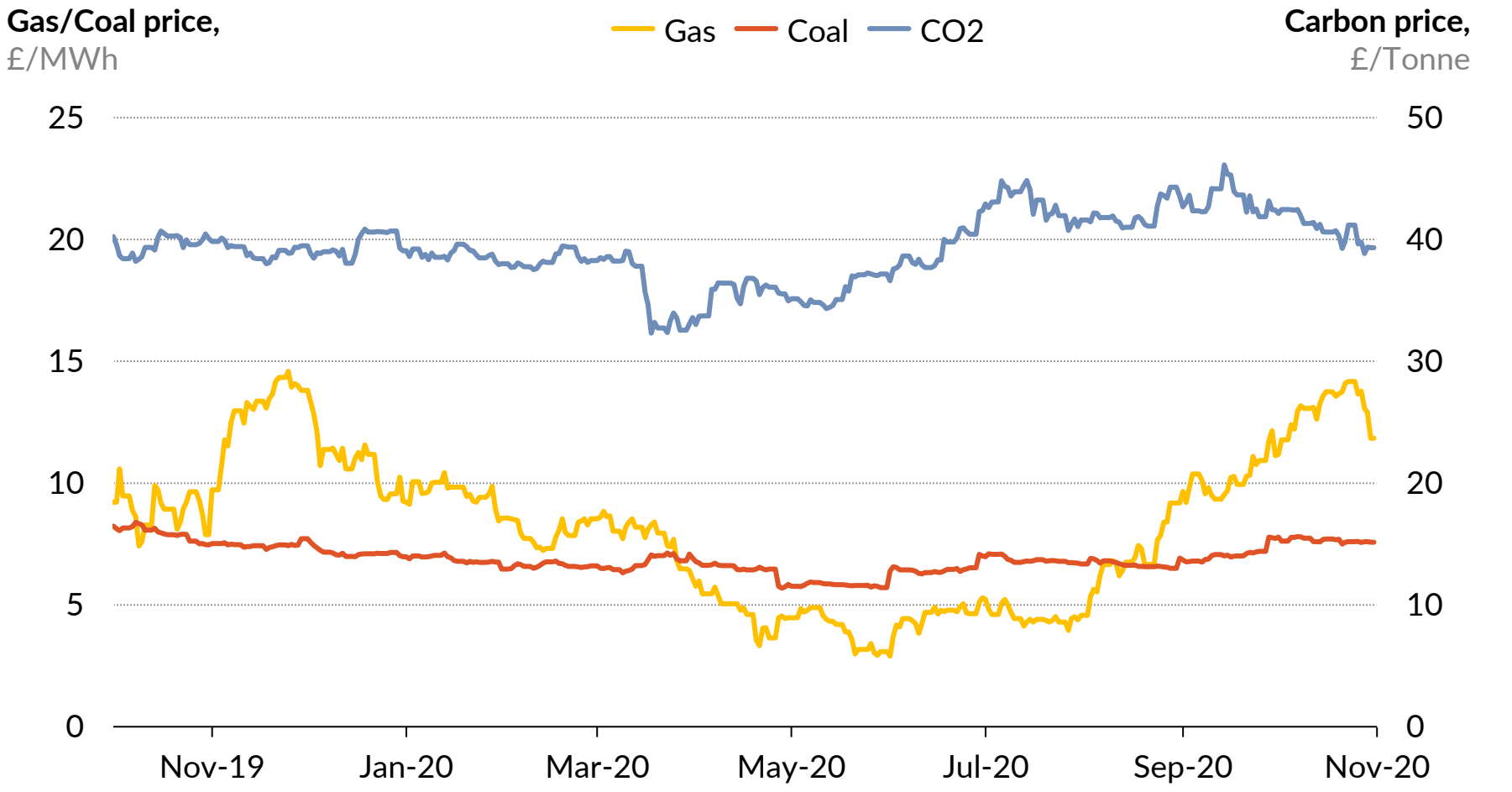


1) Average monthly APX is the average over the month of the volume-weighted reference prices for each half-hour interval.

Source: Thomson Reuters

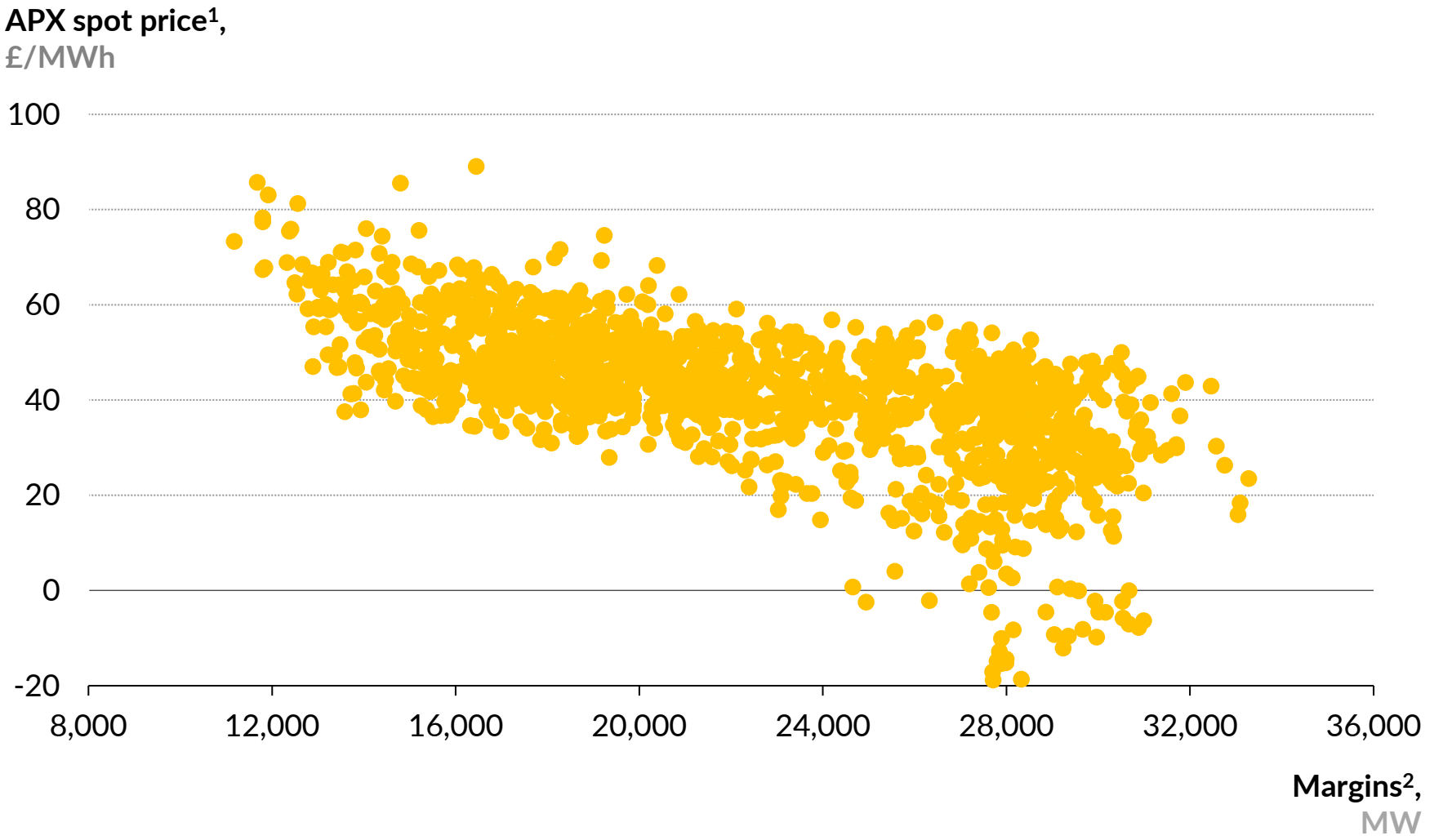
Historic fuel prices

Gas, Coal and Carbon daily prices



Source: Thomson Reuters

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

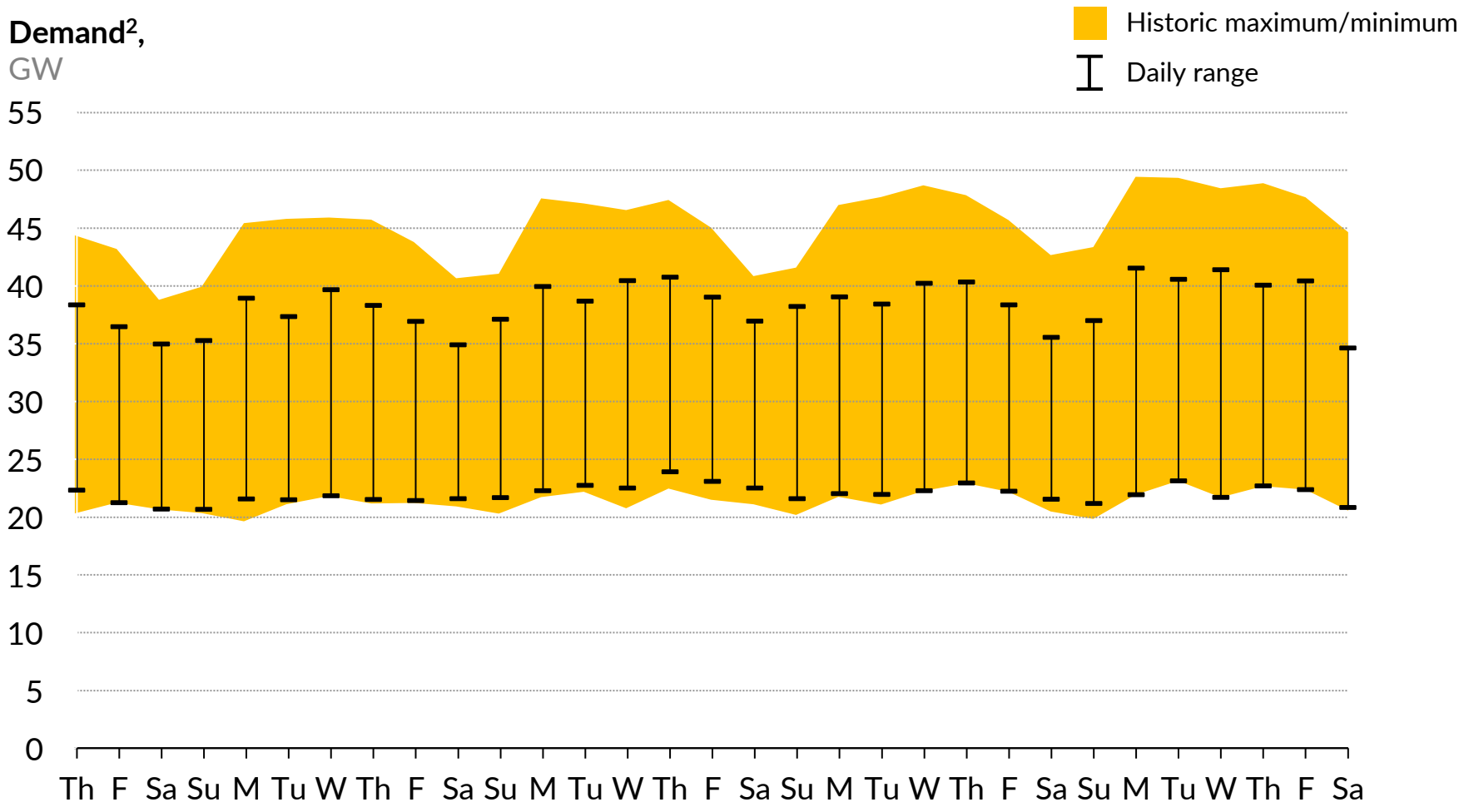


1) Half-hourly APX is the volume-weighted reference price over that half-hour interval, as provided by APX Power UK. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include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

Daily October max and min demand

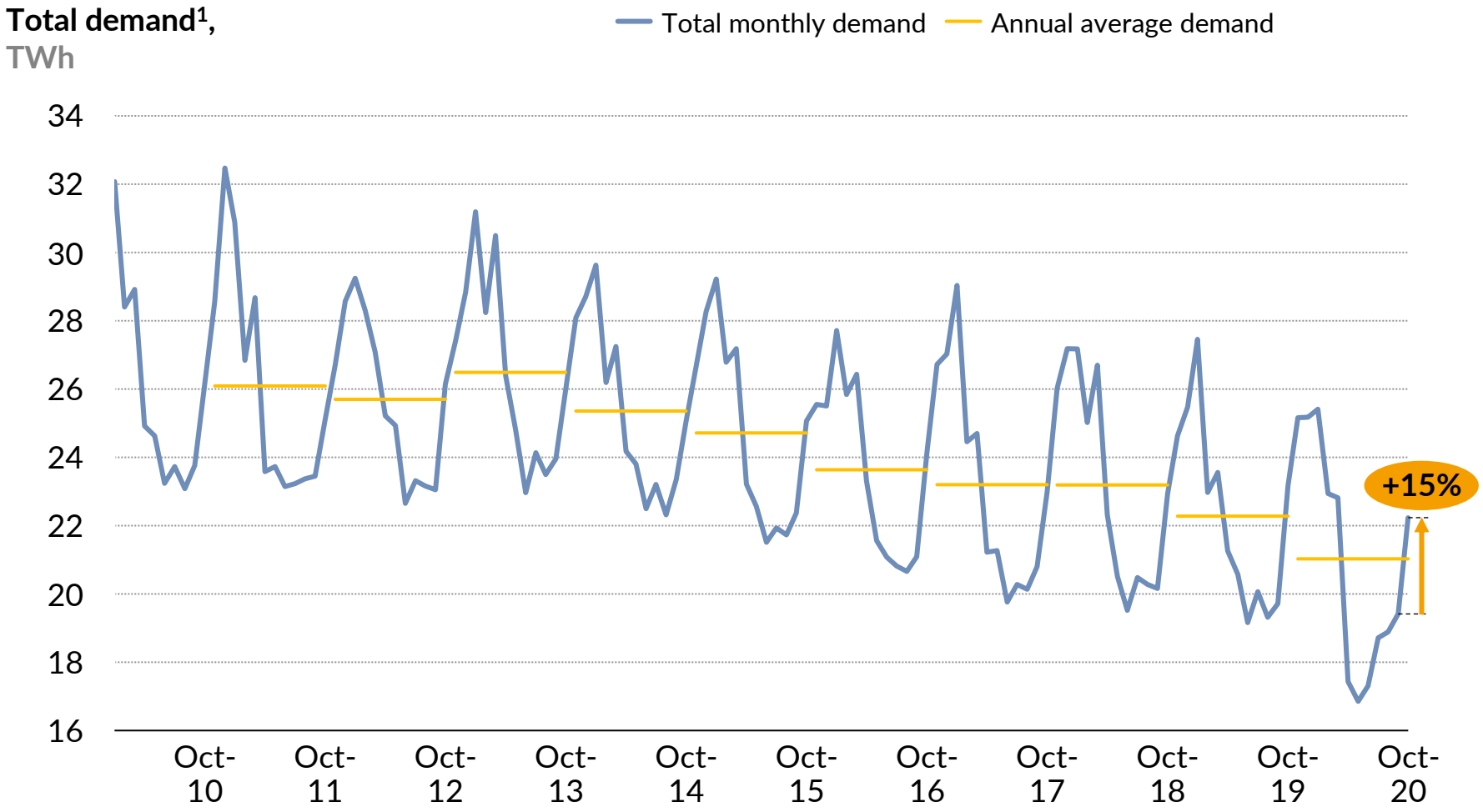
Relative to historic October max and min demand since 2010[1]



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.

Source: National Grid

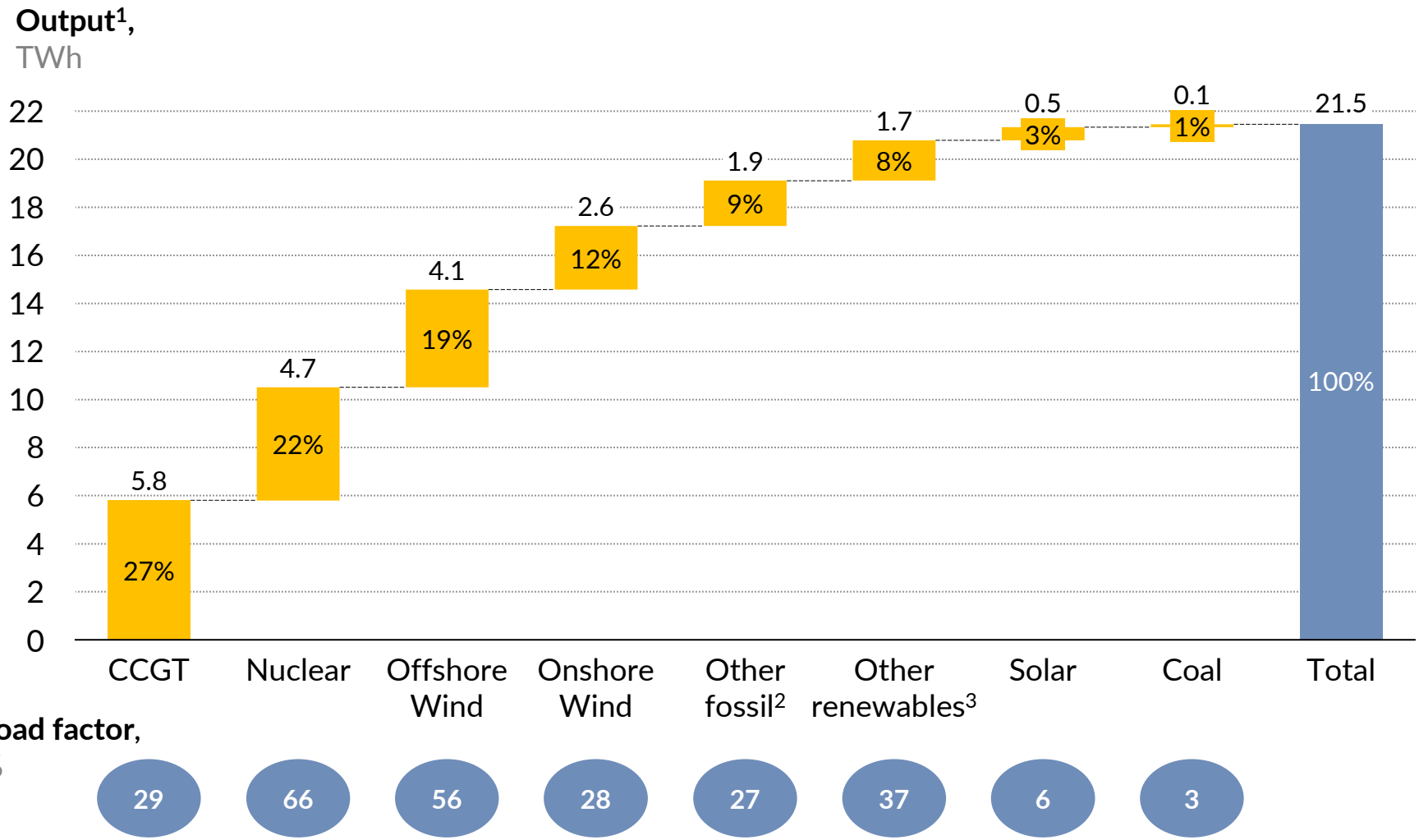
Monthly historical demand on the transmission system



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.

Source: National Grid

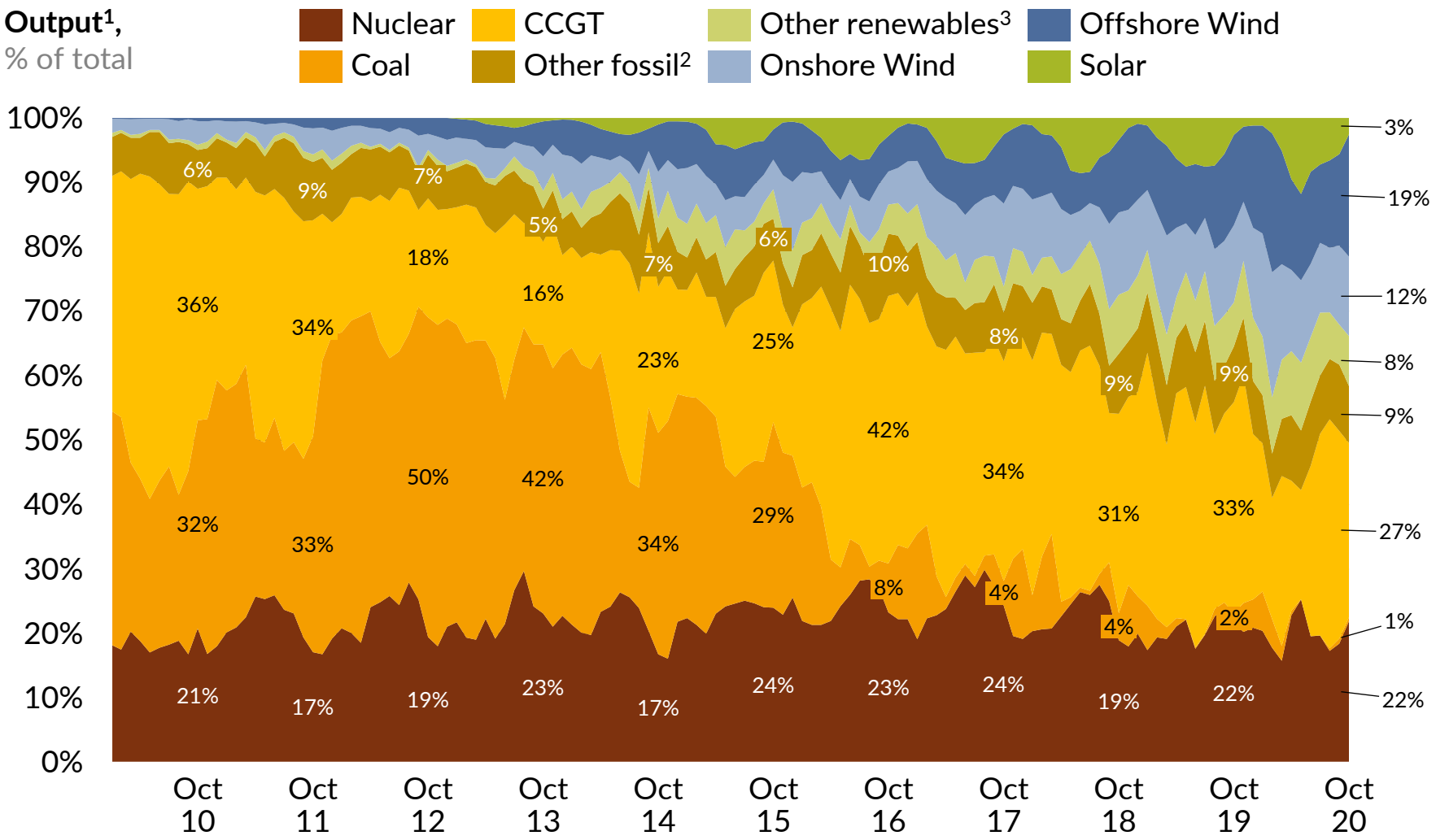
Monthly fuel mix breakdown



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.

Source: Elexon, Sheffield Solar, National Grid

Historical fuel mix breakdown

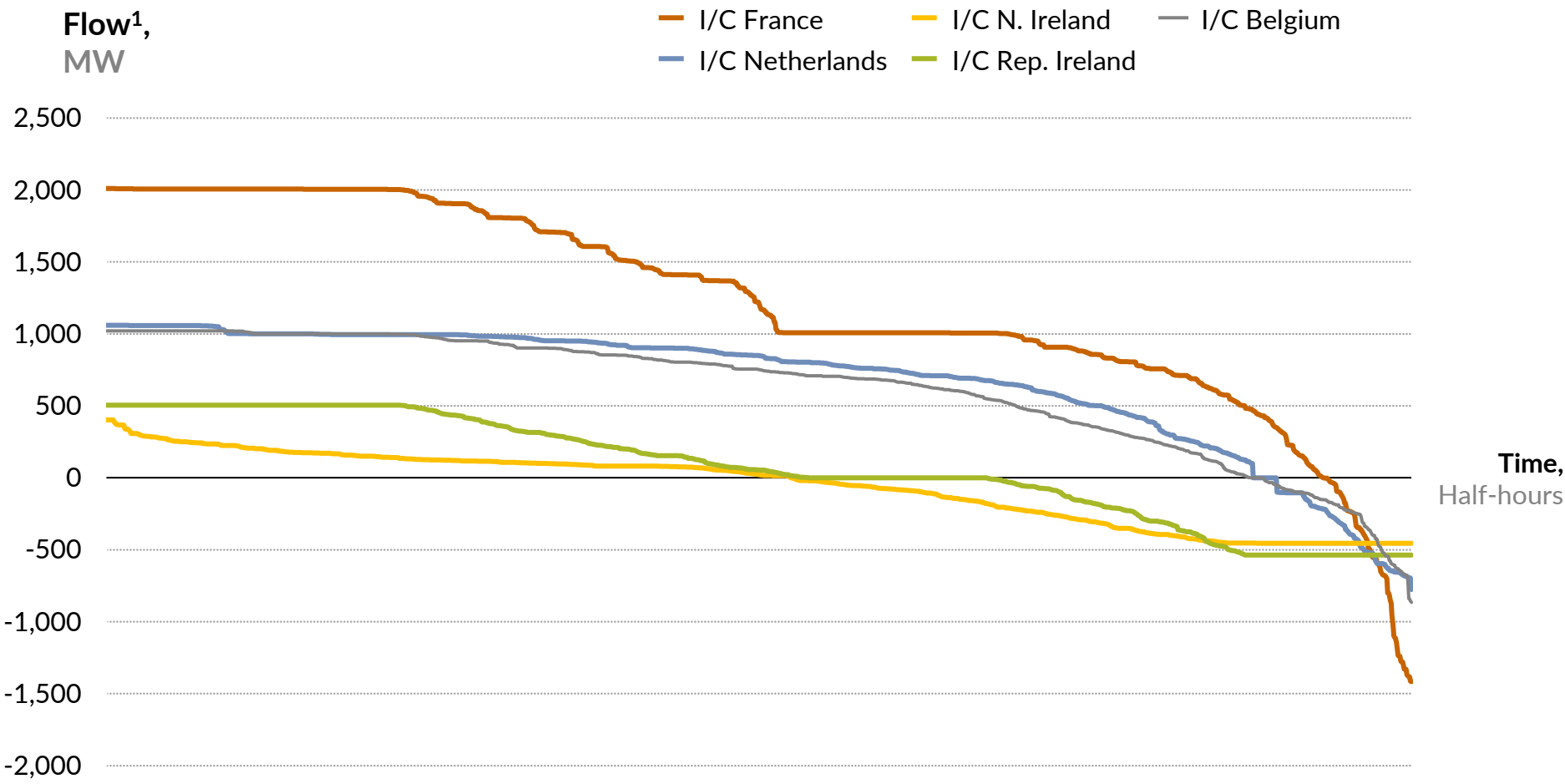


1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV. 2) Other fossil includes oil, CHP-CCGT and OCGT. 3) Other renewables includes biomass and hydro.

Sources: Elexon, Sheffield Solar, National Grid

Monthly interconnector flow duration curve

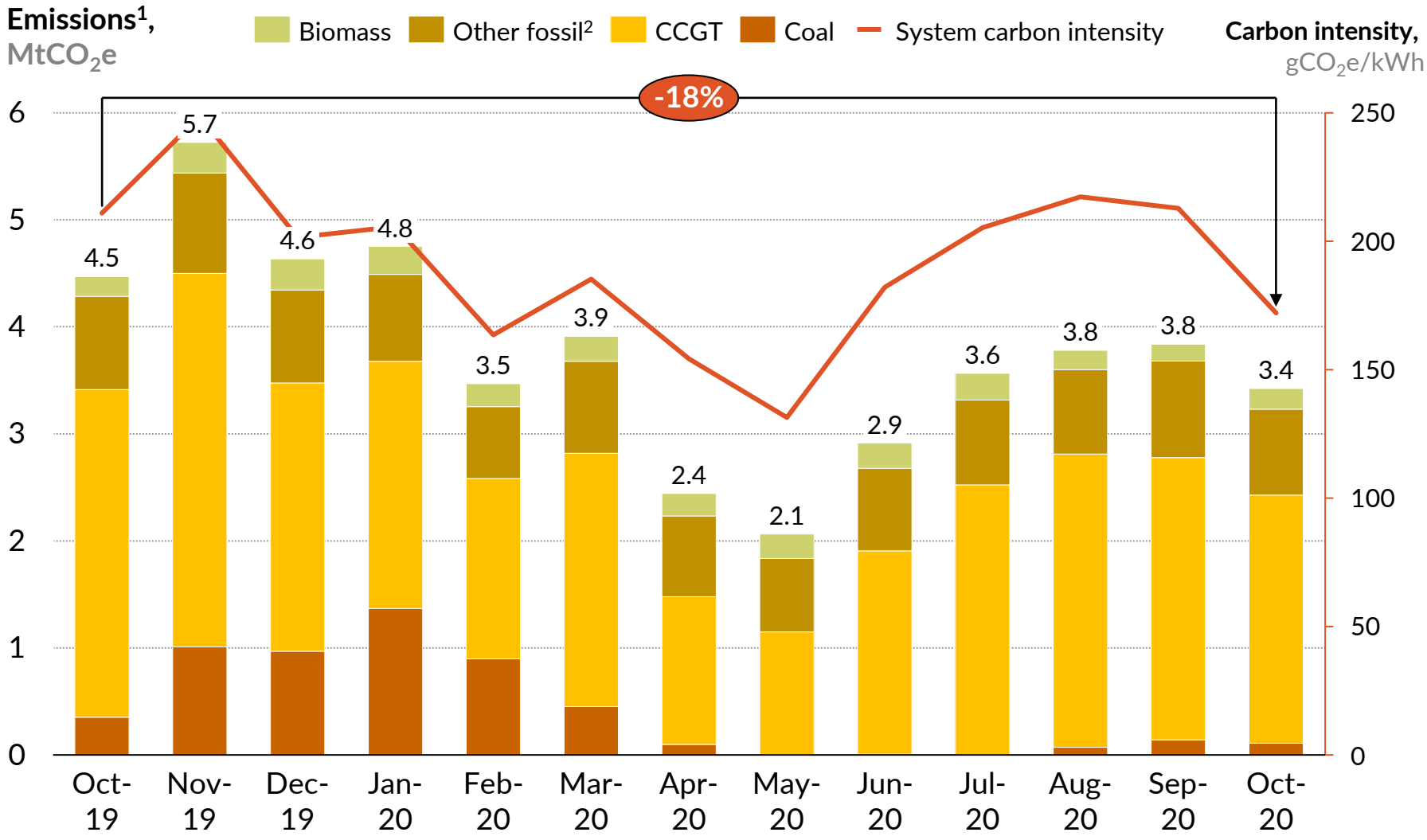
Flow in each half-hour for GB interconnectors



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

Sources: Elexon, National Grid

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

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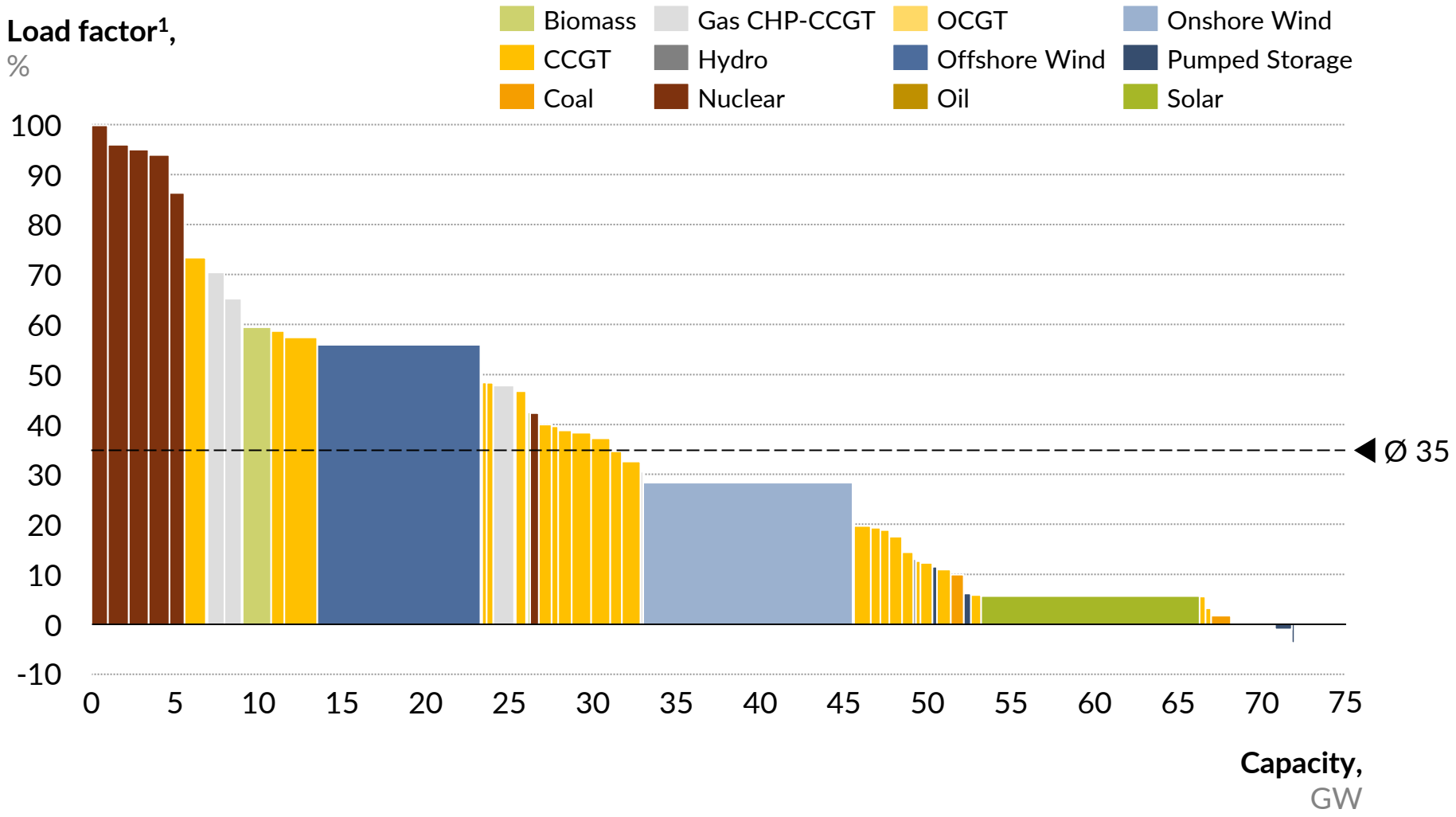
Plant utilisation – load factors by plant

Column width reflects capacity

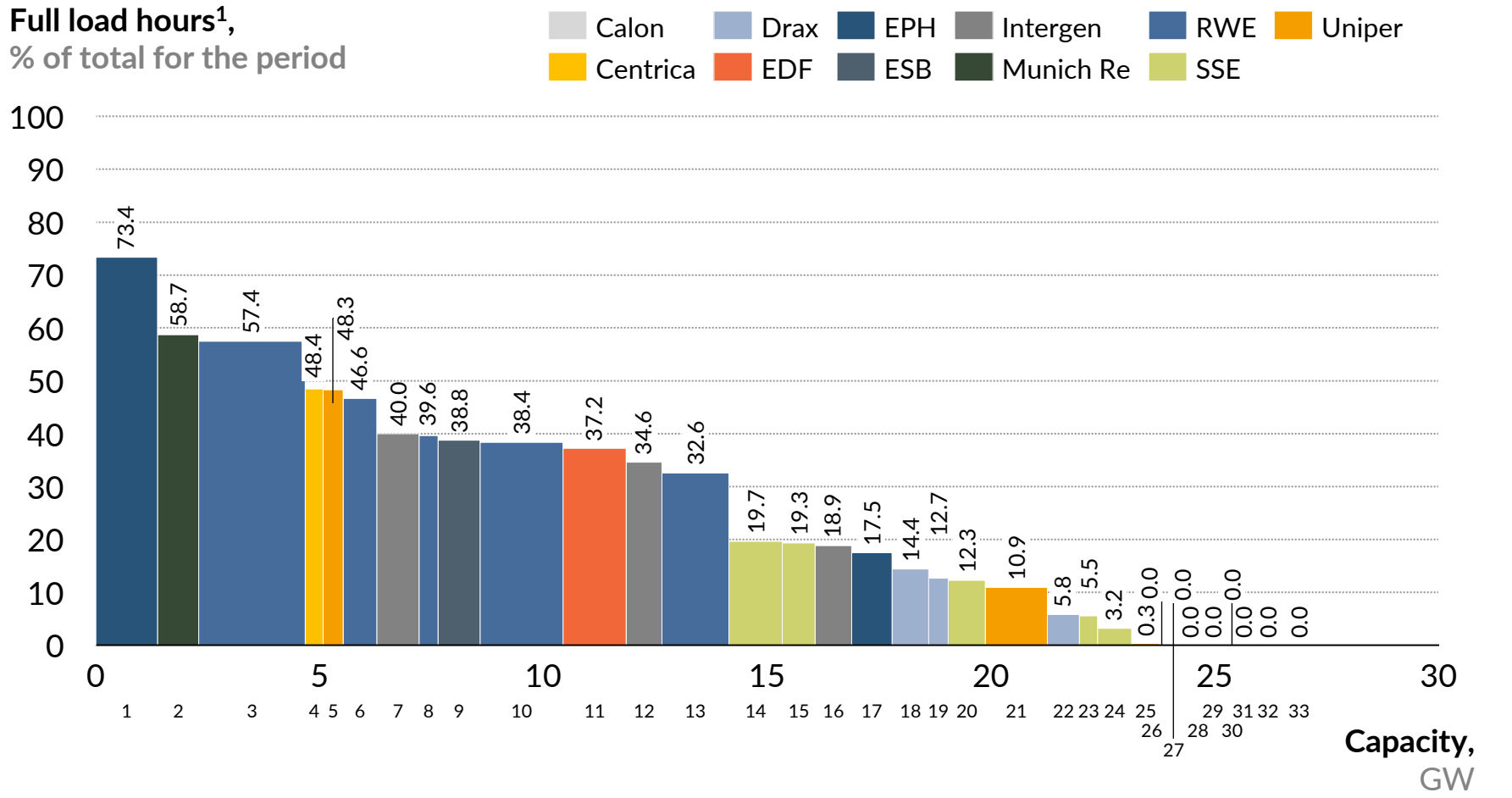


1) Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for wind and solar. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months. Please refer to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

Sources: Elexon, BEIS

CCGT plant utilisation – by plant

Column width reflects capacity

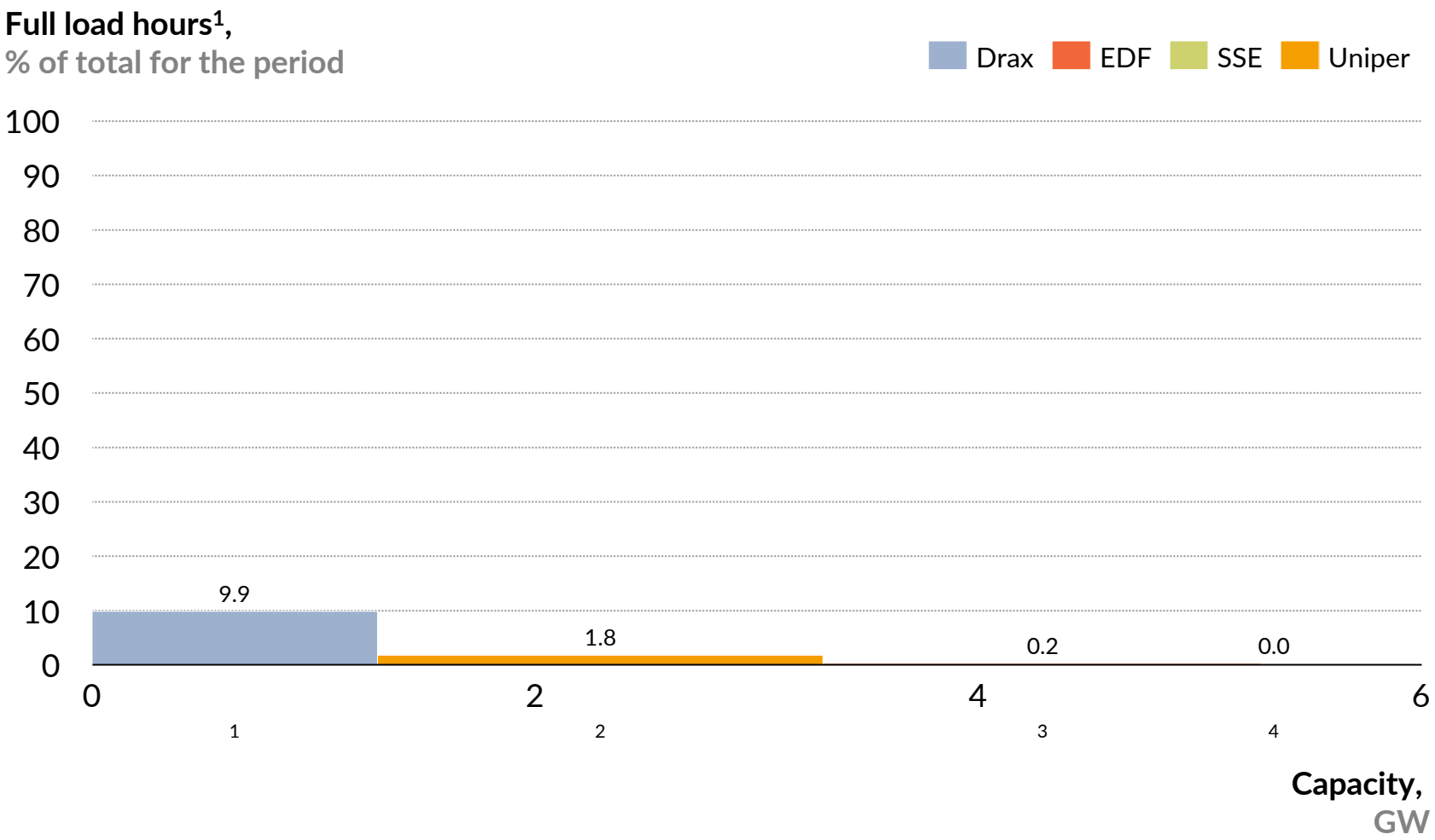


Plant Names: 1. South Humber Bank, 2. Marchwood, 3. Pembroke, 4. Kings Lynn, 5. Cottam Dvpt Centre, 6. Little Barford, 7. Spalding, 8. Great Yarmouth, 9. Carrington, 10. Staythorpe, 11. West Burton B, 12. Coryton, 13. Didcot B, 14. Peterhead, 15. Medway, 16. Rocksavage, 17. Langage, 18. Damhead Creek,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

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

Source: Elexon

Coal plant utilisation – by plant
Column width reflects capacity

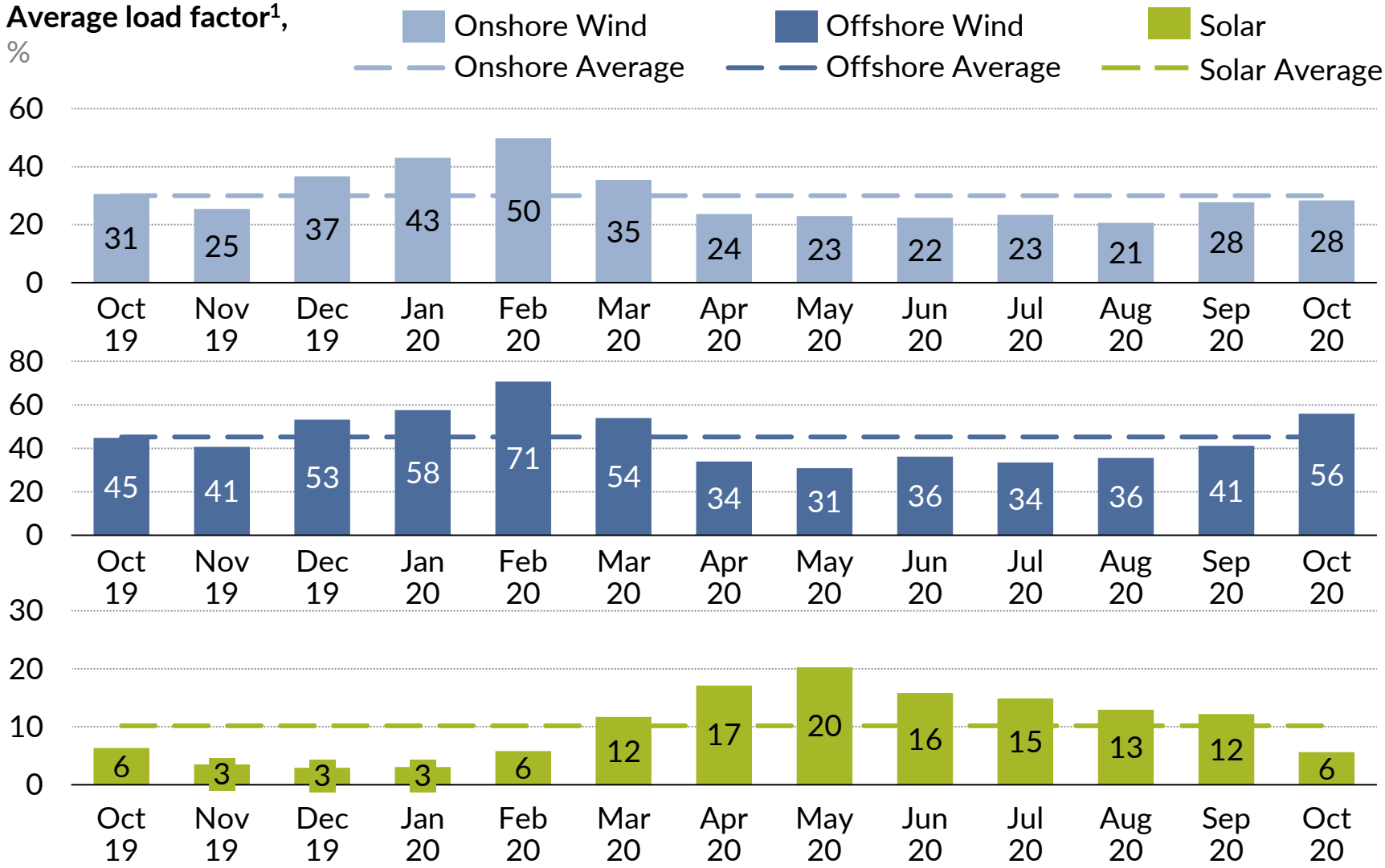


Plant Names: 1. Drax Coal, 2. Ratcliffe, 3. West Burton, 4. Fiddlers Ferry

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

Source: Elexon

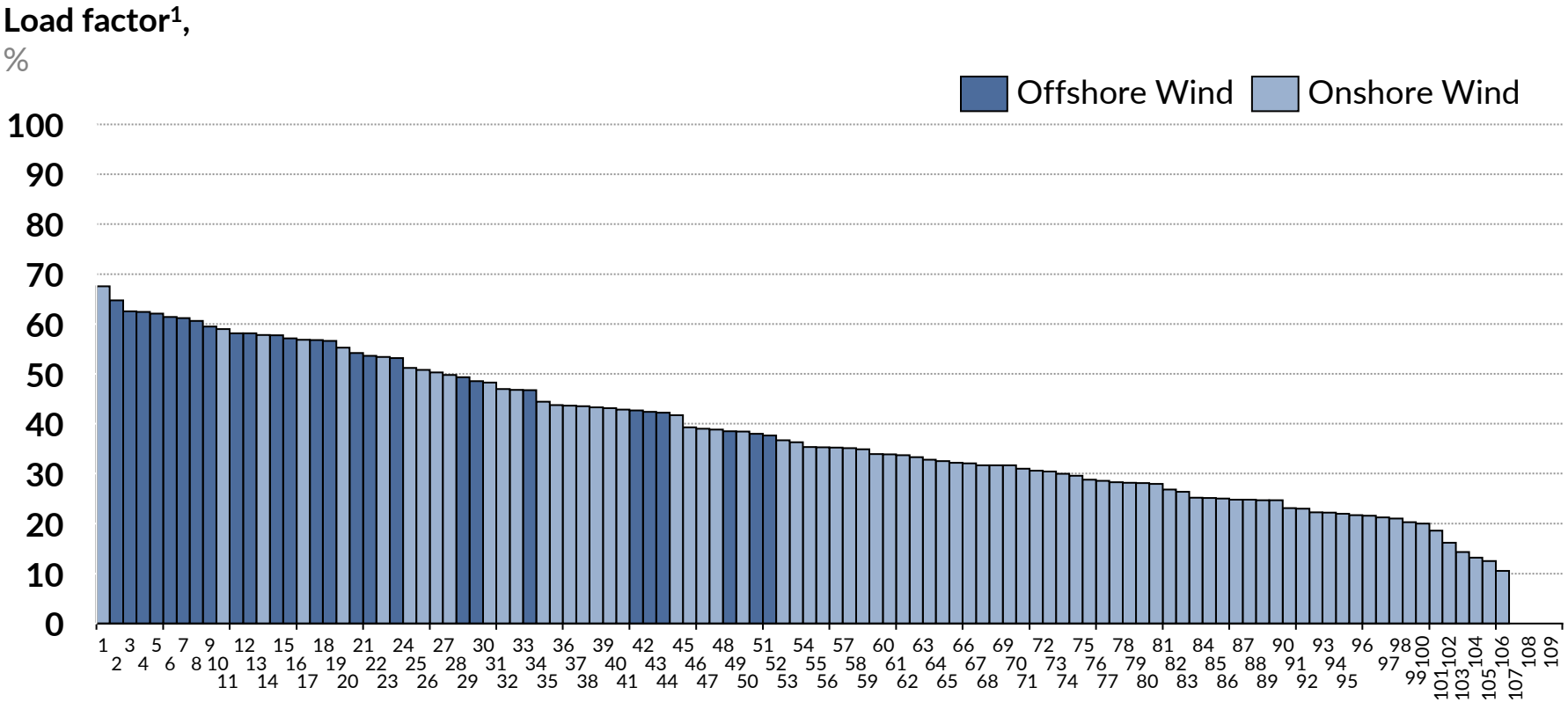
Monthly load factors by technology



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

Sources: Elexon, Crown Estate

Wind farm utilisation – load factor by wind farm

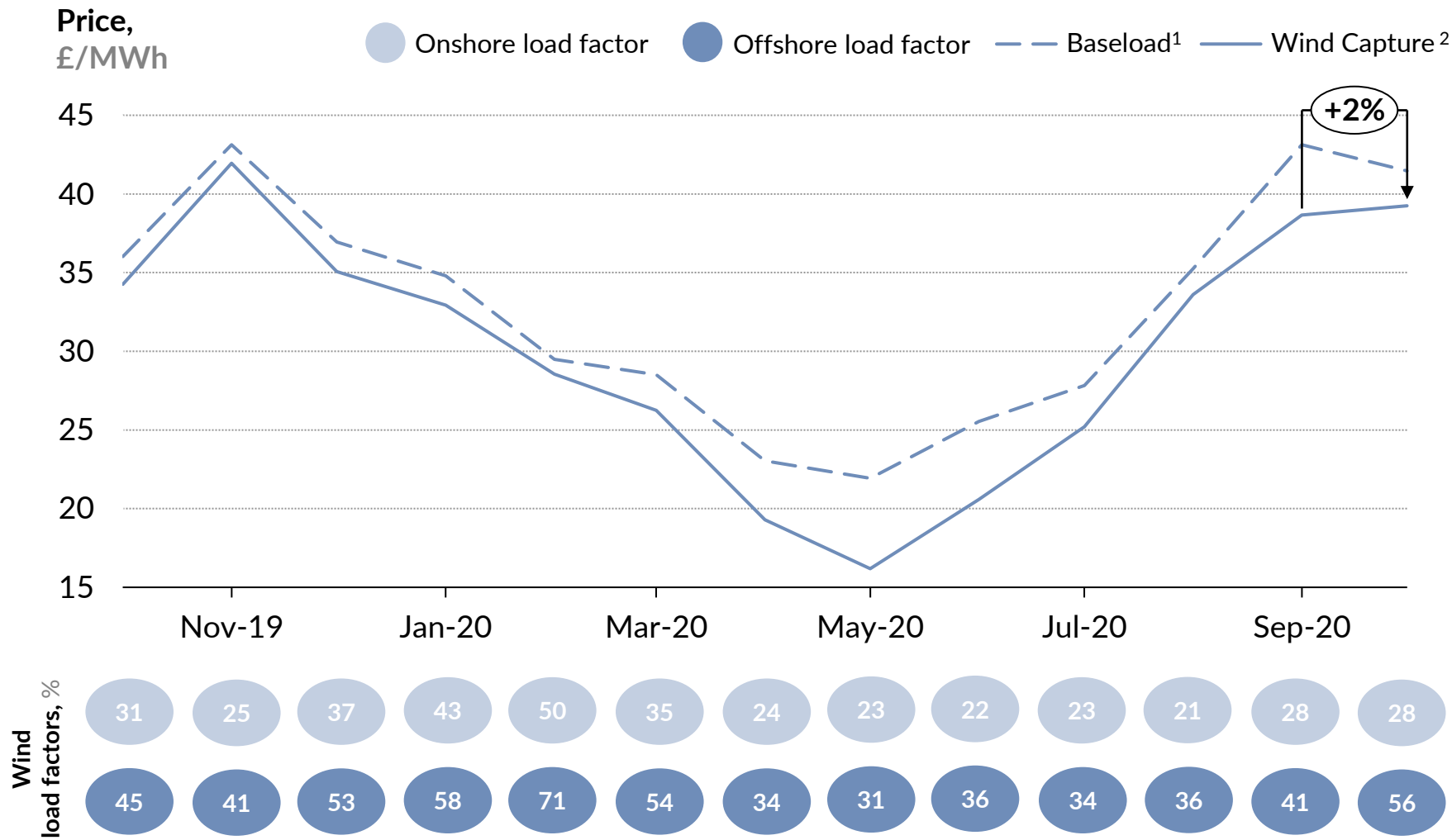


Plant Names: 1. Hill of Glaschyle, 2. East Anglia One, 3. London Array, 4. Dudgeon, 5. Galloper, 6. Hornsea 1 , 7. Walney Extension, 8. Greater Gabbard, 9. Westermost Rough, 10. Whiteside Hill, 11. Race Bank, 12. Rampion, 13. Sanquhar Community, 14. Burbo Extension, 15. West of Duddon Sands, 16. Aikengall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

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: Elexon, Crown Estate

Wind capture price versus baseload price



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: Elexon, Thomson Reuters

Appendix

Data used:

1. 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.
2. 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.
3. Prices used in this summary are the APX half-hourly Reference Prices for half-hourly, two-hourly and four-hourly spot products.

Categories presented:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.

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