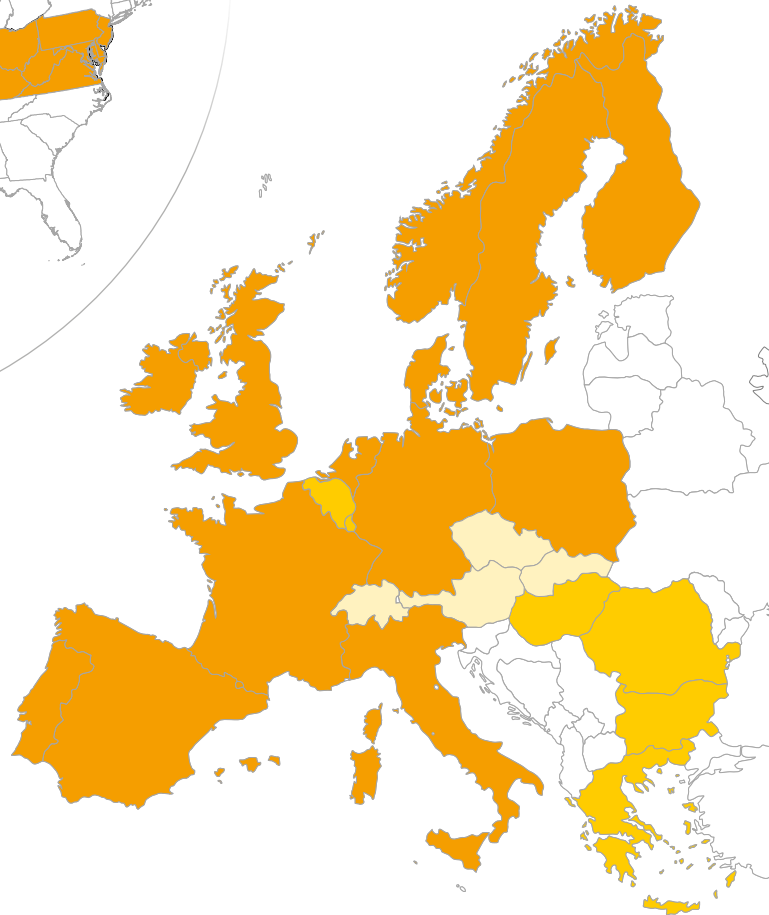


GB Wholesale Market Summary September 2021

Published October 2021



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Executive Summary

- Average power prices in September climbed to £177/MWh, driven by the continued increase in gas and carbon prices, a 67% increase on August
- The UK-ETS traded at an average of £58/tCO₂ in September, a £10/tCO₂ increase relative to August
- Thermal generation increased by over 23%, while wind load factors fell by an average of 0.9 p.p. to 23%, relative to August
- Consequently, power sector emissions increased to 4.1 MtCO₂e, a 21% increase relative to the month prior
- Low wind and an interconnector outage contributed to EPEX spot prices reaching almost £2,000/MWh

	Monthly value ¹	Month-on-month change	Year-on-year change	Slide reference(s)
Power prices <i>£/MWh</i>	177	+71 (69%)	+134 (311%)	<u>5</u> , <u>6</u>
Gas prices <i>£/MWh</i>	52	+15 (40%)	+42 (409%)	<u>7</u>
Carbon² prices <i>£/tCO₂</i>	76	+10 (15%)	+33 (176%)	<u>7</u>
Transmission demand <i>TWh</i>	19	+0.4 (2%)	+0.1 (0.6%)	<u>10</u>
Low carbon³ generation <i>TWh</i>	10	-0.5 (5%)	-2 (18%)	<u>11</u> , <u>12</u>
Thermal⁴ generation <i>TWh</i>	9	+2 (24%)	+0.4 (4%)	<u>11</u> , <u>12</u>
Carbon emissions <i>MtCO₂e</i>	4	+0.7 (21%)	+0.2 (6%)	<u>14</u>
Grid carbon intensity <i>gCO₂e/kWh</i>	246	+38 (18%)	+30 (14%)	<u>14</u>
Wind load factors⁵ <i>%</i>	23	-0.9 (4%)	-11 (33%)	<u>25</u>
Wind capture prices⁵ <i>£/MWh</i>	156	+53 (52%)	+118 (304%)	<u>27</u>

1) Values averaged over the calendar month. 2) Includes CPS and UK-ETS. 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

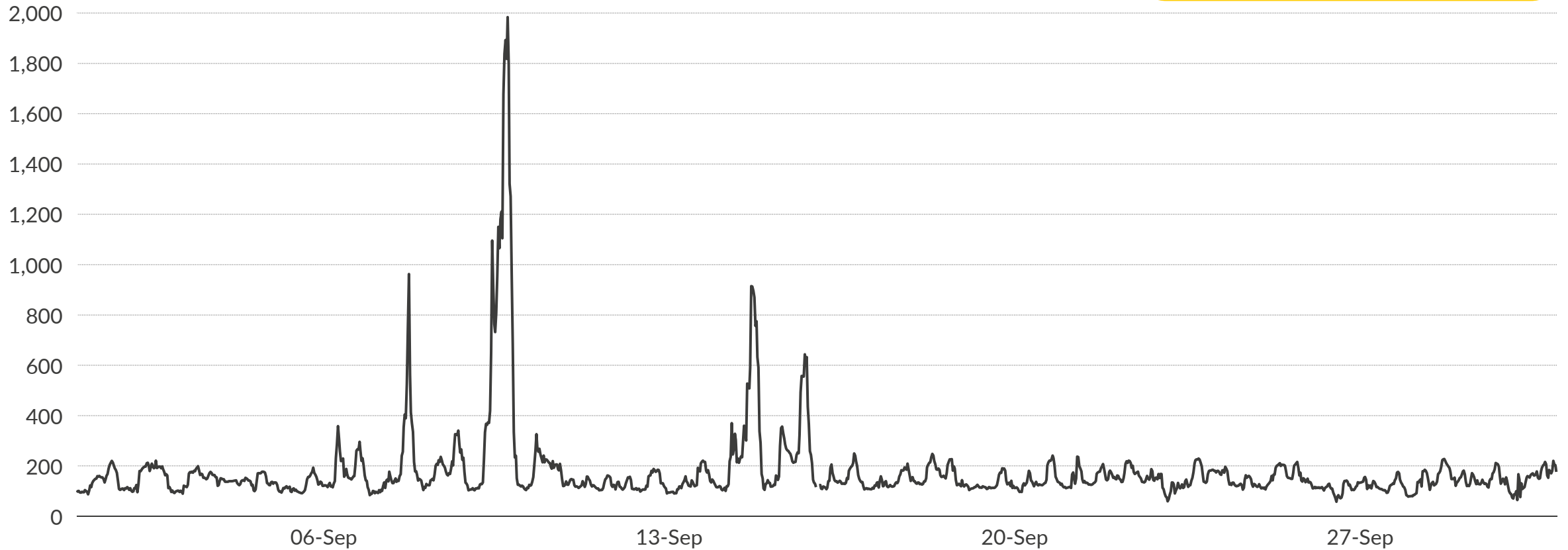
Agenda

- I. System performance
- II. Company performance
- III. Plant performance

Half-hourly EPEX spot price for September

EPEX spot price¹
£/MWh

Monthly average price in September 2021:
£177/MWh



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

Historic monthly average EPEX spot price

Average EPEX spot price¹
£/MWh



— Average monthly spot price — Annual average spot price (x) Month-on-month difference (x) Year-on-year difference

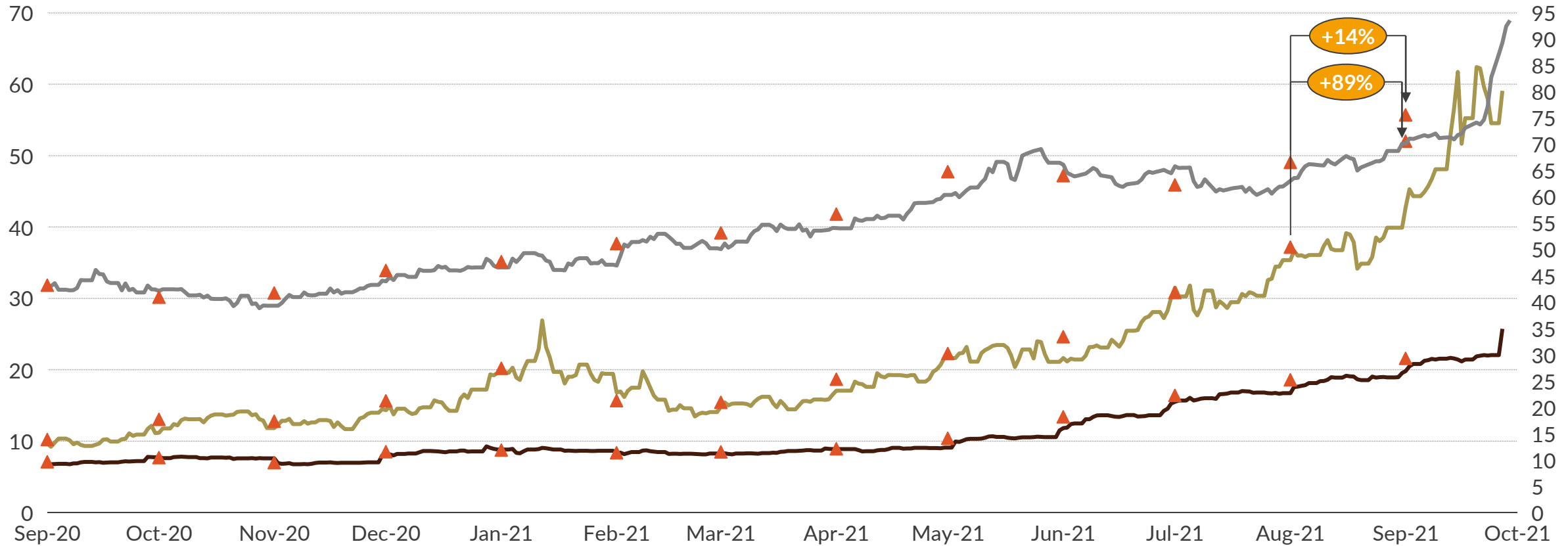
1) Average monthly EPEX is the average over the month of the volume-weighted reference prices for each half-hour interval.

Historic fuel prices

Gas, Coal and Carbon daily prices

Gas/Coal price
£/MWh

Total GB carbon price¹
£/tCO₂

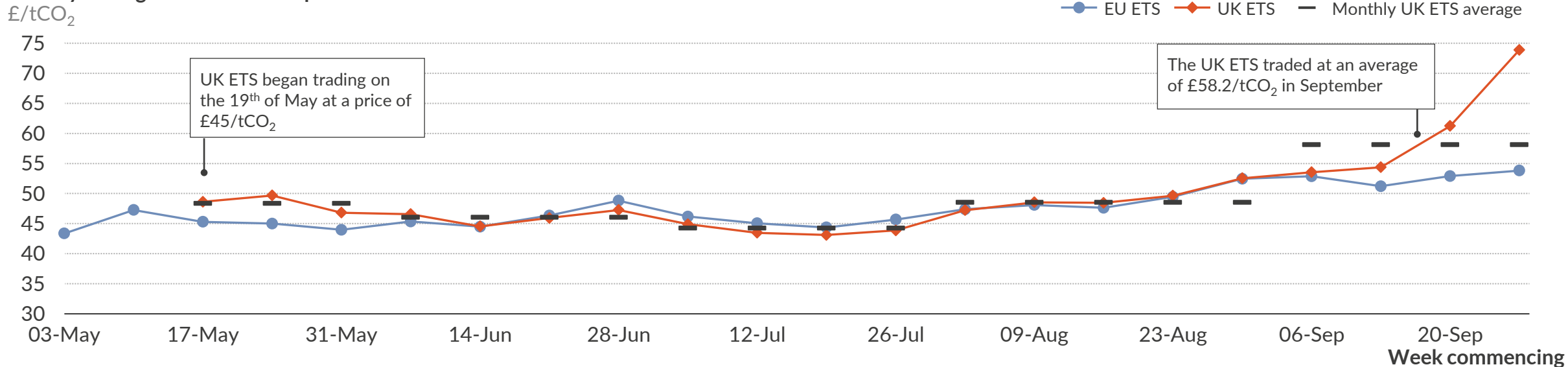


— Gas — Coal — CO2 ▲ Monthly averages ○ x Month-on-month difference

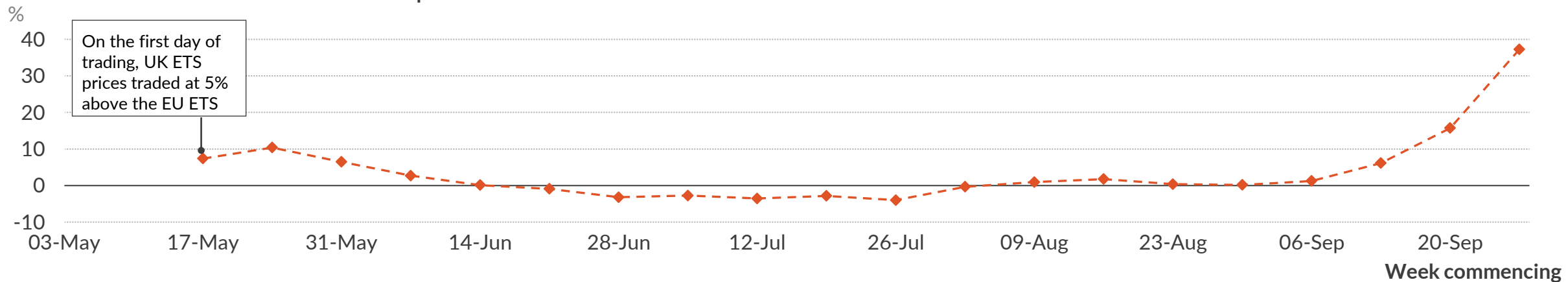
1) Includes CPS and EU-ETS until 18th of May 2021, and from 19th of May onwards, includes CPS and UK ETS

Historic UK ETS and EU ETS Prices

Weekly average EU and UK ETS prices

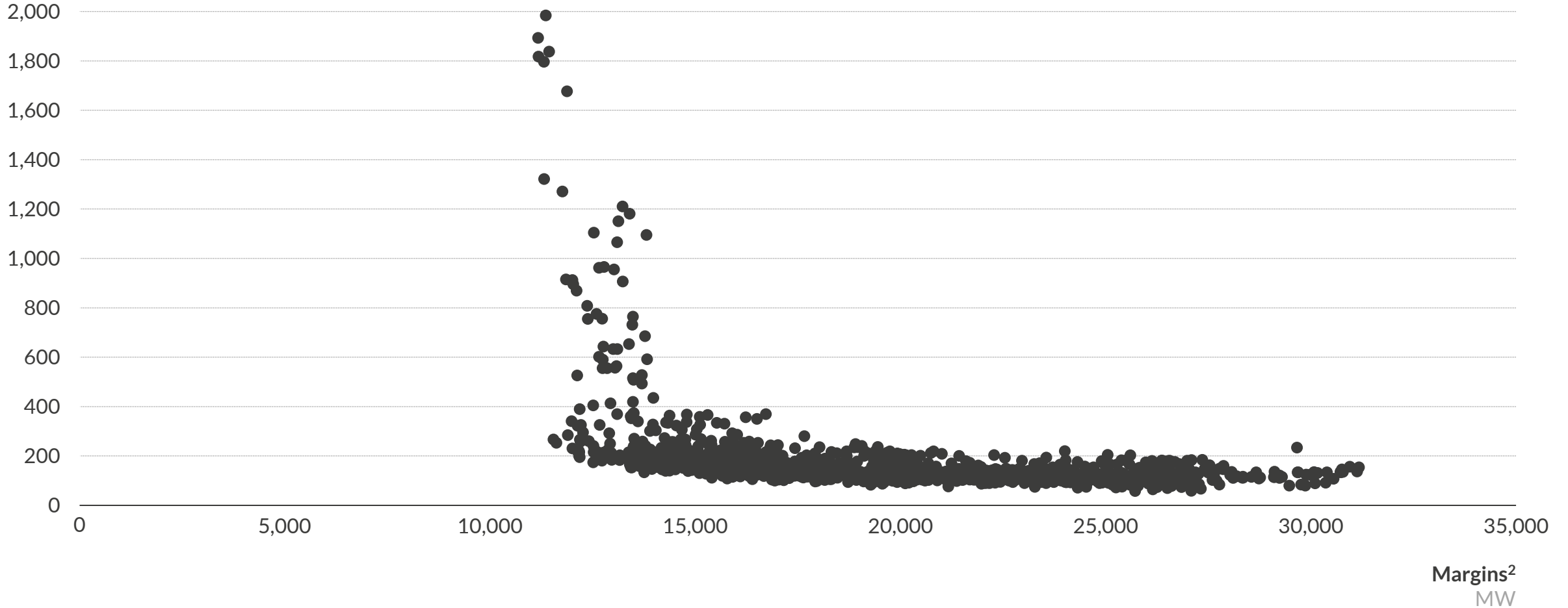


Relative difference between UK and EU ETS prices



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

EPEX spot price¹
£/MWh

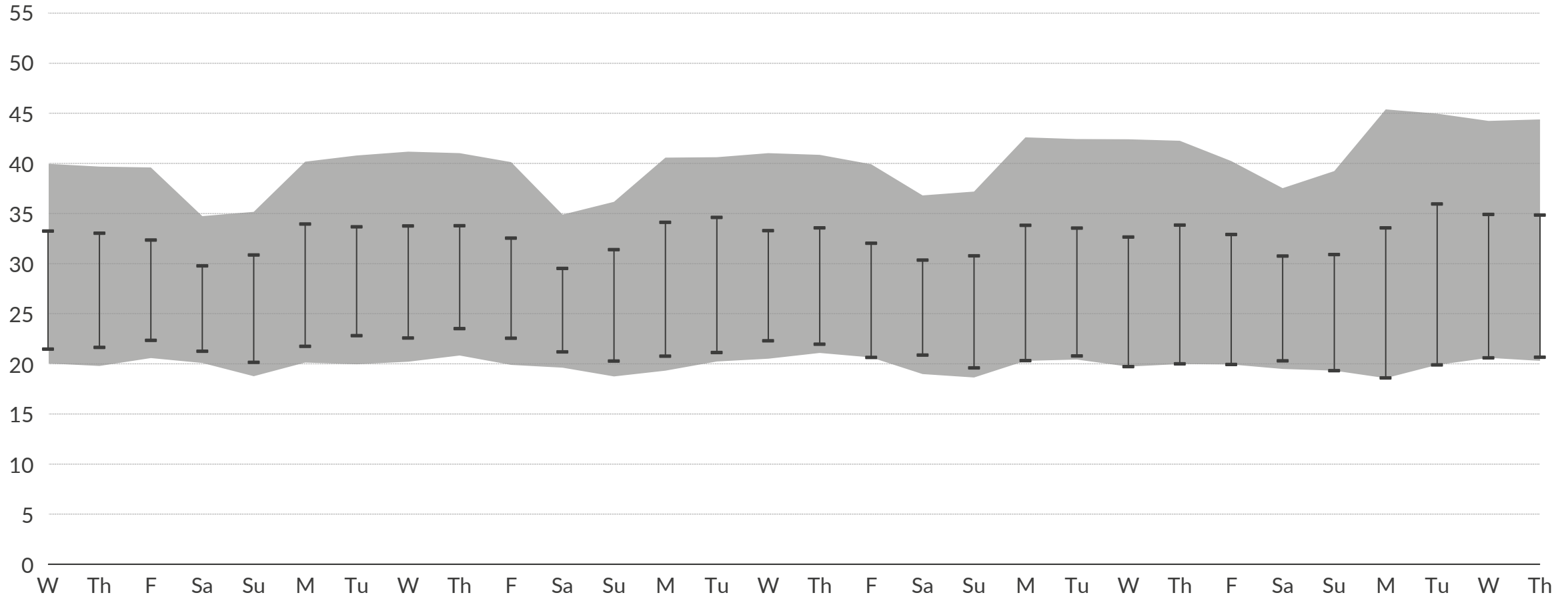


1) Half-hourly EPEX is the volume-weighted reference price over that half-hour interval, as provided by EPEX Spot. 2) Margins are calculated as the difference between MEL and Demand for each half-hour period. Demand data presented here is Initial Transmission System Demand Out-Turn, and does not include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

Daily September max and min demand

Relative to historic September max and min demand since 2010¹

Demand²
GW

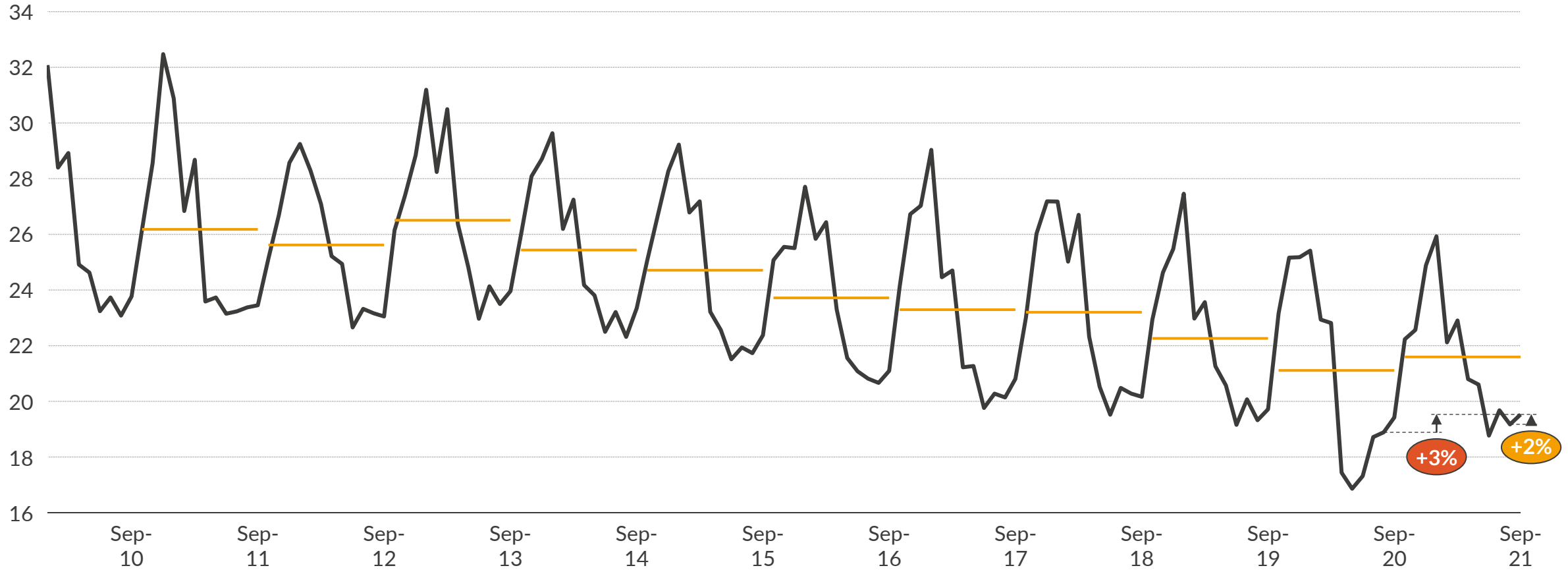


I Daily range ■ Historic maximum/minimum

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.

Monthly historical demand on the transmission system

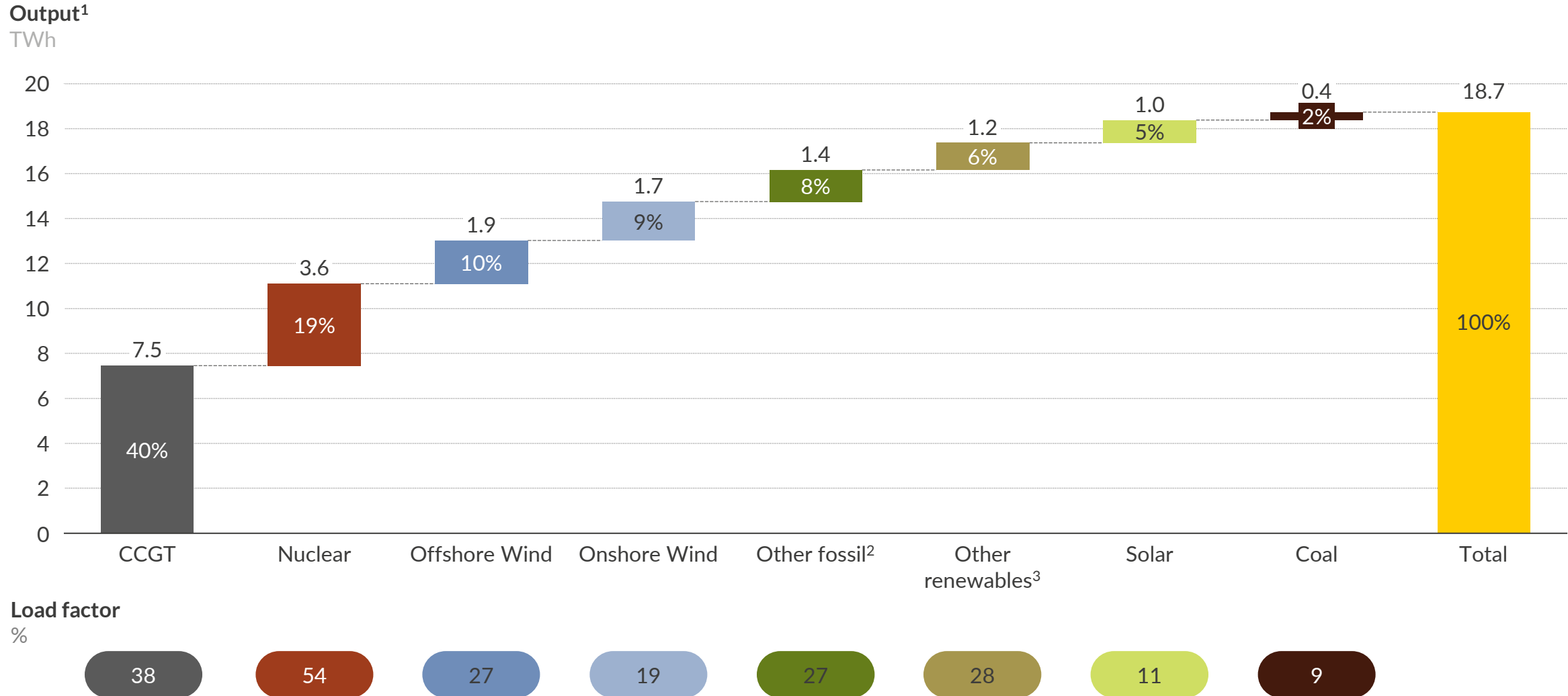
Total demand¹
TWh



— Total monthly demand — Annual average demand (x) Month-on-month difference (x) Year-on-year difference

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.

Monthly fuel mix breakdown

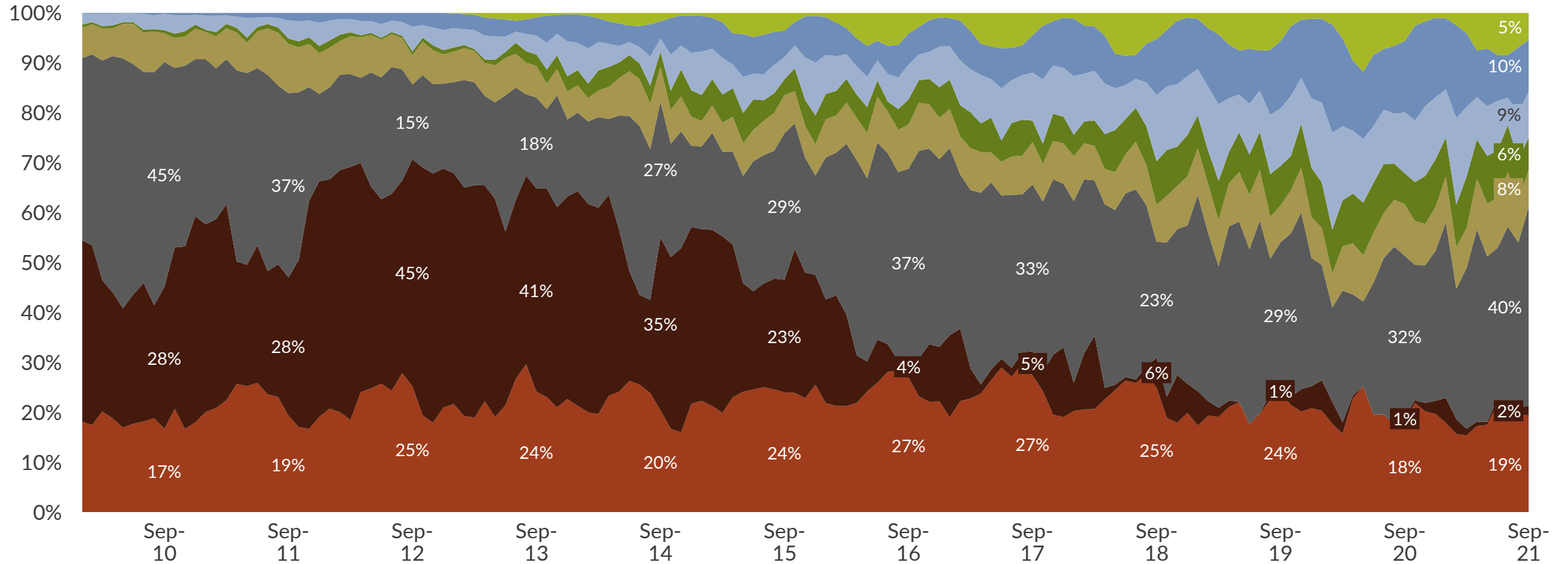


1) Includes outputs from generators registered as BM Units as well as embedded wind and solar PV assets. All numbers are rounded to 0.1 TWh which means that subtotals may not sum to total value. 2) Other fossil includes oil, CHP-CCGT and OCGT. 3) Other renewables includes biomass and hydro.

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

Historical fuel mix breakdown

Output¹
% of total

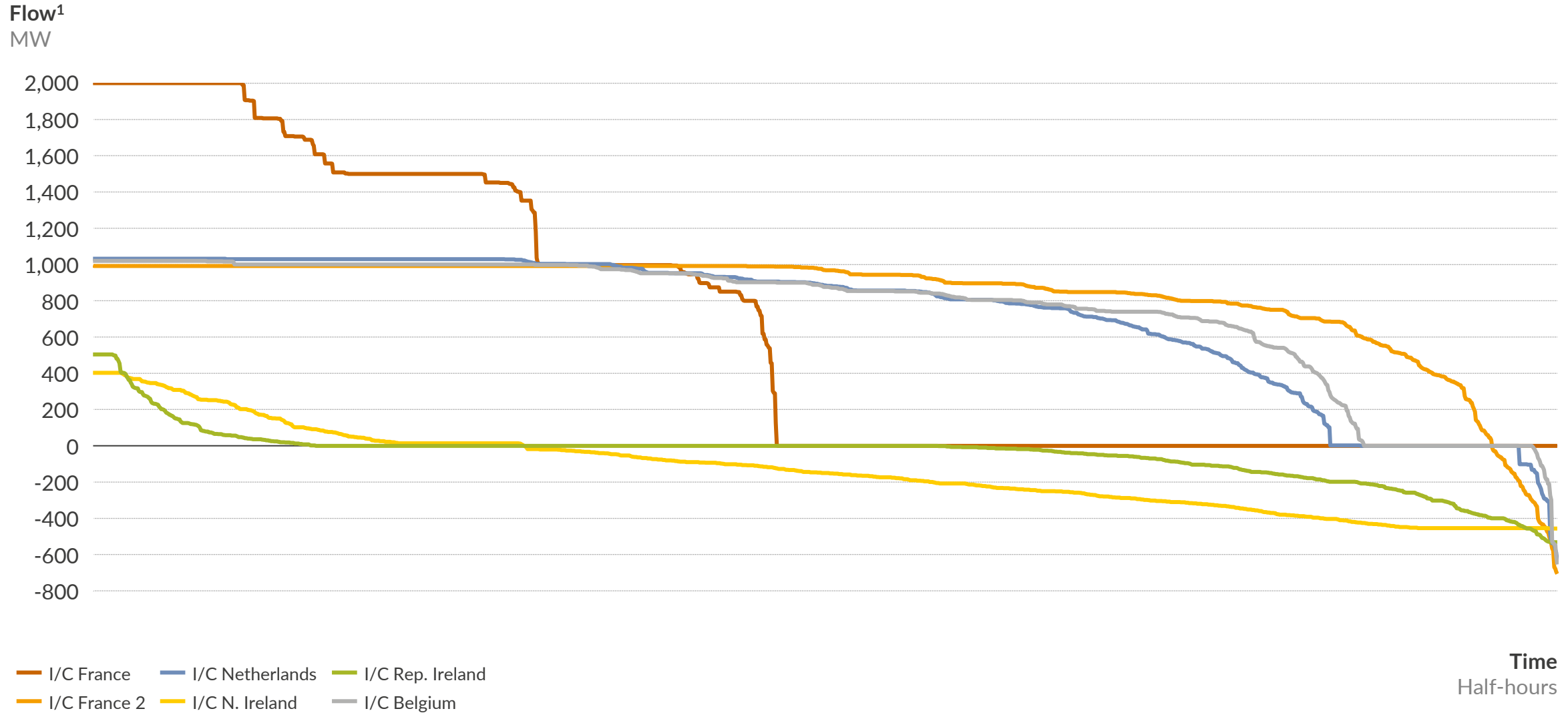


■ Nuclear
 ■ Coal
 ■ CCGT
 ■ Other fossil²
■ Other renewables³
■ Onshore Wind
 ■ Offshore Wind
 ■ Solar
 ■ Imports

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.

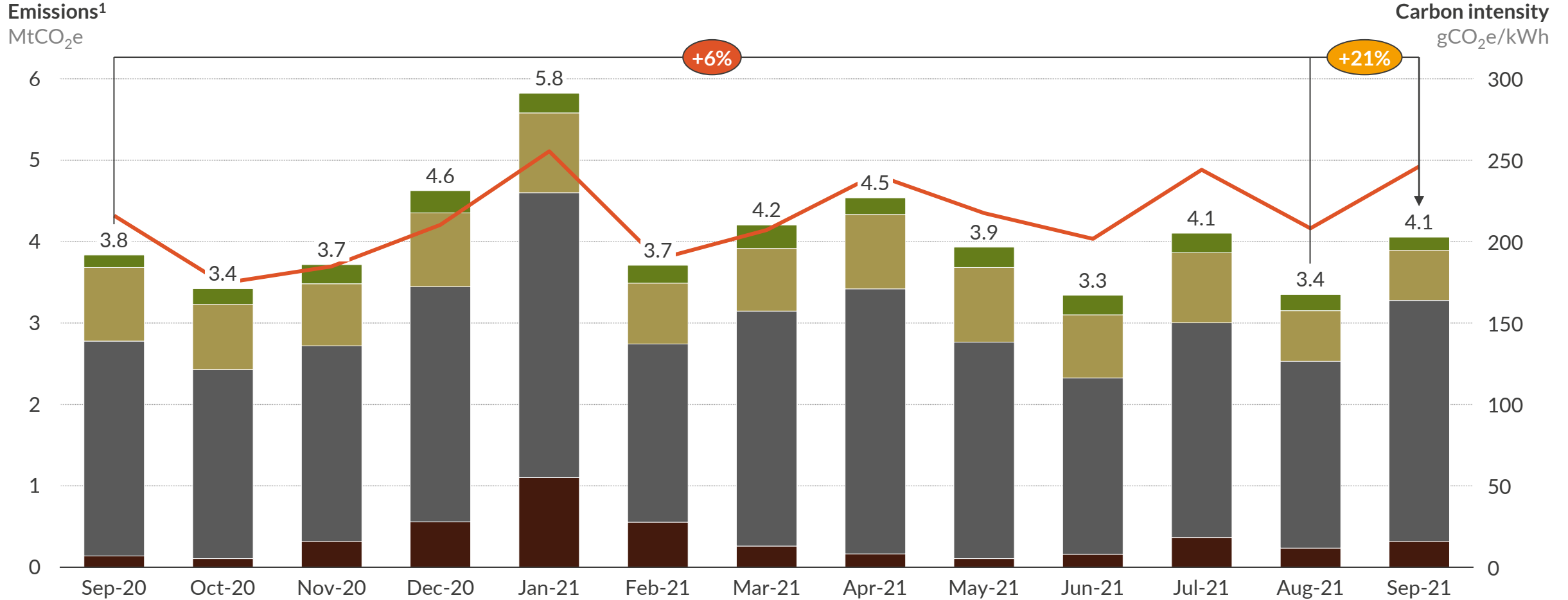
Monthly interconnector flow duration curve

Flow in each half-hour for GB interconnectors



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

Monthly emissions by technology



■ Biomass
 ■ Other fossil²
■ CCGT
 ■ Coal
 — System carbon intensity
 x Month-on-month difference
 x Year-on-year difference

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.

Agenda

I. System performance

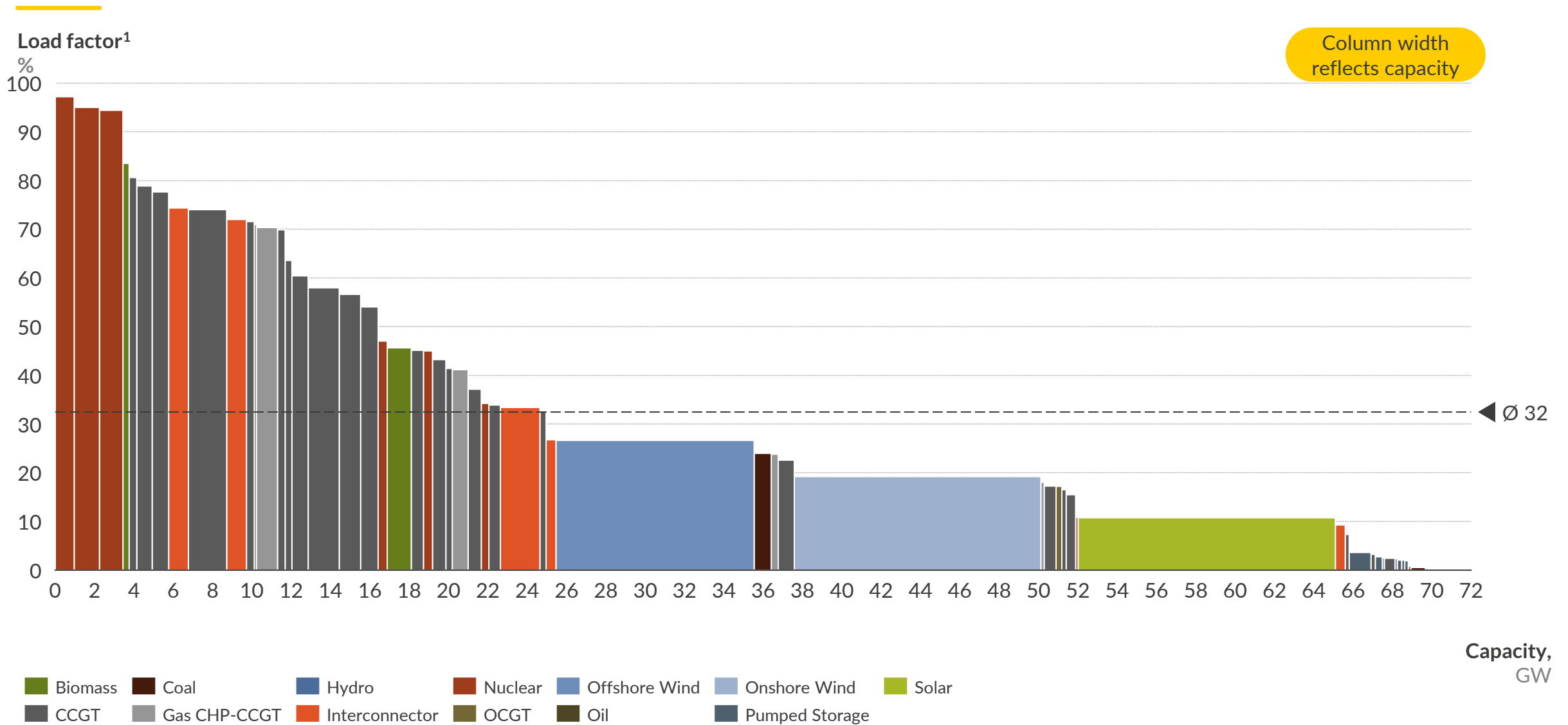
II. Company performance (*Subscriber Only*)

III. Plant performance

Agenda

- I. System performance
- II. Company performance
- III. Plant performance

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

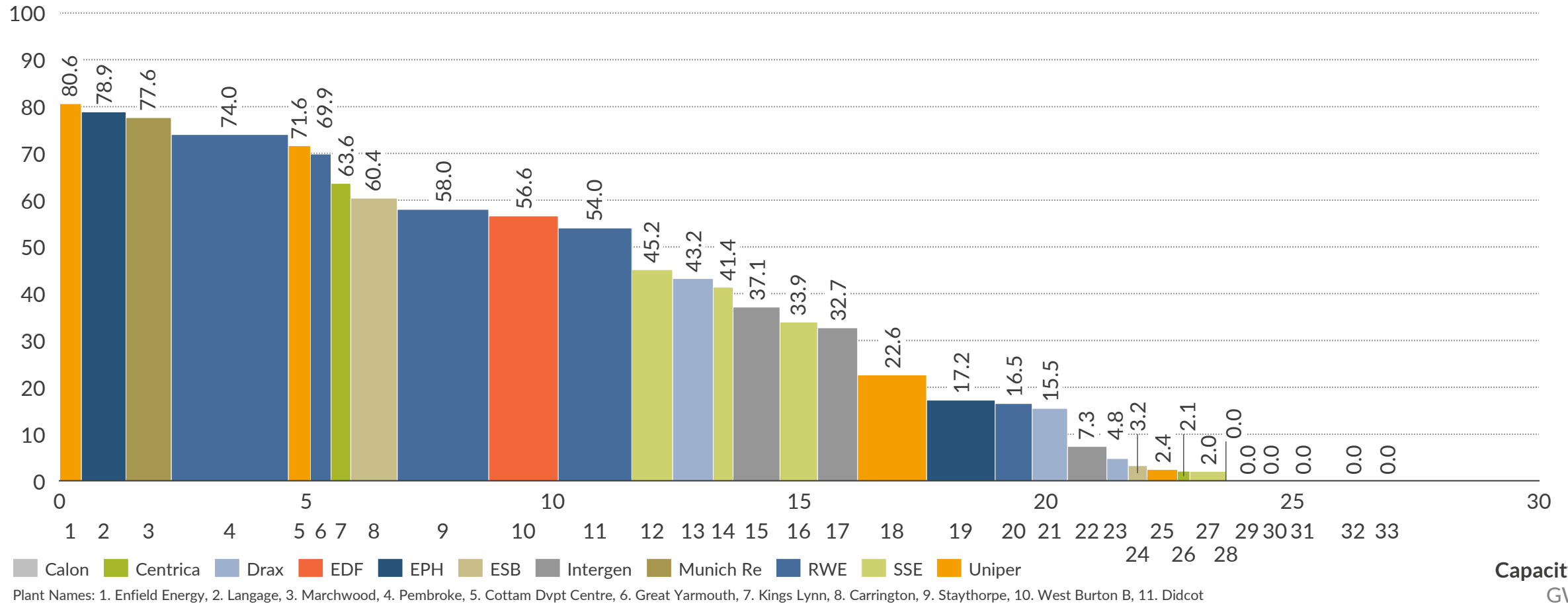
Sources: Aurora Energy Research, Elexon, BEIS

CCGT plant utilisation – by plant

Full load hours¹

% of total for the period

Column width reflects capacity



■ Calon
 ■ Centrica
 ■ Drax
 ■ EDF
 ■ EPH
 ■ ESB
 ■ Intergen
 ■ Munich Re
 ■ RWE
 ■ SSE
 ■ Uniper

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

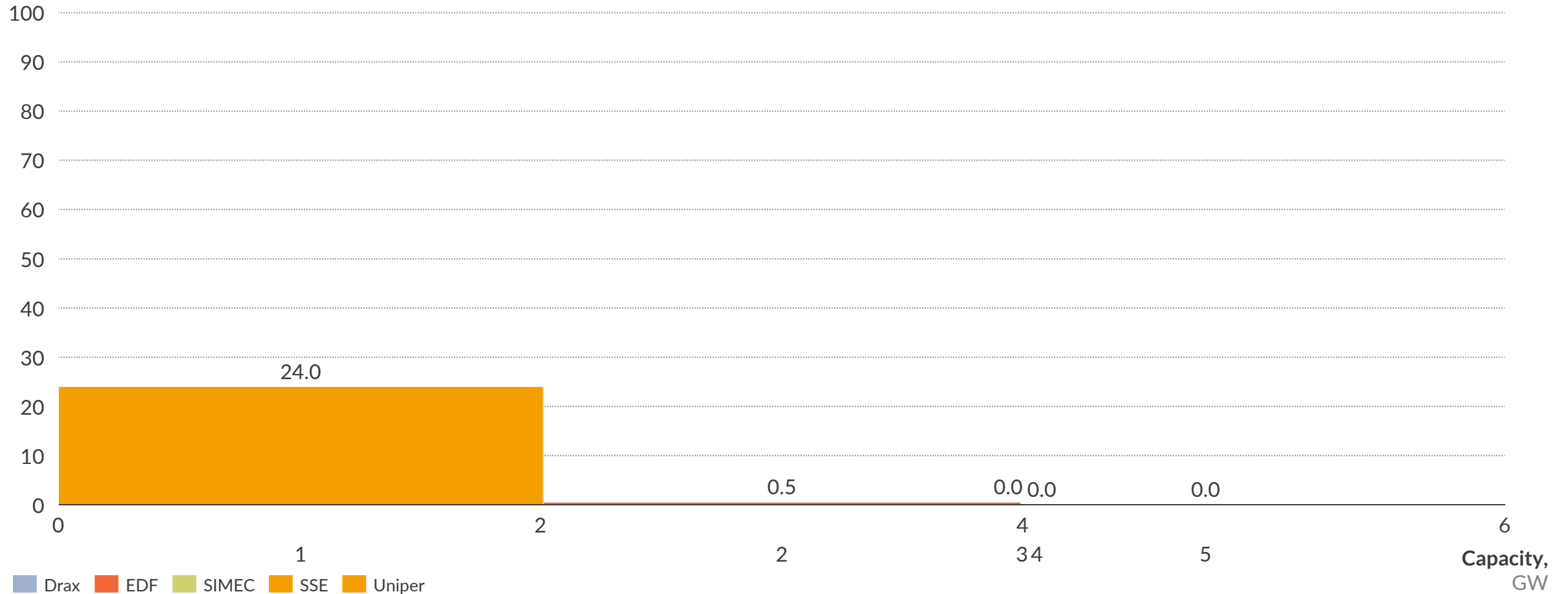
1) Includes all CCGT plants of the presented companies that report to the Balancing Mechanism

Coal plant utilisation – by plant

Full load hours¹

% of total for the period

Column width reflects capacity

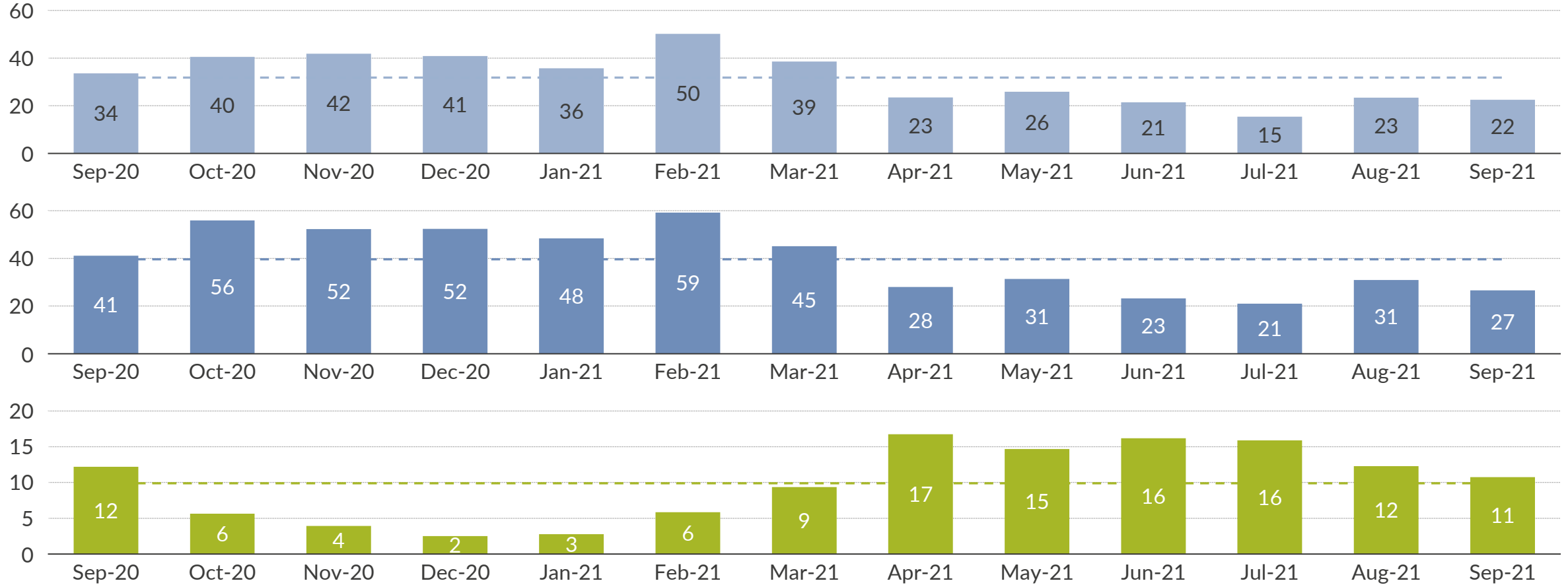


Plant Names: 1. Ratcliffe, 2. West Burton, 3. Uskmouth, 4. Fiddlers Ferry, 5. Drax Coal.

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

Monthly load factors by technology

Average load factor¹
%

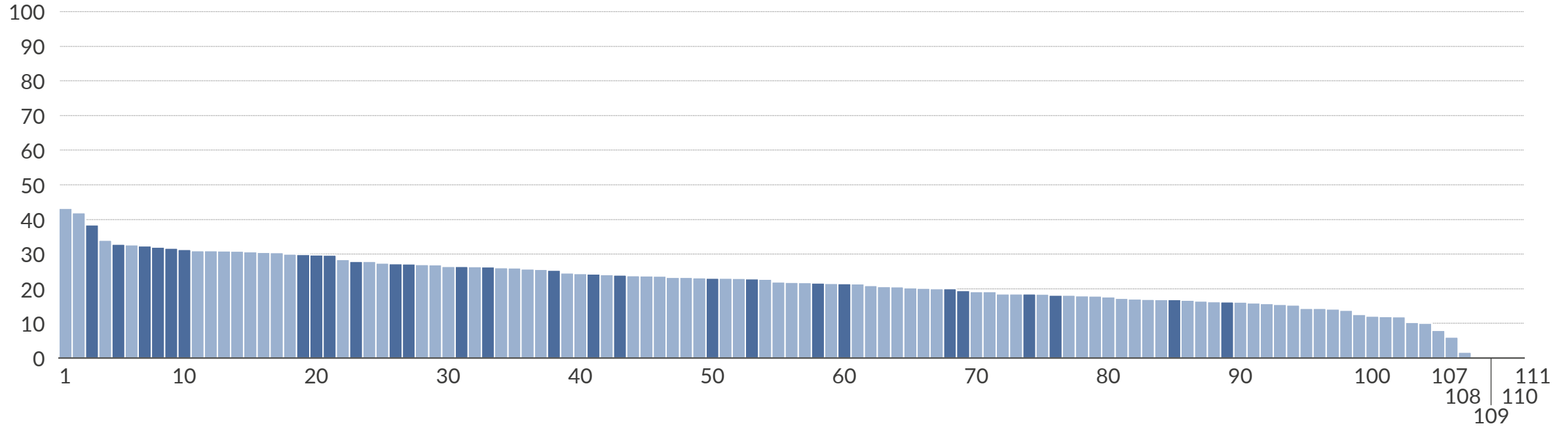


■ Onshore Wind - - Onshore Average ■ Offshore Wind - - Offshore Average ■ Solar - - Solar Average

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

Wind farm utilisation – load factor by wind farm

Load factor¹
%



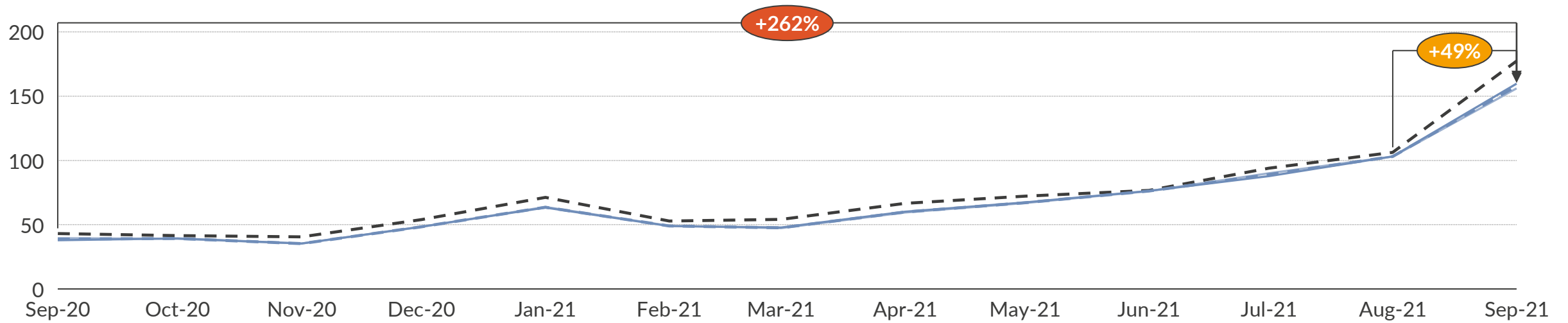
Plant Names: 1. Halsary Windfarm, 2. Whiteside Hill, 3. Galloper, 4. Aikengall 2, 5. Beatrice, 6. Dunmaglass, 7. Westermost Rough, 8. Dudgeon, 9. Hornsea 1 , 10. Moray East, 11. Brockloch Rig 2, 12. Corriegarth, 13. Andershaw, 14. Beinn an Tuirc III , 15. Carraig Gheal, 16. Crystal Rig, 17. Cour, 18.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

■ Offshore Wind ■ Onshore Wind

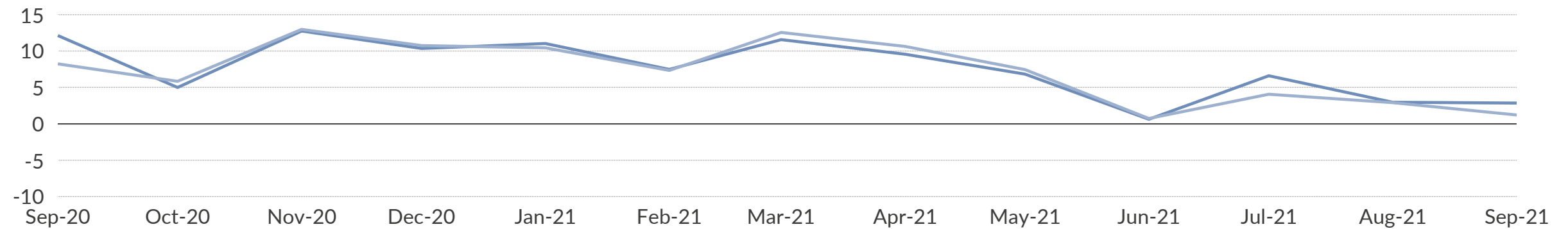
1) Represents UK wind farms reporting Balancing Mechanism Unit data. Figures presented reflect Final Physical Notification (FPN) expectations reported to the grid, which are not always representative of actual production

RES capture price versus baseload price

Baseload and capture price^{1,2}
£/MWh



Technology capture discount^{2,3} to baseload
%



--- Baseload
 — Onshore Wind
 — Offshore Wind
 --- Average wind
 x Month-on-month difference (average wind)
 x Year-on-year difference (average wind)

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

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.

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