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# GB Wholesale Market Summary December 2018

Published January 2019

# Executive summary

1. With rising carbon prices mitigating the decrease in gas and coal prices, the average power price in December increased to £61.4/MWh, a £0.2/MWh increase from the previous month. See slides 6 and 7.
2. With lowering temperatures increasing average monthly demand by 4%, gas and nuclear enjoyed an increase in production of 1.3 TWh. See slides 7, 10 and 11.
3. Total monthly gross profits fell by £23.8m compared to November, due to lower utilisation rate of renewable assets coupled with looser capacity margins which resulted in the top 5th percentile of prices falling from £99/MWh to £89/MWh between months. See slides 8 and 20.
4. Wind assets saw gross profits fall by an average of 10%, as the modest increase in wind capture price of 1% failed to ameliorate the significant drop in load factors of 6 percentage points. See slides 21 and 22.

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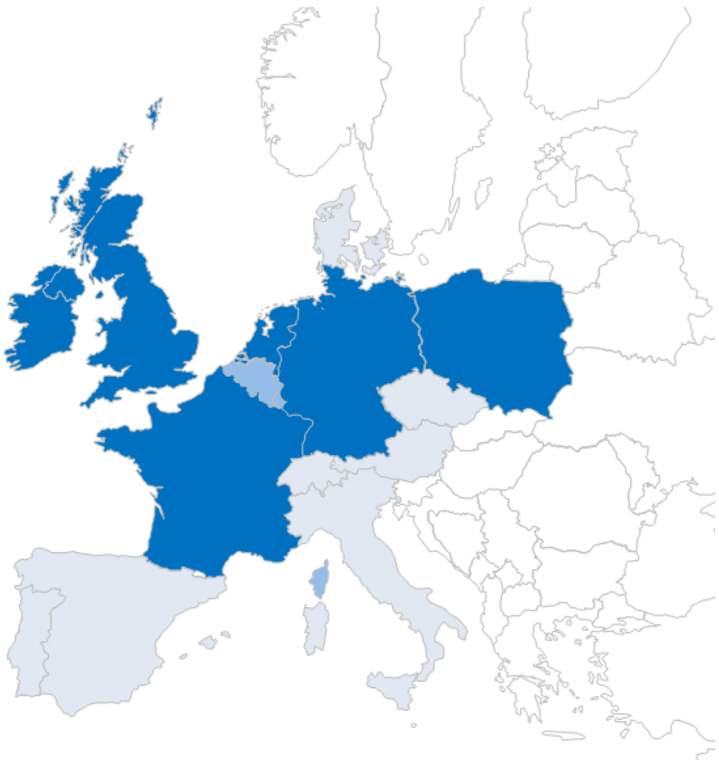

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Source: Aurora Energy Research

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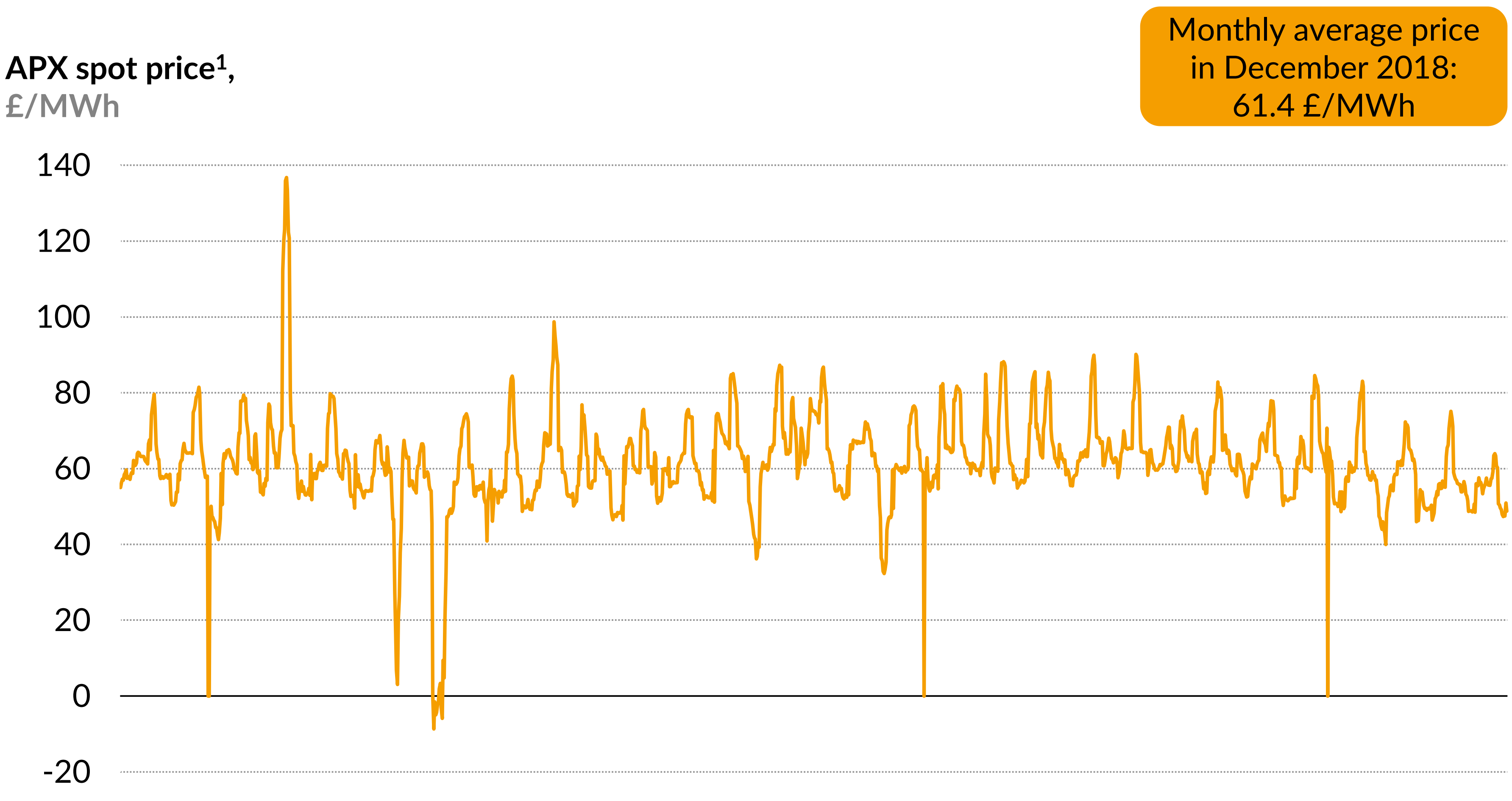
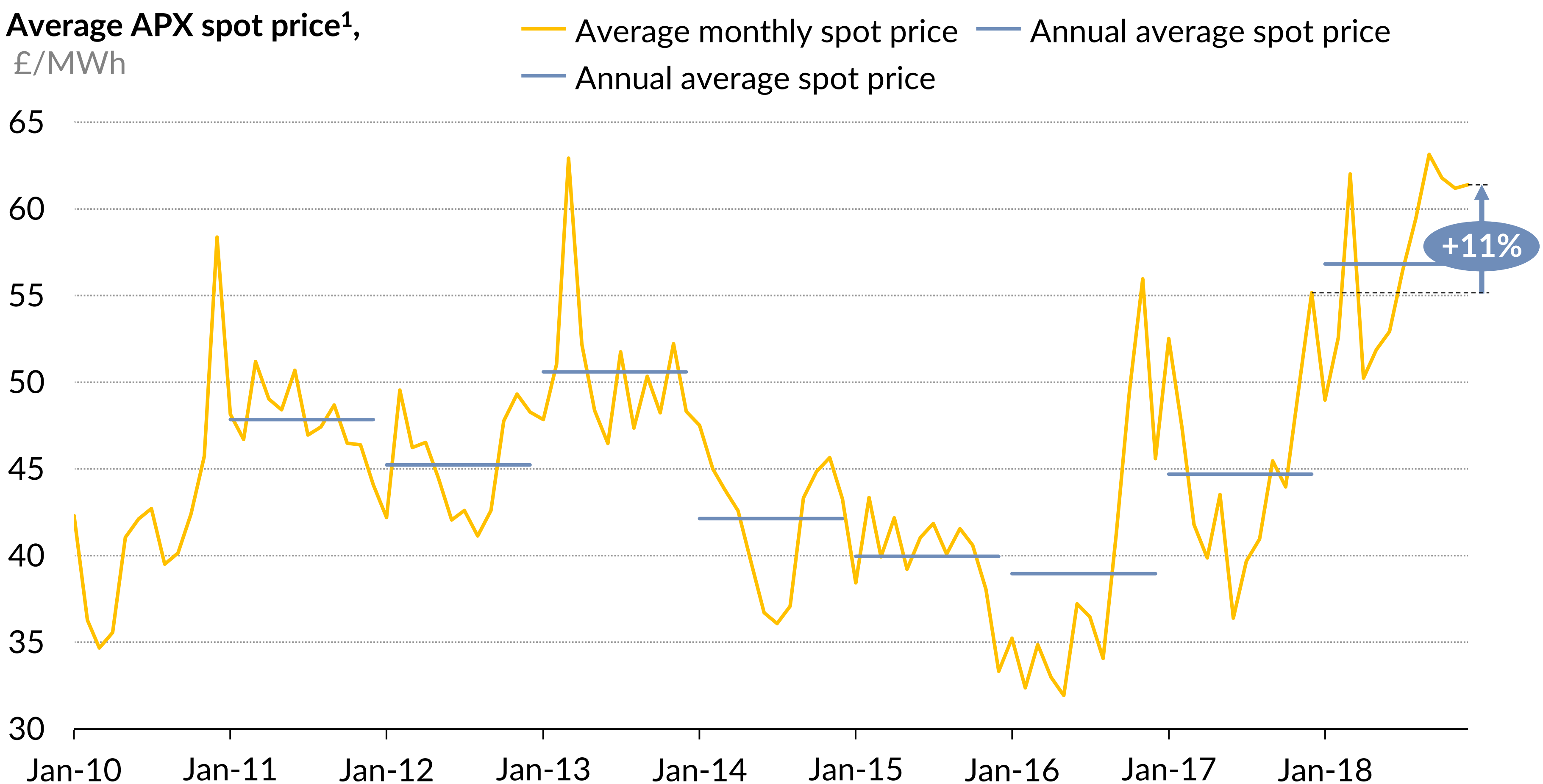
# Half-hourly APX spot price for December




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

Source: Thomson Reuters

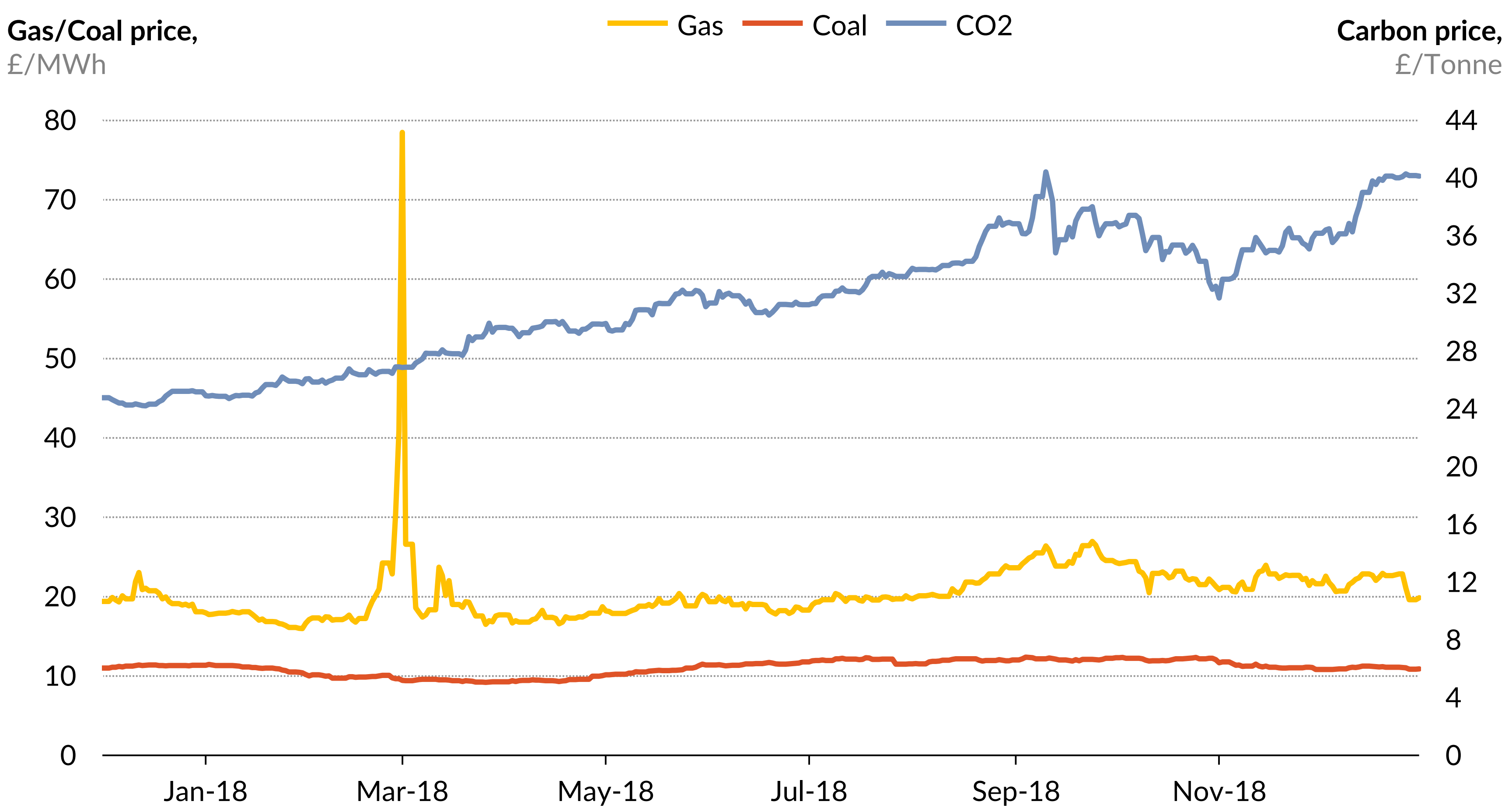
# Historic monthly average APX spot price




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

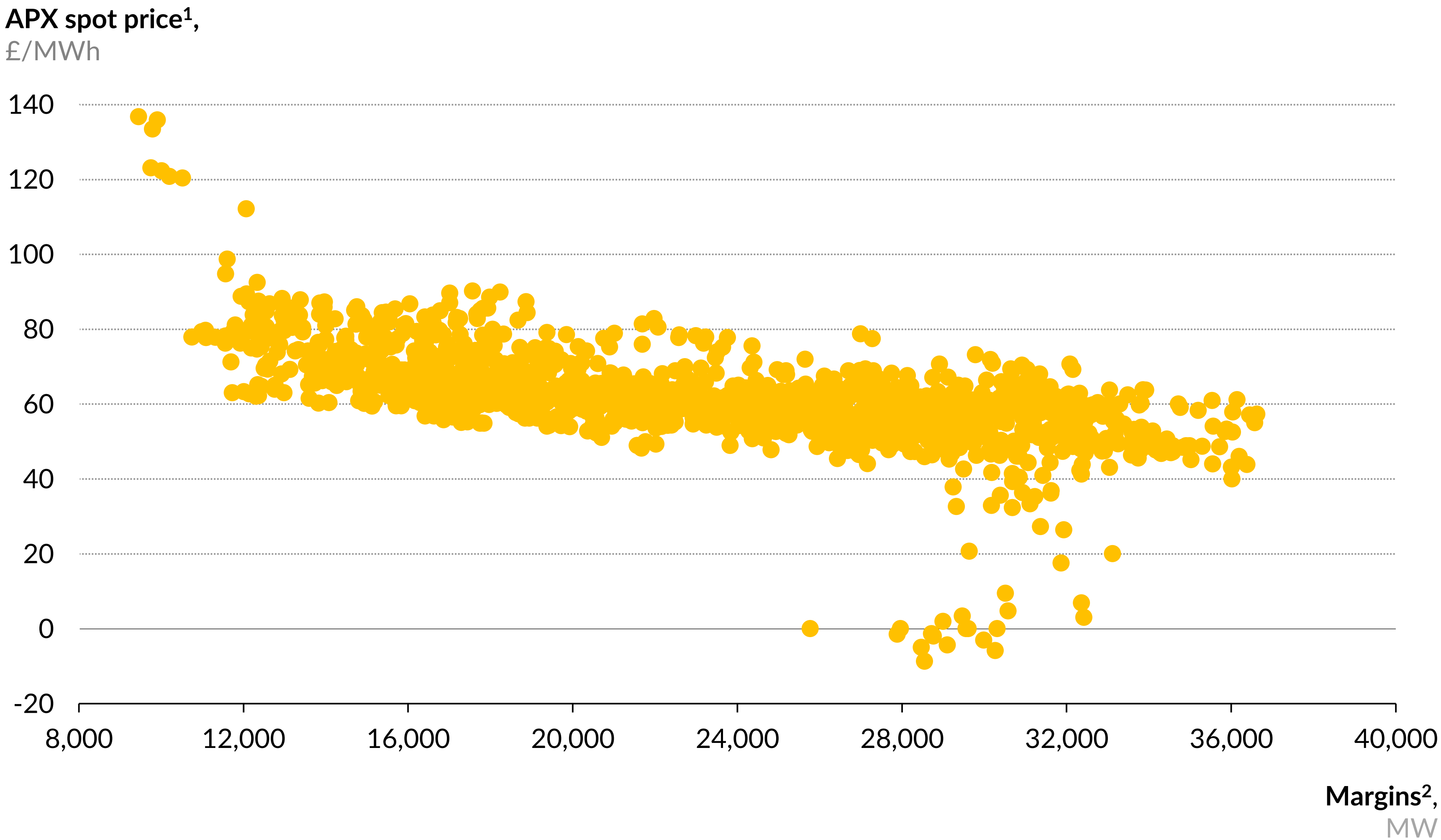
Source: Thomson Reuters

# Historic fuel prices
## Gas, Coal and Carbon daily prices




Source: Thomson Reuters

# Half-hourly spot prices against half-hourly system margins for December



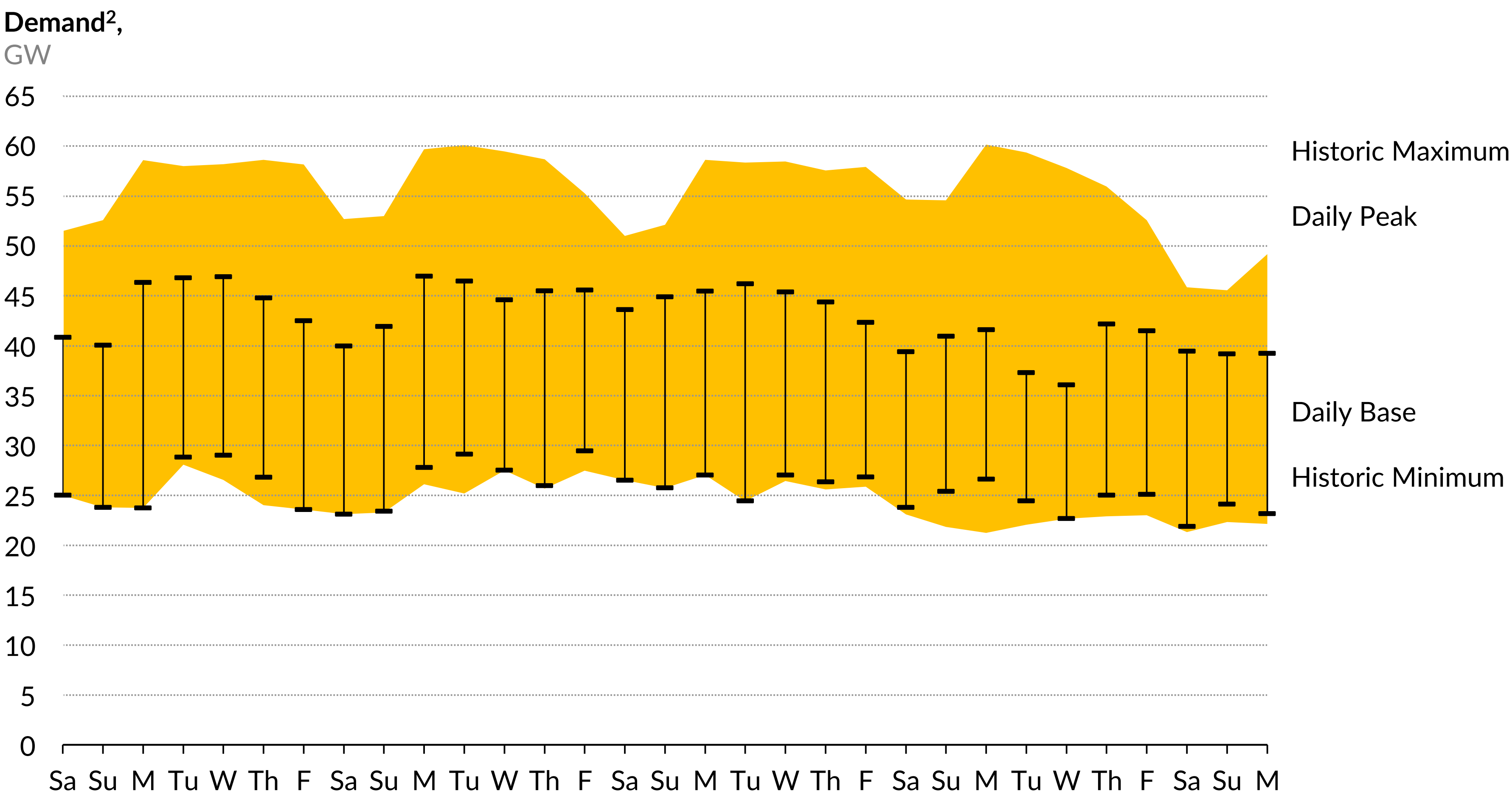

1. Half-hourly APX is the volume-weighted reference price over that half-hour interval, as provided by APX Power UK.

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 April max and min demand

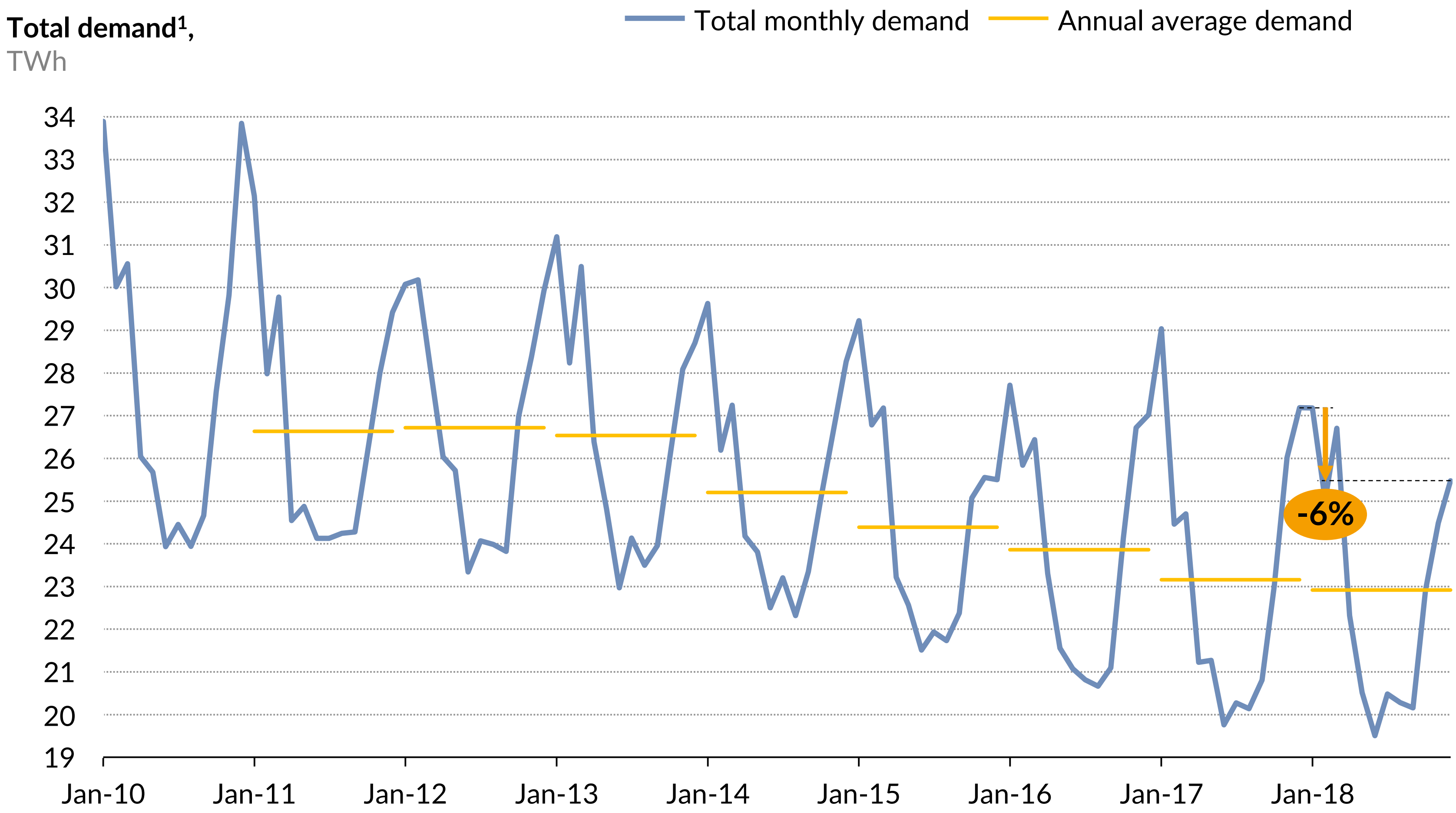
## Relative to historic December max and min demand since 2010[1]




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

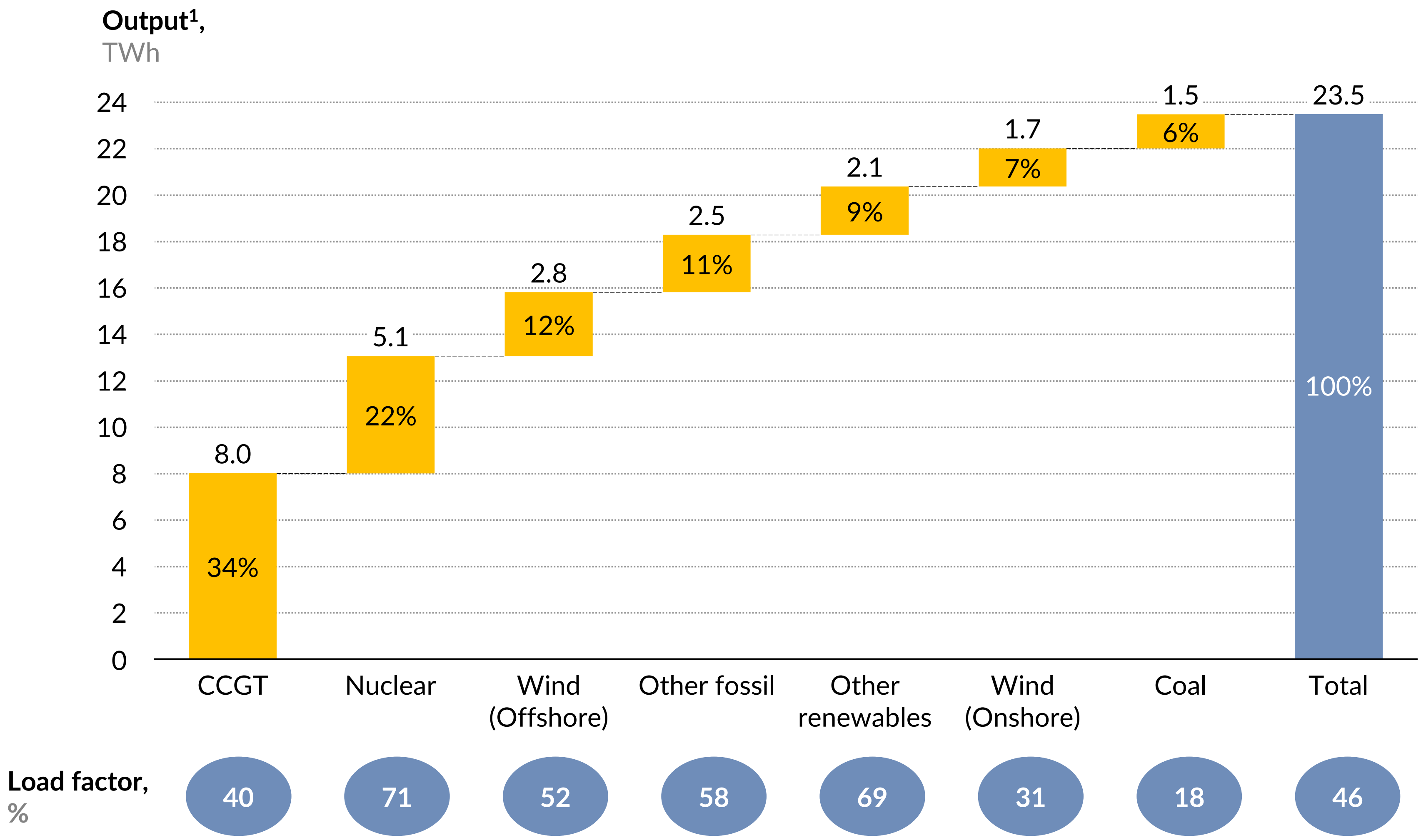
# Monthly historical demand on the transmission system




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

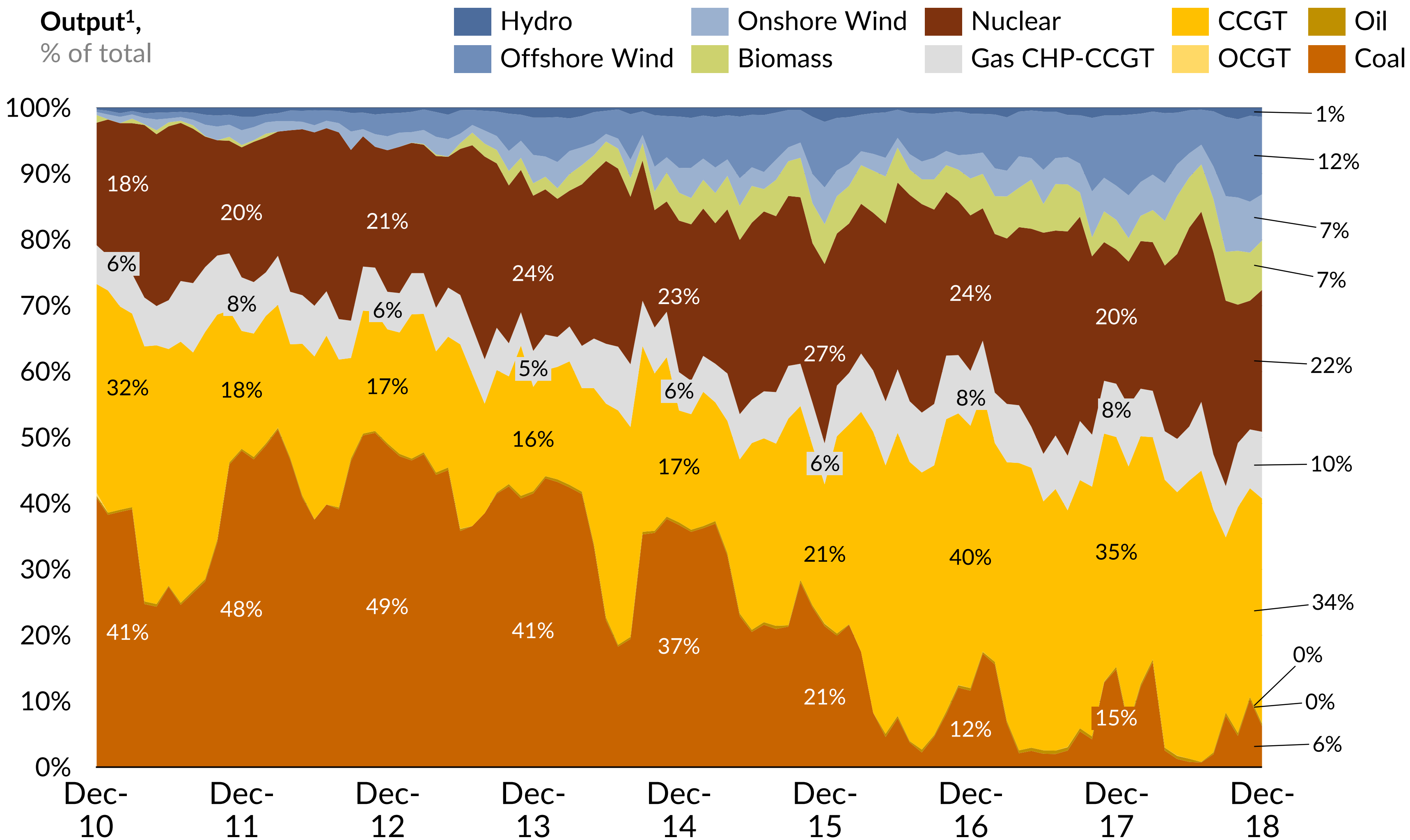
# Monthly fuel mix breakdown




1. Only includes outputs from generators registered as BM Units. 2. Other fossil includes oil, OCGT and gas CHP-CCGT. 3. Other renewables includes biomass and hydro.
4. All numbers are rounded to 0.1 TWh which means that subtotals may not sum to total value.

Source: Elexon

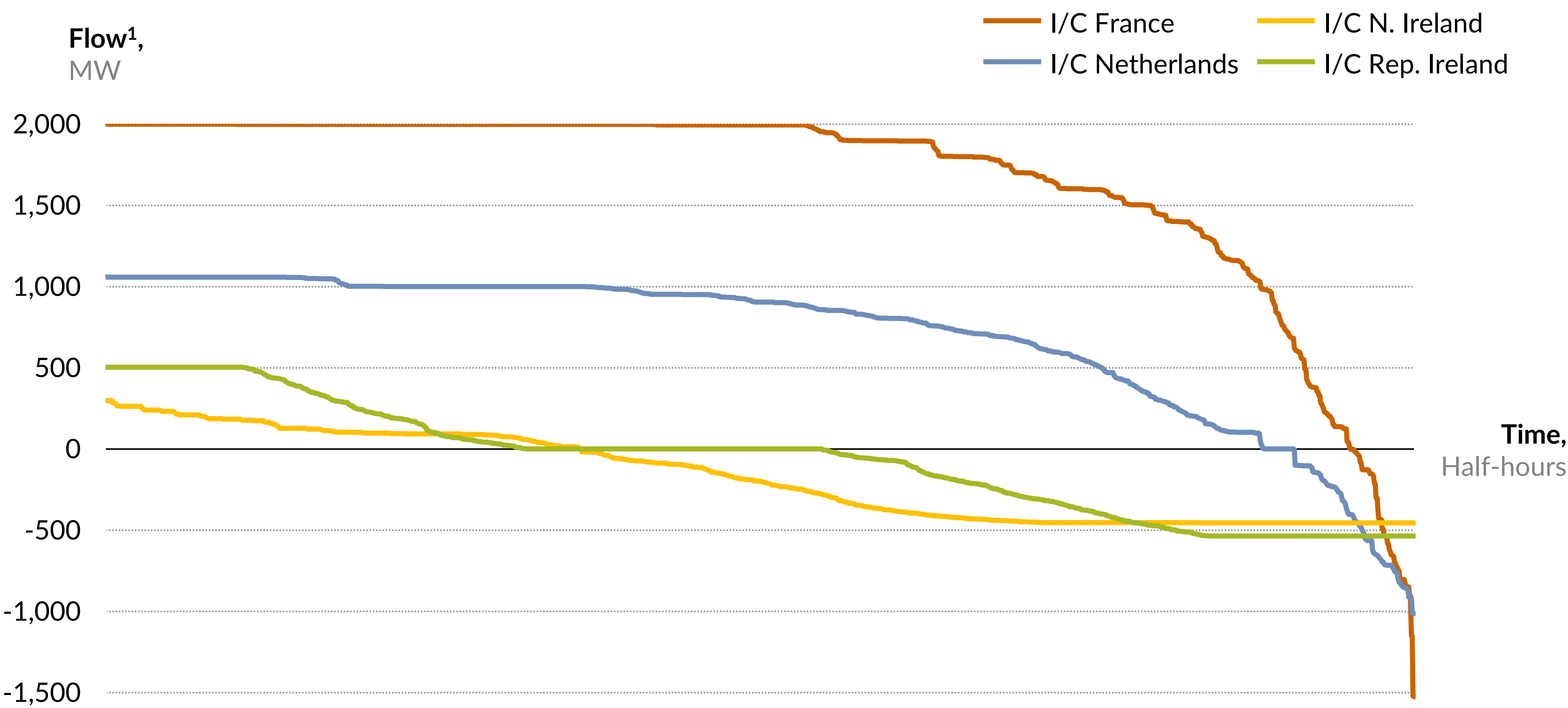
# Historical fuel mix breakdown
## Monthly values from 2010




1. Only includes outputs from generators registered as BM Units.

Source: Elexon

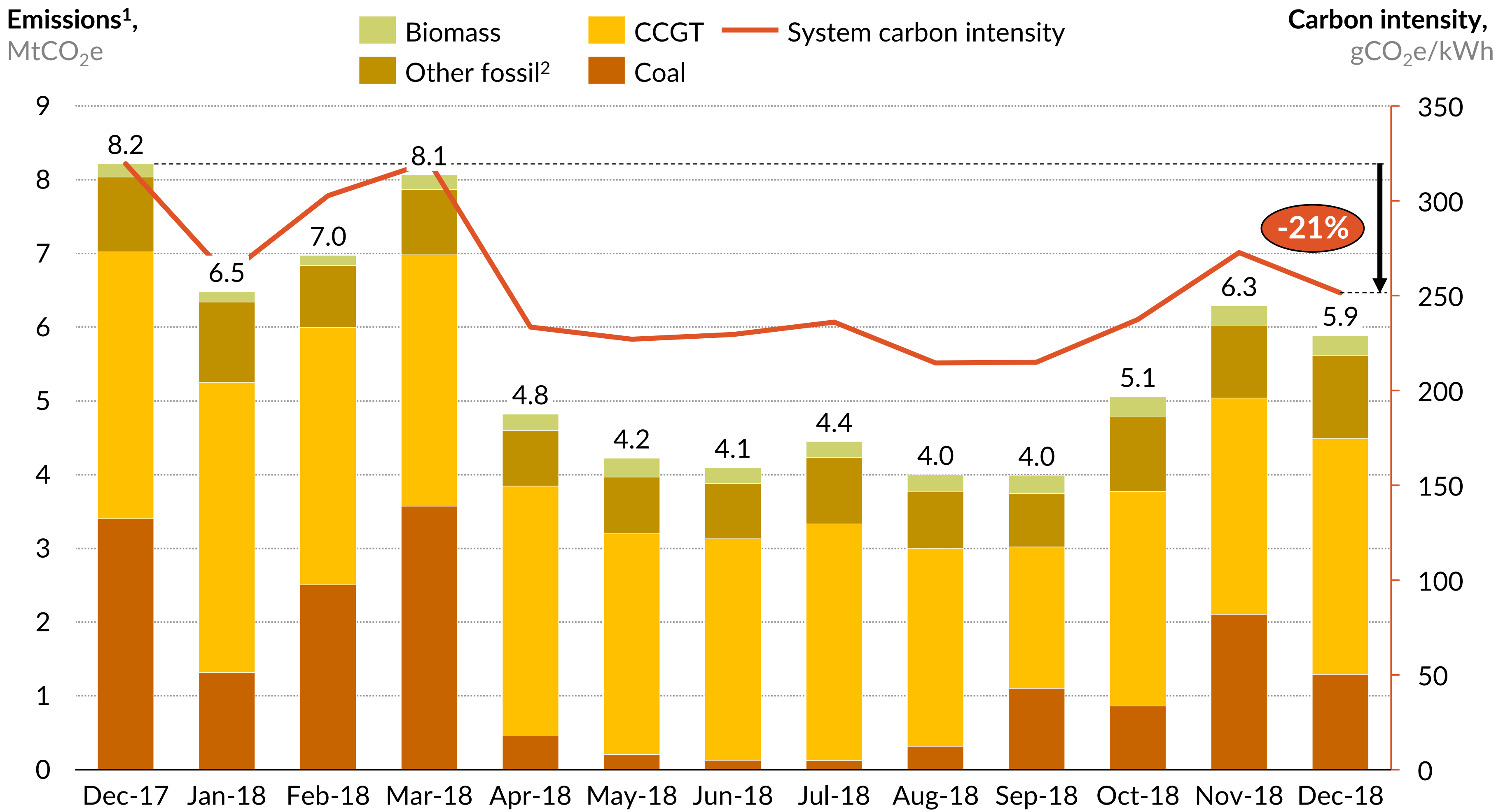
# Monthly interconnector flow duration curve
## Flow in each half-hour for GB interconnectors




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

Sources: Elexon, National Grid

# Monthly emissions by technology




1. Please refer to Appendix 1 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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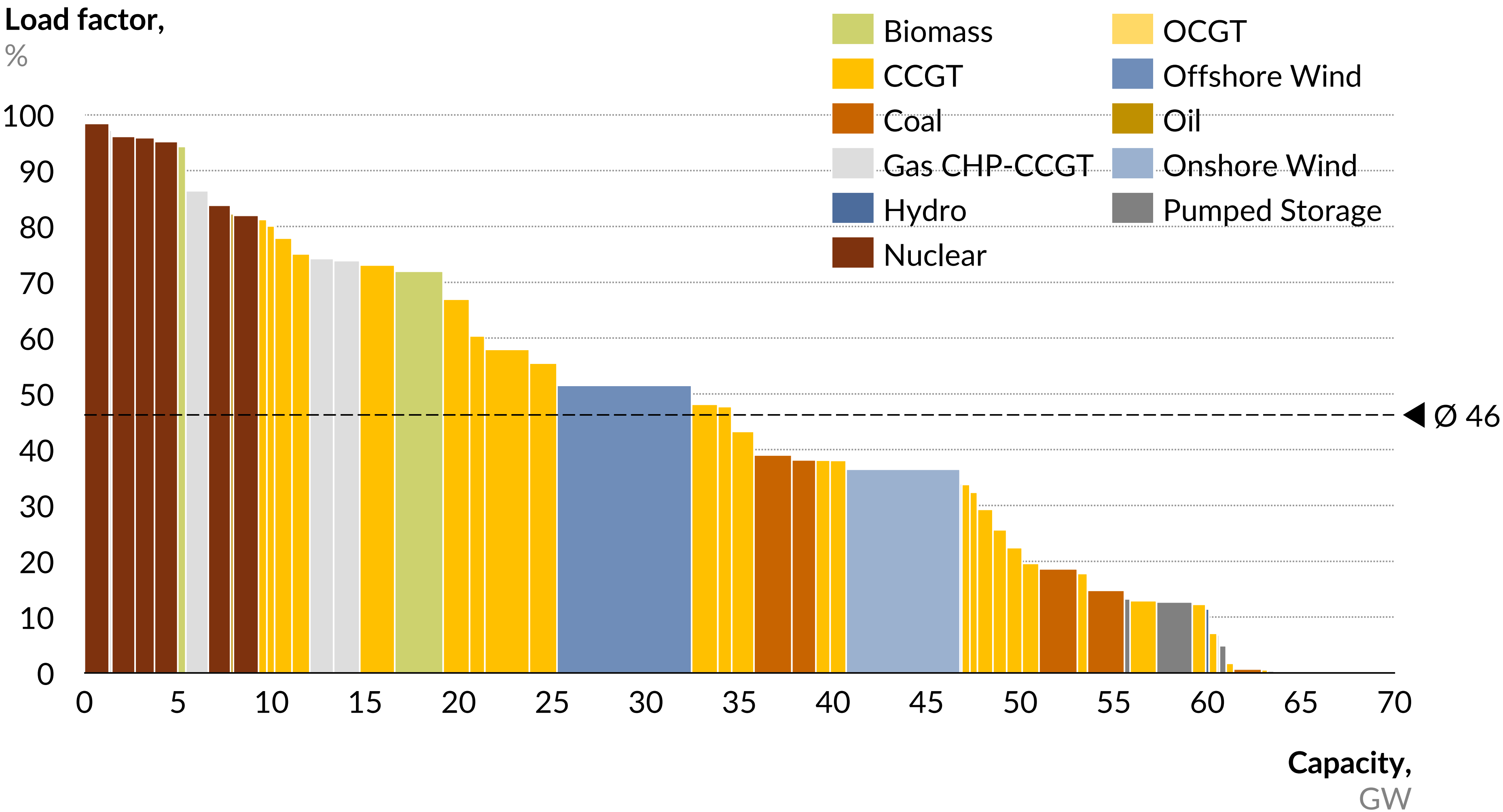
# Plant utilisation – load factors by plant
## (column width reflects capacity)



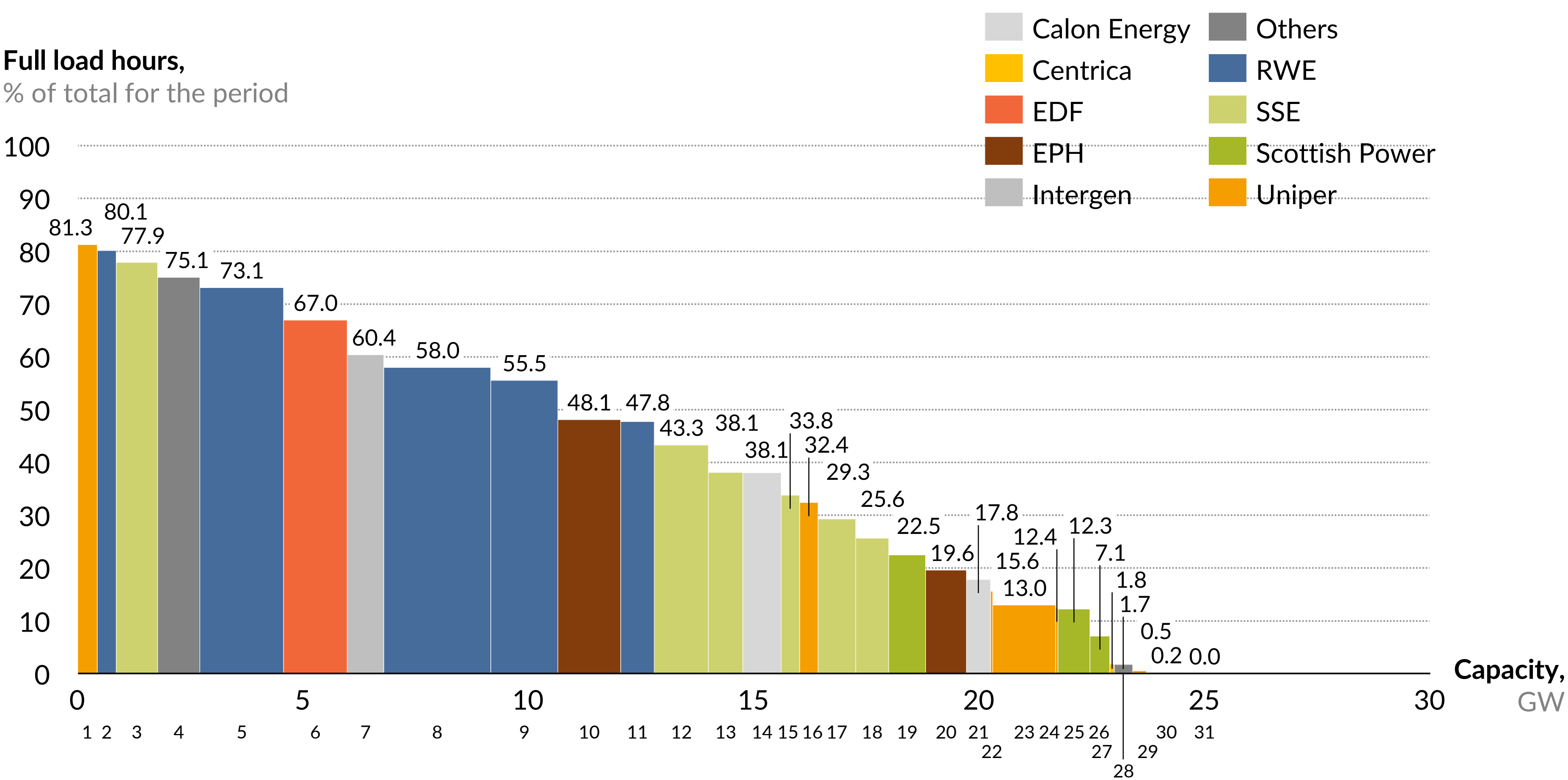

Represents 60 plants with highest capacity according to the Balancing Mechanism (BM) database, as well as aggregated data for offshore and onshore wind farms reporting to the BM. Capacity of each plant represents the sum of capacities of all its generators that have been active at least once in the last three months.

Please refer to Appendix for a detailed description of the data used and categories presented.

Sources: Elexon, DECC

# CCGT plant utilisation – by plant, December 2018

## Column width reflects capacity



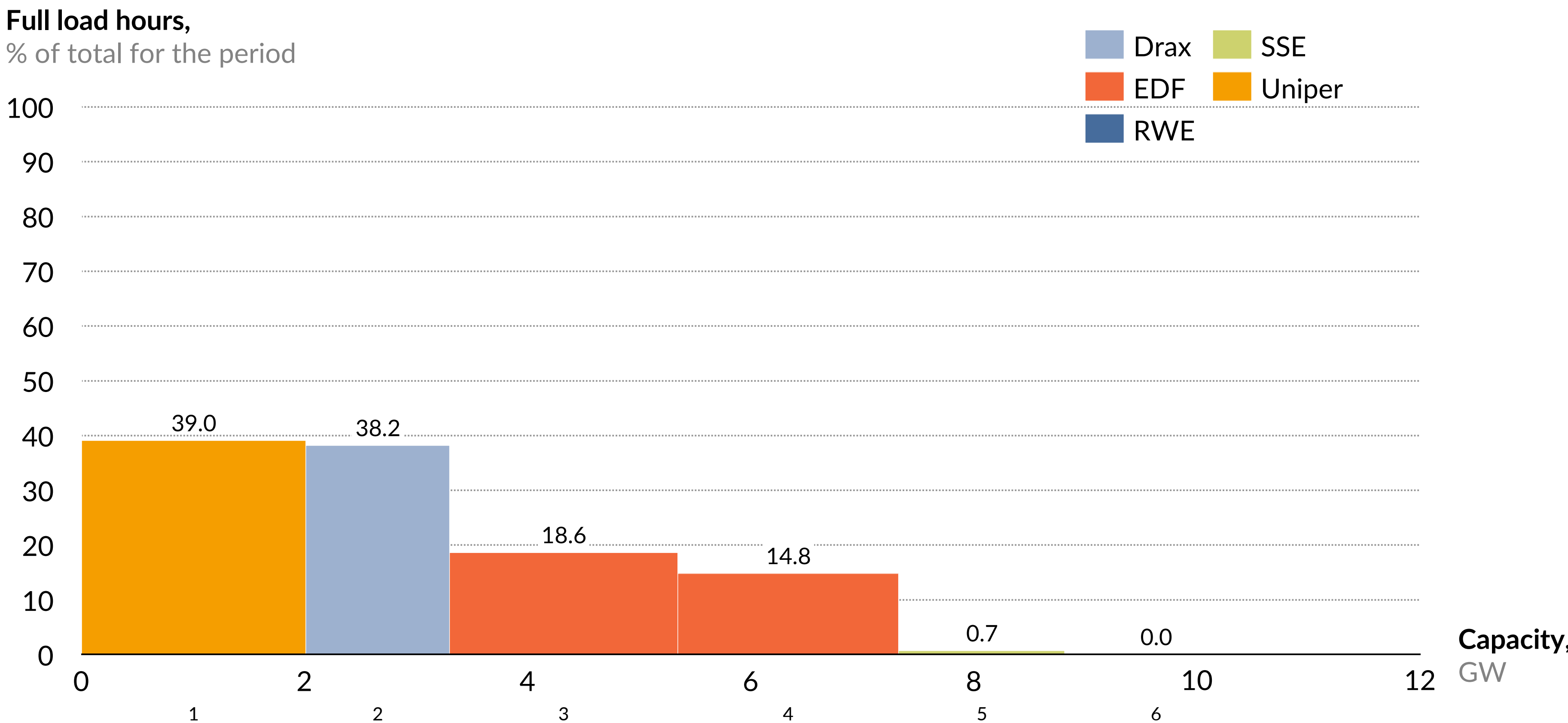

Plant Names: 1. Cottam Dvpt Centre, 2. Great Yarmouth, 3. Marchwood, 4. Carrington, 5. Staythorpe, 6. West Burton B, 7. Rocksavage, 8. Pembroke, 9. Didcot B, 10. South Humber Bank, 11. Little Barford, 12. Peterhead, 13. Keadby, 14. Severn, 15. Seabank 2, 16. Enfield Energy, 17. Seabank 1, 18. Medway,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

Includes all CCGT plants of the presented companies that report to the Balancing Mechanism. Refer to Appendix B for ownerships in joint-ventured CCGT plants.

Source: Elexon

# Coal plant utilisation – by plant, December 2018

## Column width reflects capacity

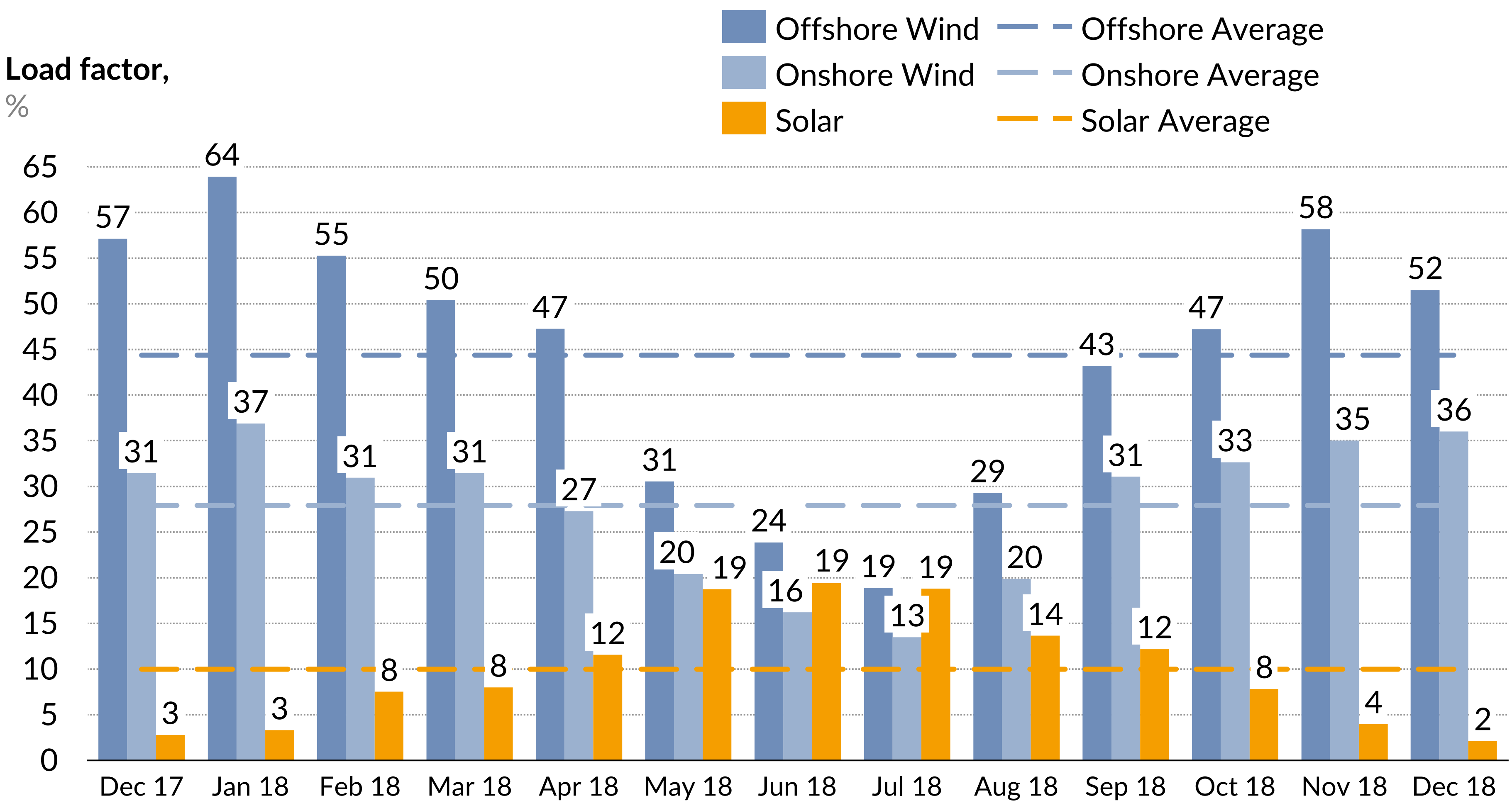



Plant Names: 1. Ratcliffe, 2. Drax Coal, 3. Cottam, 4. West Burton, 5. Fiddlers Ferry, 6. Aberthaw B.

Includes all coal plants of the presented companies that report to the Balancing Mechanism. Refer to Appendix B for ownerships in joint-ventured coal plants.

Source: Elexon

# Renewables utilisation
## Average load factors over the last year




Represents UK wind farms reporting to Balance Mechanism Unit data. Load factors of offshore wind farms under construction might not be representative.

Sources: Elexon, Crown Estate

# Wind farm utilisation – load factor by wind farm

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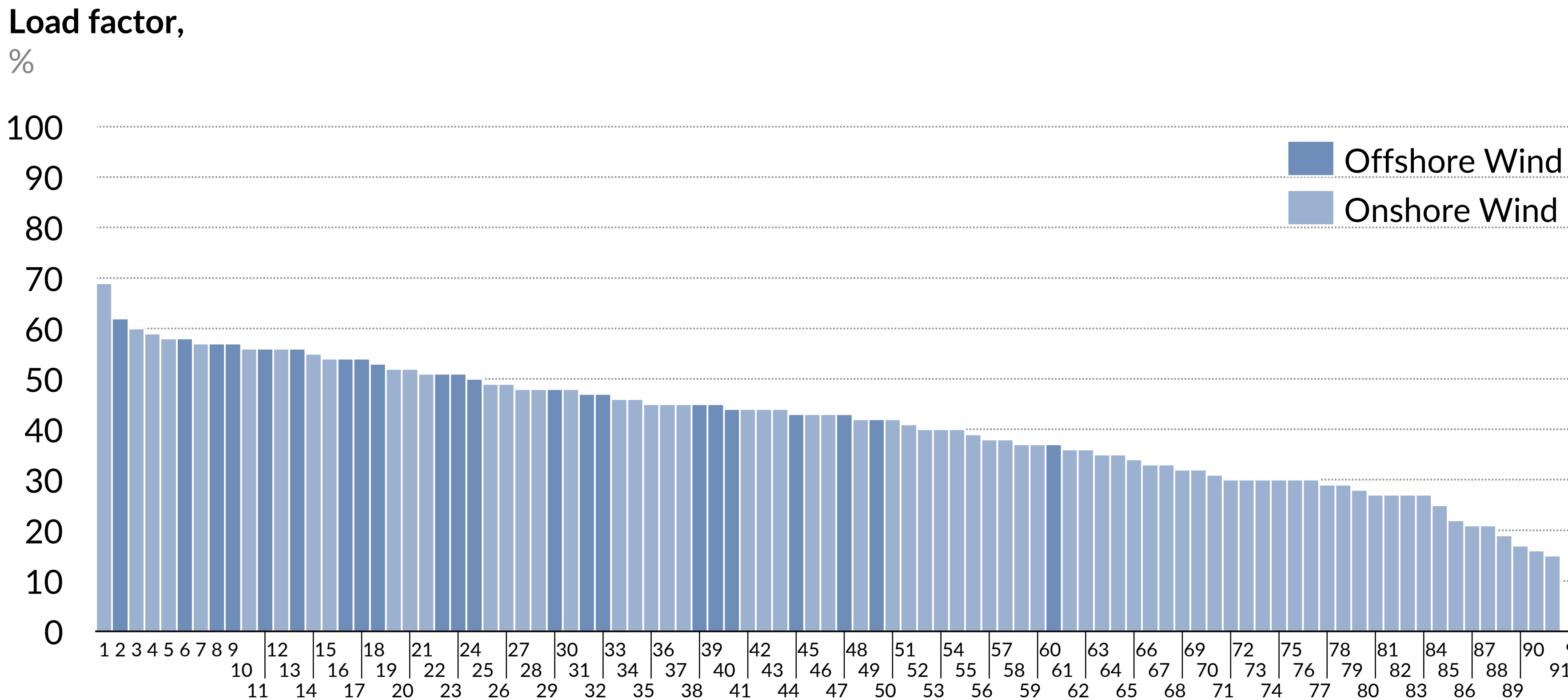
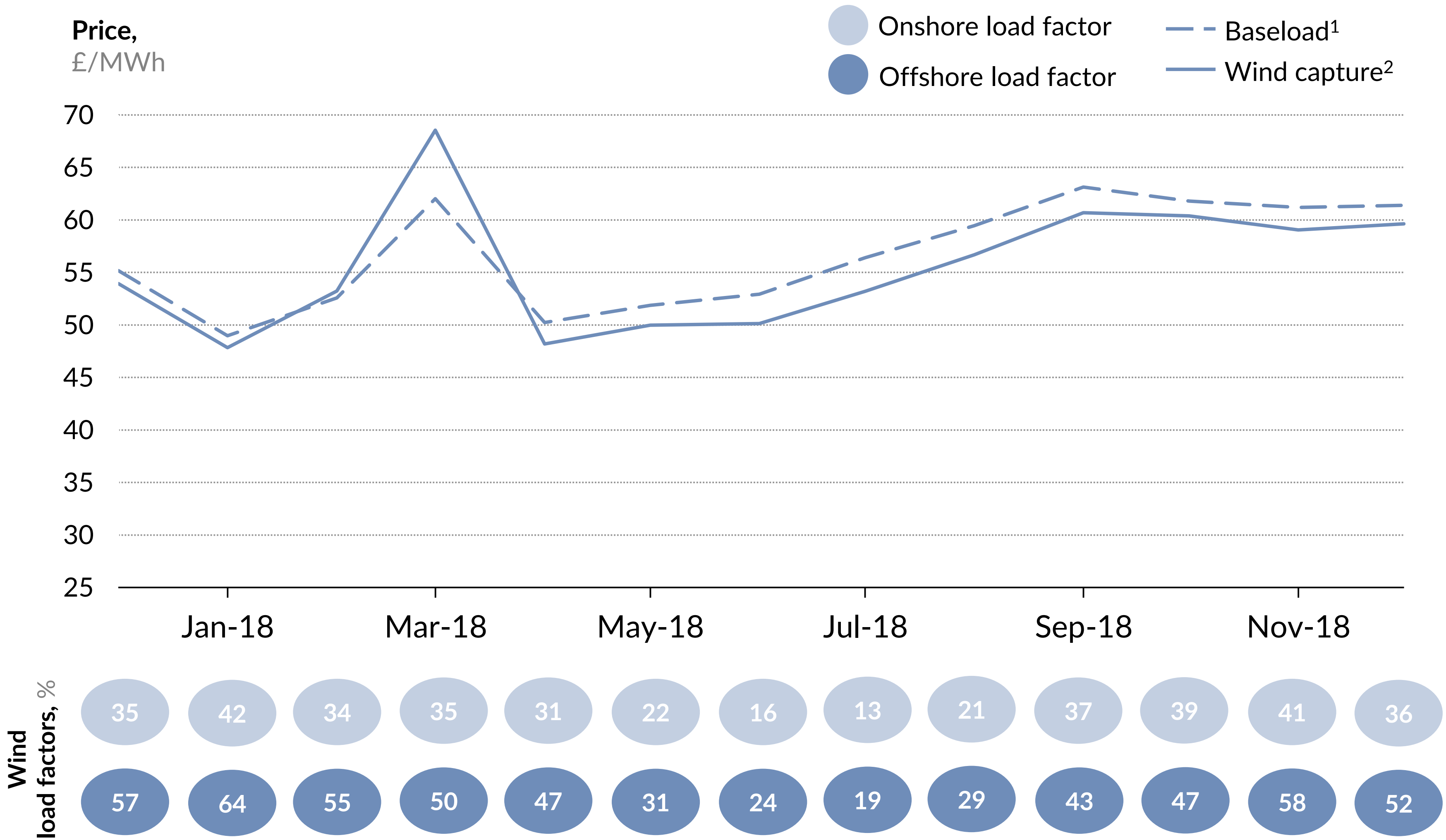



Plant Names: 1. Whiteside Hill, 2. Sheringham Shoals, 3. Afton, 4. Sanquhar Community Wind Farm, 5. Millennium, 6. Walney Extension, 7. Cour, 8. Galloper, 9. Westermost Rough, 10. Brockloch Rig 2, 11. Gwynt y Mor, 12. Kilbraur, 13. West of Duddon Sands, 14. Gordonstown, 15. Fallago Rig, 16. Rampion Offshore,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

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 A

**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 DECC's *Greenhouse gas reporting – Conversion factors 2016*. System carbon intensity is calculated as the total emission divided by total electricity generated.

# Appendix B

## List of joint ventures in CCGT, coal and offshore wind:

### CCGT plants:

**Marchwood** is co-owned by SSE (50%) and Munich Re (50%);
**Deeside** is co-owned by Engie (75%) and Mitsui (25%);
**Seabank 1** is co-owned by SSE (50%) and Cheung Kong Infrastructure Holdings (50%).
**Seabank 2** is co-owned by SSE (50%) and Cheung Kong Infrastructure Holdings (50%).

### Coal plants:

**Eggborough** is co-owned by EPH (90%) and Engie (10%);
**Rugeley** is co-owned by Engie (75%) and Mitsui (25%).

### Offshore wind farms:

**Gwynt y Mor** is co-owned by RWE (60%), Stadtwerke Muenchen (30%) and Siemens (10%);
**Greater Gabbard** is co-owned by SSE (50%) and RWE (50%);
**London Array** is co-owned by E.ON (30%), DONG (25%), the Caisse (25%) and Masdar (20%);
**Gunfleet Sands** is co-owned by DONG (50.1%), Marubeni (24.95%) and Development Bank of Japan (24.95%)
**Walney** is co-owned by DONG (50.1%), SSE (25.1%) and PGGM & Dutch Ampere Equity Fund (24.8%);
**Sheringham Shoals** is co-owned by Statkraft (40%), Statoil (40%) and Green Investment Bank (20%);
**Lincs** is co-owned by Centrica (50%), Siemens (25%) and DONG (25%);
**West of Duddon Sands** is co-owned by DONG (50%) and Scottish Power (50%);
**Westermost Rough** is co-owned by DONG (50%), Marubeni (25%) and Green Investment Bank (25%).

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