

WATSON FARLEY  
&  
WILLIAMS

ARE YOU A BIG FAN?  
EXPERT INSIGHT INTO OFFSHORE WIND IN THE UK  
6 APRIL 2024



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Who are we?

Who am I?

Why are we here?

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# Expert insight into offshore wind in the UK

## Who are we?

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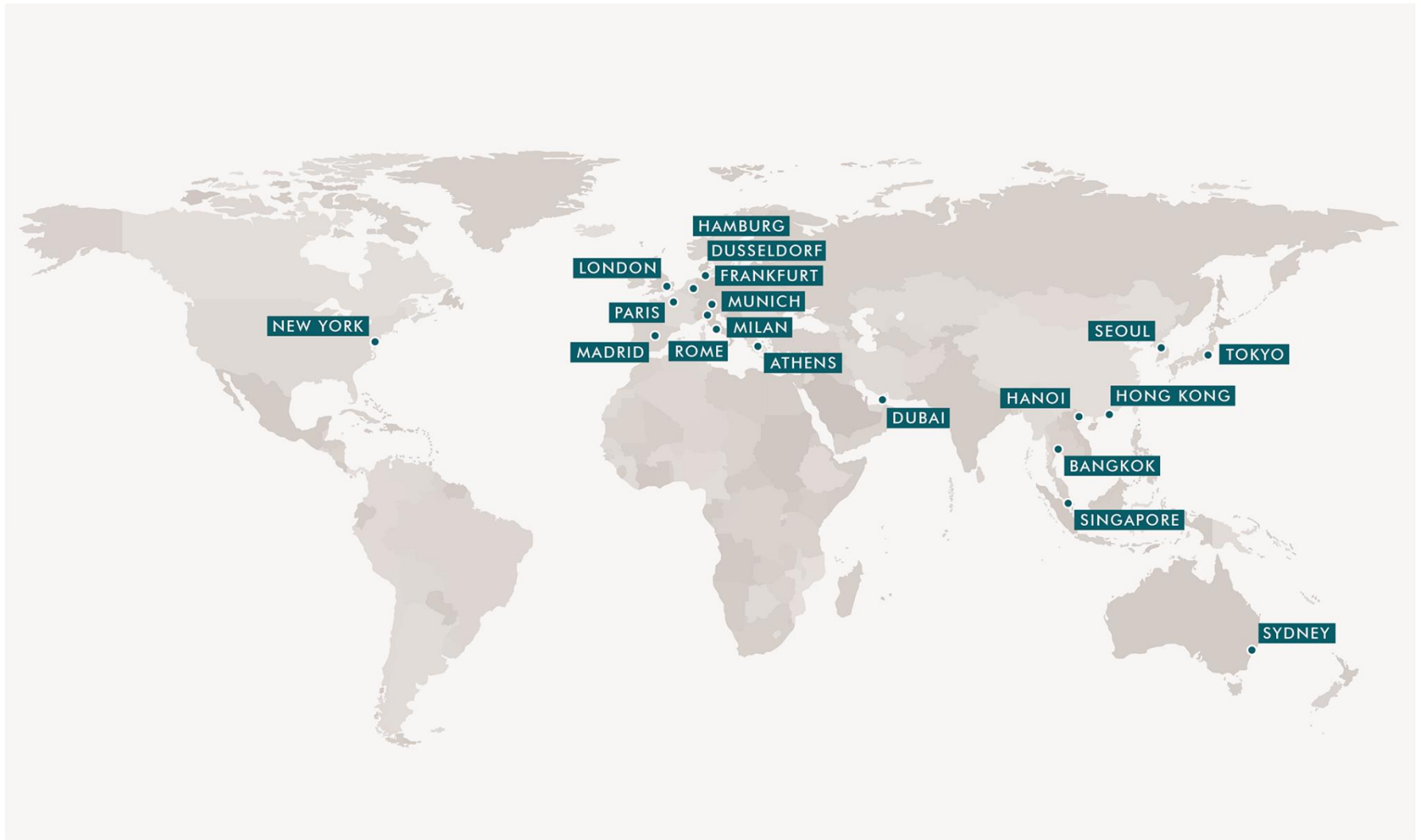
OUR EXPERTISE

WFW IS AN  
INTERNATIONAL ENERGY,  
INFRASTRUCTURE AND  
TRANSPORT LAW FIRM

MORE

An aerial photograph of a cargo ship's deck, showing stacks of colorful shipping containers (red, blue, and yellow) and various pieces of equipment. A white rectangular button with the word 'MORE' in black capital letters is centered over the image.

# WFW's global footprint



# Expert insight into offshore wind in the UK

## Who am I?

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### ENERGY REGULATION

- Legislation
- Licensing
- Subsidies

### COMMERCIAL ARRANGEMENTS

- Power purchase agreements
- Battery optimisation agreements
- Revenue contracts

### ENERGY INDUSTRY ARRANGEMENTS

- Grid support services (ancillary services)
- Industry codes – e.g. Connection and use of system code



MARIANNE ANTON  
Counsel  
London

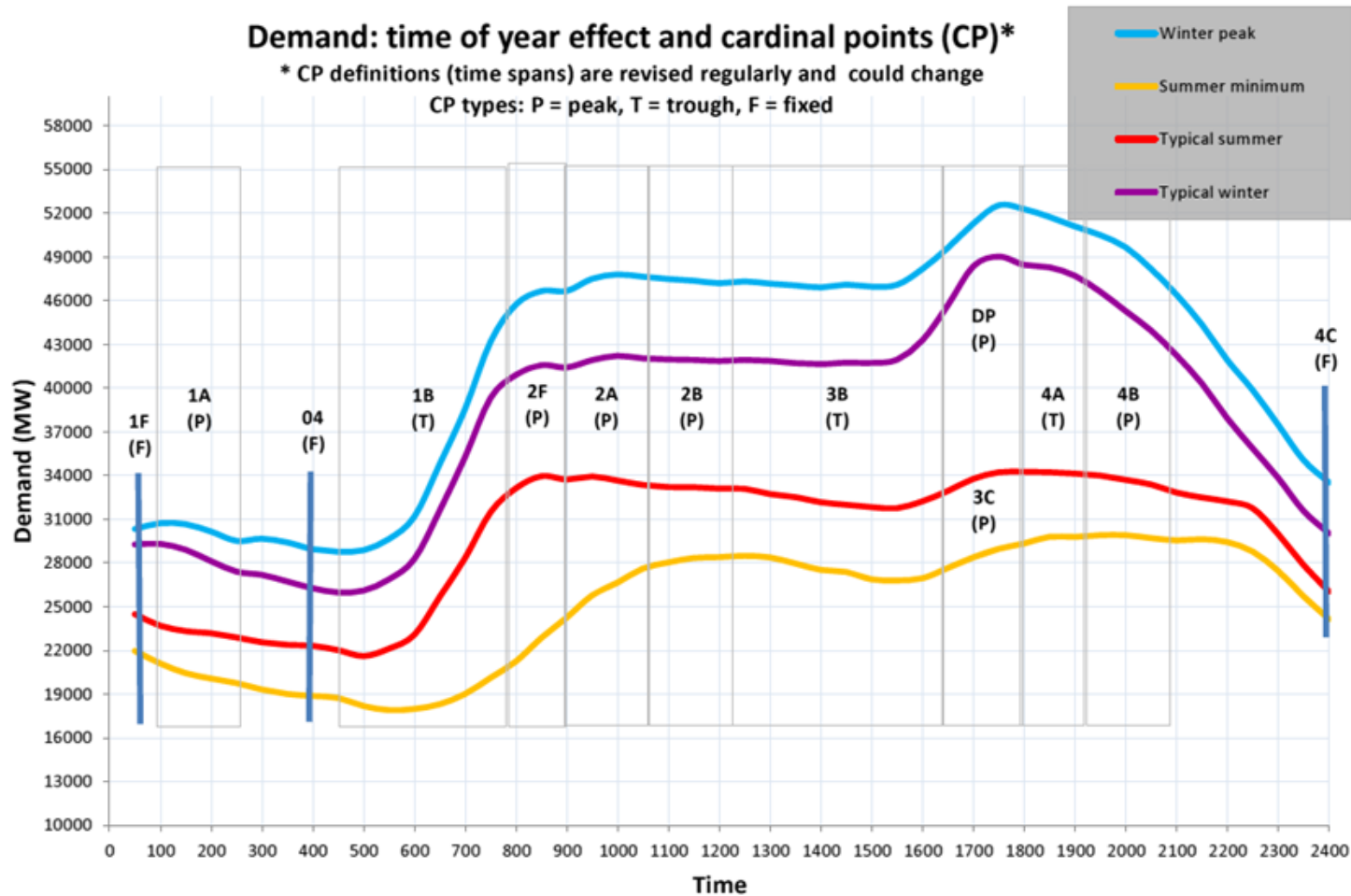
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## Before we begin, an offshore wind primer

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# Offshore Wind Primer

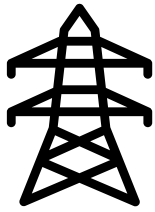
## Electricity Basics – balancing supply and demand



Source: National Grid Electricity System Operator

# Offshore Wind Primer

## Electricity Basics – some numbers for context

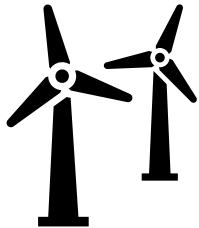


2022 total GB figures:

- installed generation capacity = 76.7 GW
- generation production = 325.3 TWh
- demand = 320.7 TWh



Average UK household uses 2,700 kWh of electricity per year according to Ofgem



Dogger Bank Wind Farm will power 6 million homes per annum based on Typical Domestic Consumption Values in Britain (Medium Electricity Profile Class 1, 2,900 kWh per household; OFGEM, January 2021), typical 55% offshore wind load factor, and projected installed capacity of 3.6 GW



# Offshore Wind Primer

## Why offshore wind? Geography.

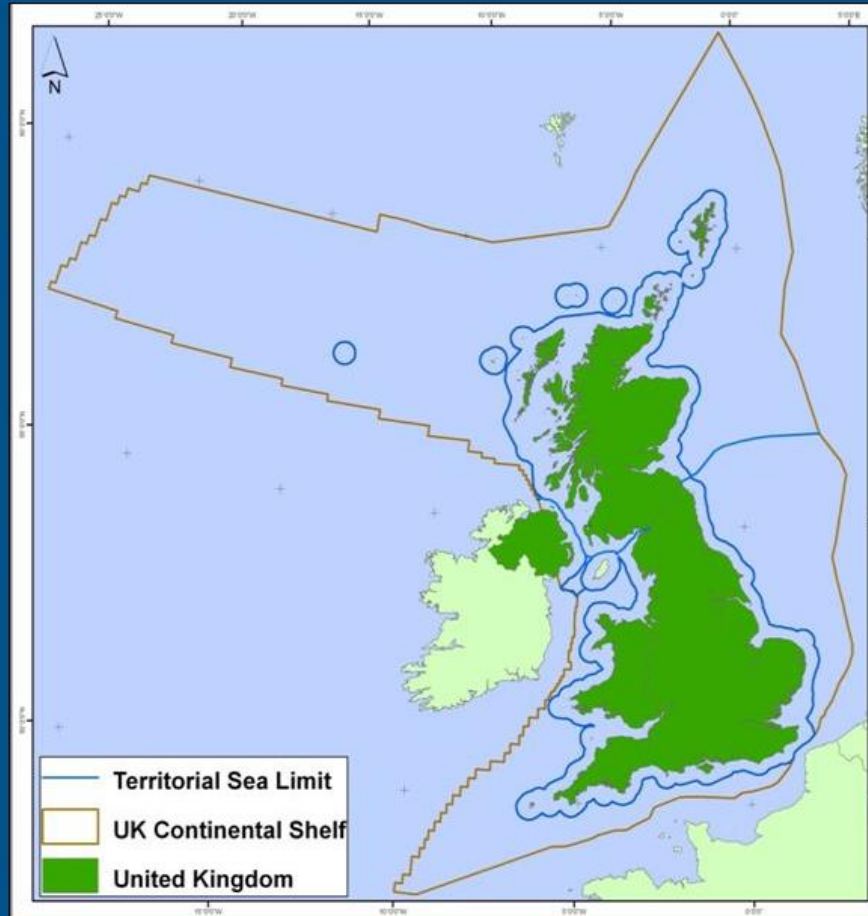
### ...The Marine Estate

Approx. 17,250km of foreshore (55%)

The Territorial Seabed (out to 12 nautical miles)

Rights to explore & utilise the natural resources of the continental shelf out to 200nm (excluding hydrocarbons)

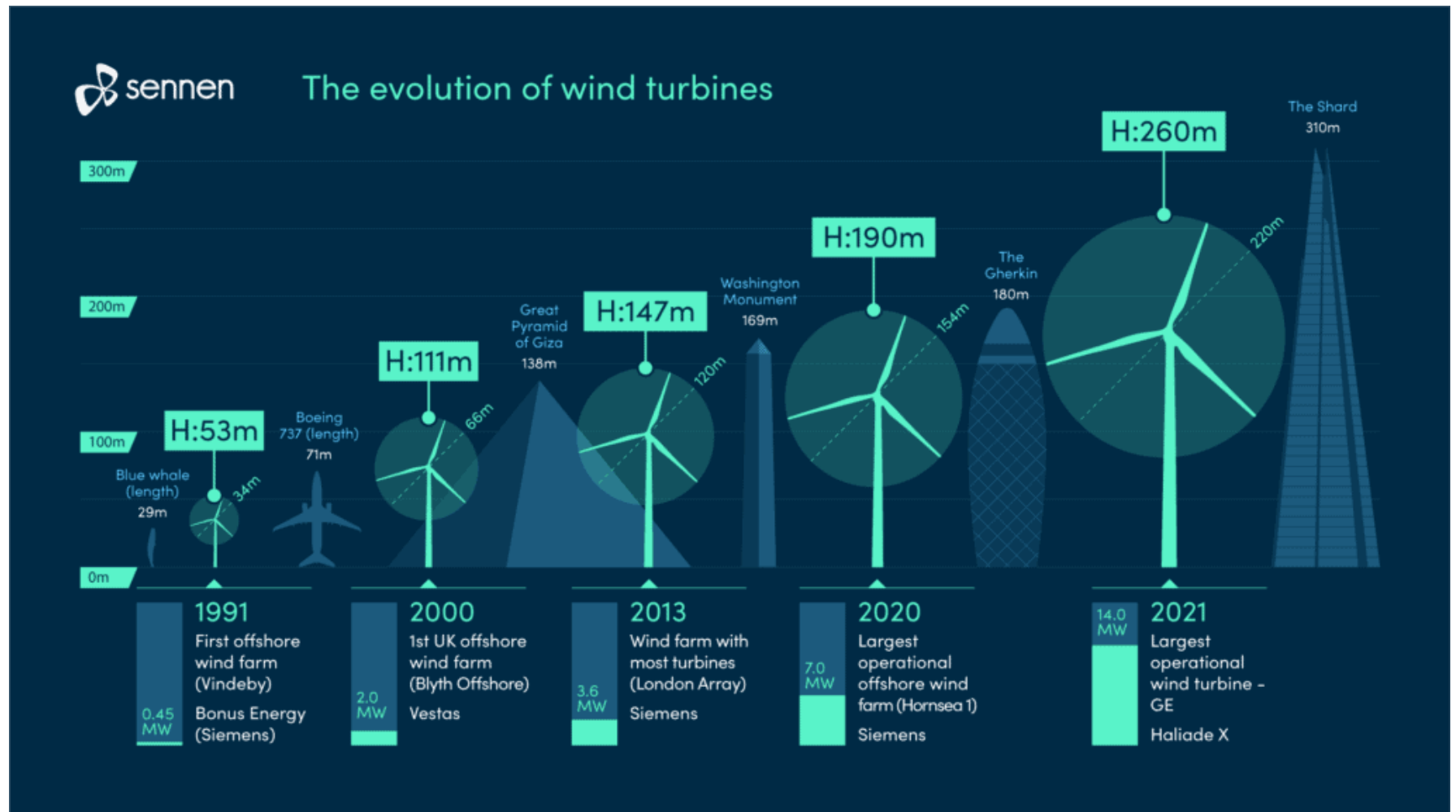
Rights to lease areas for the generation of renewable energy within the UK's Renewable Energy Zone & rights to lease areas for CCS/gas storage



Source: The Crown Estate

# Offshore Wind Primer

## Size matters



# Offshore Wind Primer

## Size matters



Denmark's Vestas is Europe's biggest maker of wind turbines

# Offshore Wind Primer

## Size matters

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# Offshore Wind Primer

## Size matters

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# Offshore Wind Primer

## Size matters



BBC news, 31 August 2022: The world's largest offshore wind farm is now fully operational, 55 miles off the coast of Yorkshire.

The Hornsea 2 project can generate enough electricity to power about 1.3 million homes - that's enough for a city the size of Manchester.

# Offshore Wind Primer

## Size matters

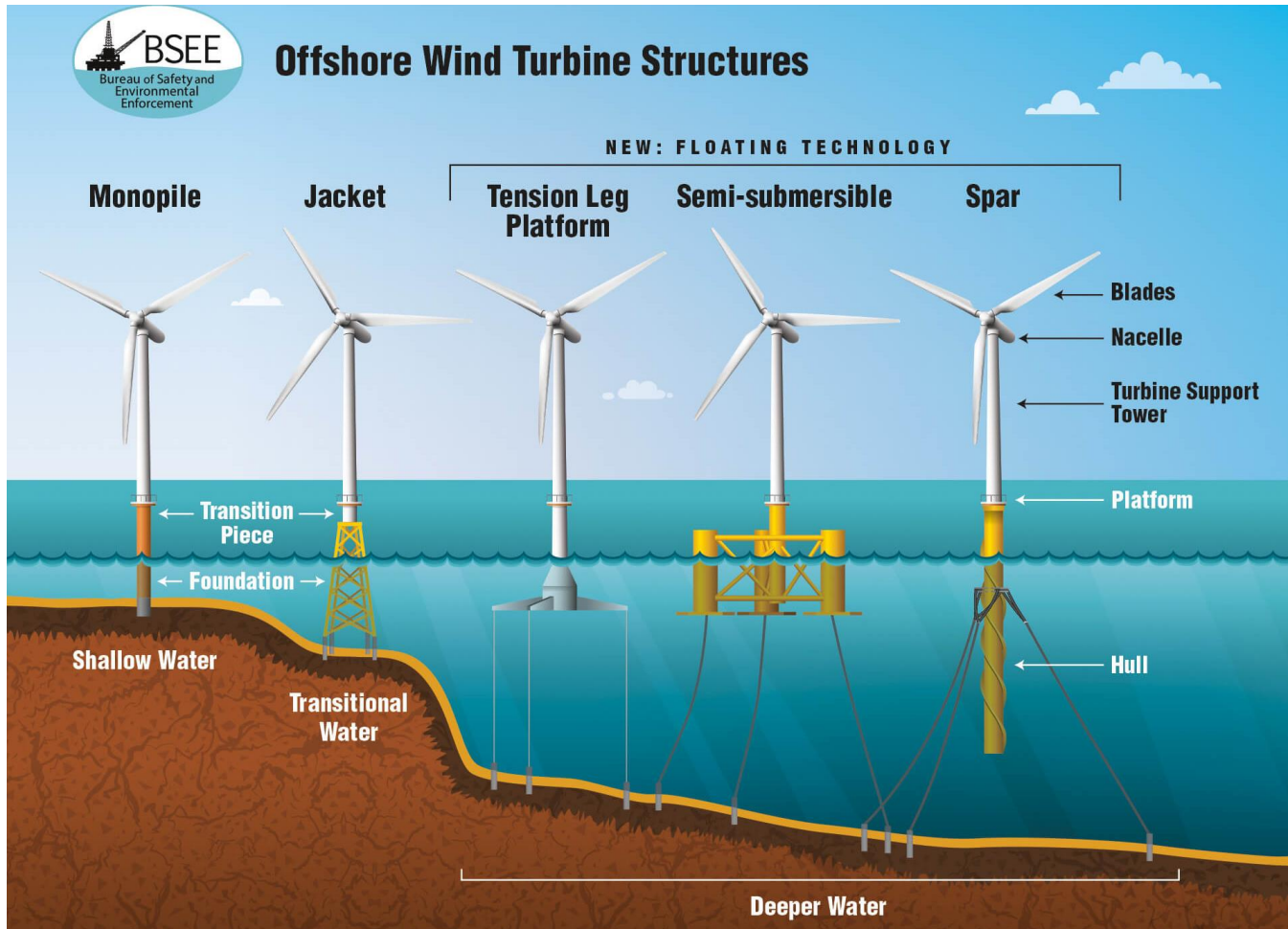


Equinor, 10 October 2023: Major energy security milestone as world's largest offshore wind farm produces first power.

Dogger Bank is now connected to Britain's national grid and has started exporting electricity for the first time to British homes and businesses.

# Offshore Wind Primer

## Types of technology

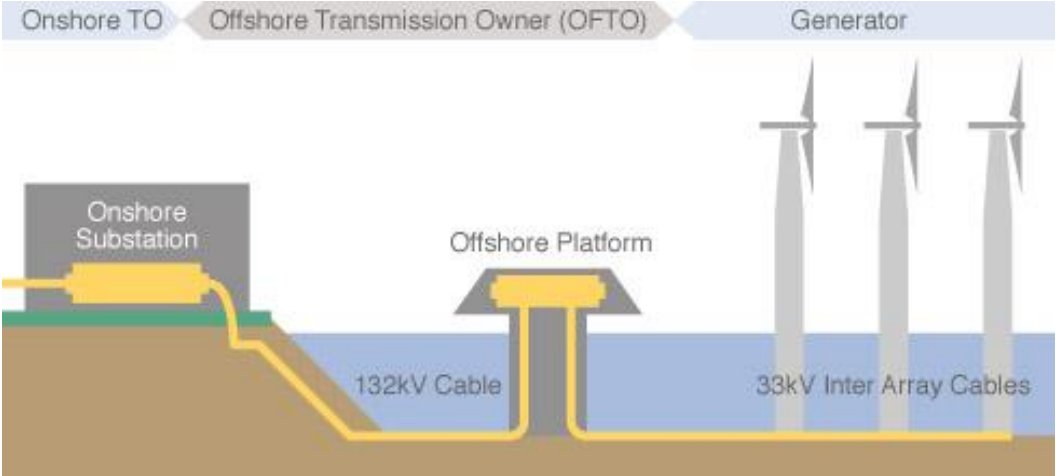


Source: <https://www.windpowerengineering.com/ready-to-float-a-permanent-cost-reduction-for-offshore-wind/>



# Offshore Wind Primer

## Getting power onshore

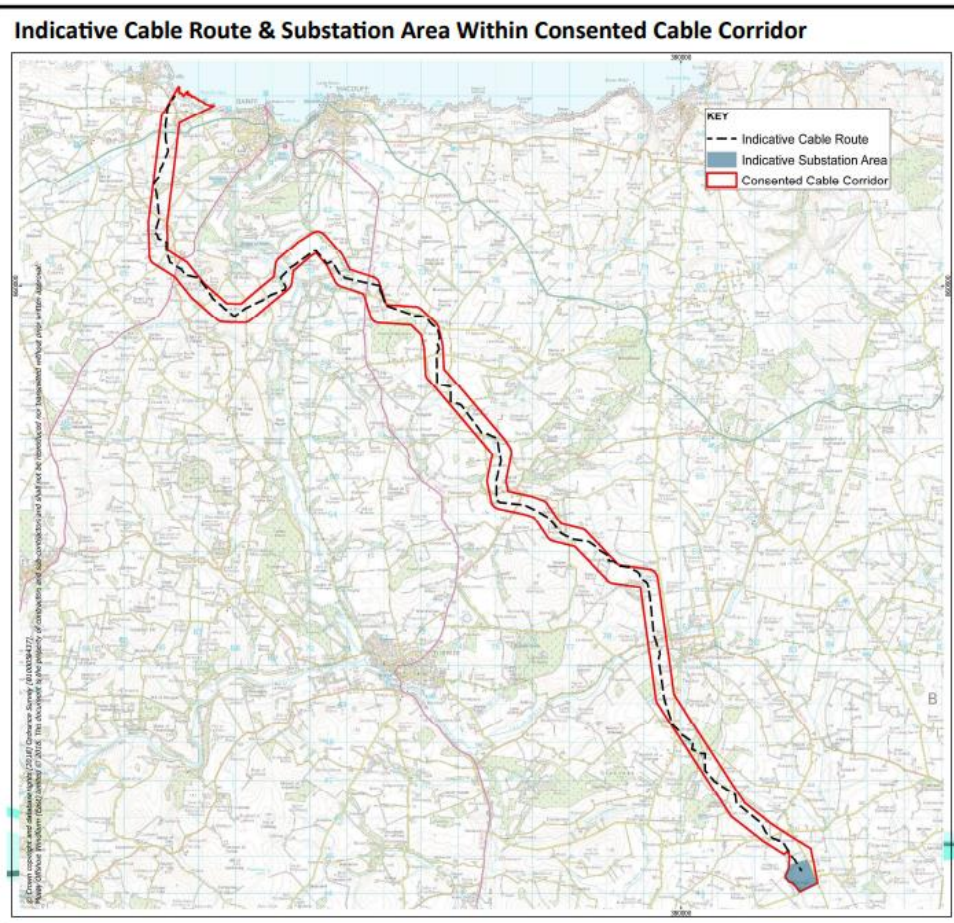


Cross section of a 132 kV cable



# Offshore Wind Primer

## Getting power onshore – Moray East case study



### Cable Route

In 2014, Moray East was awarded planning permission in principle for a 500m planning corridor for the onshore cables which is shown outlined in red on the map above. Engineering work has been undertaken to refine proposals according to local circumstances, and a 45m wide cable and installation corridor has been developed. This is shown above by a broken black line.



Substation site in March 2019



Substation site in February 2020

# Offshore Wind Primer

## Getting power onshore – Dogger Bank case study



*Part of the cable route from landfall at Ulrome.*



*The cable installation vessel just offshore installing the export cables.*



*Engineers check the progress of the cable installation.*

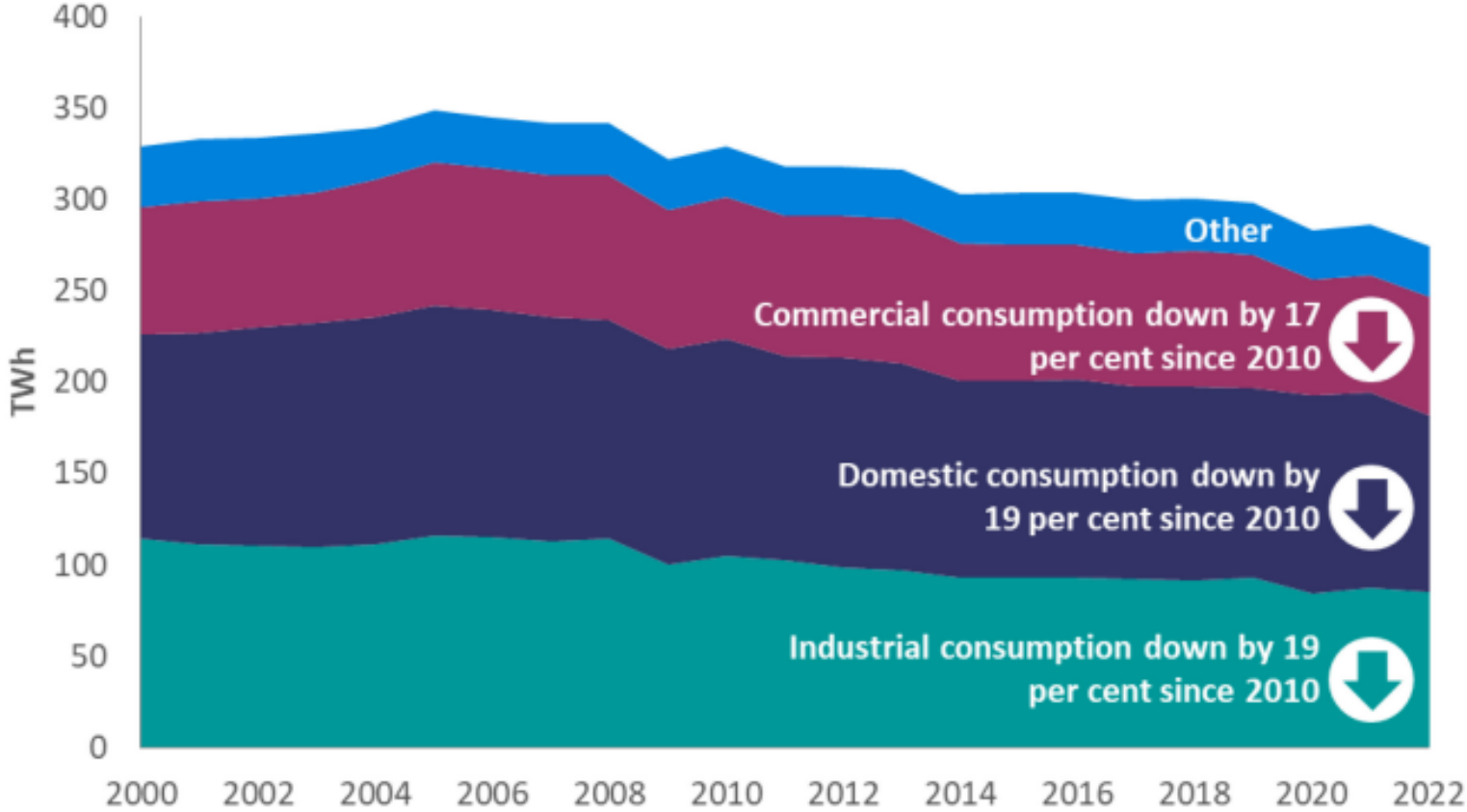


*The Operations and Maintenance Base is now complete.*

# Offshore Wind Primer

## Some government statistics

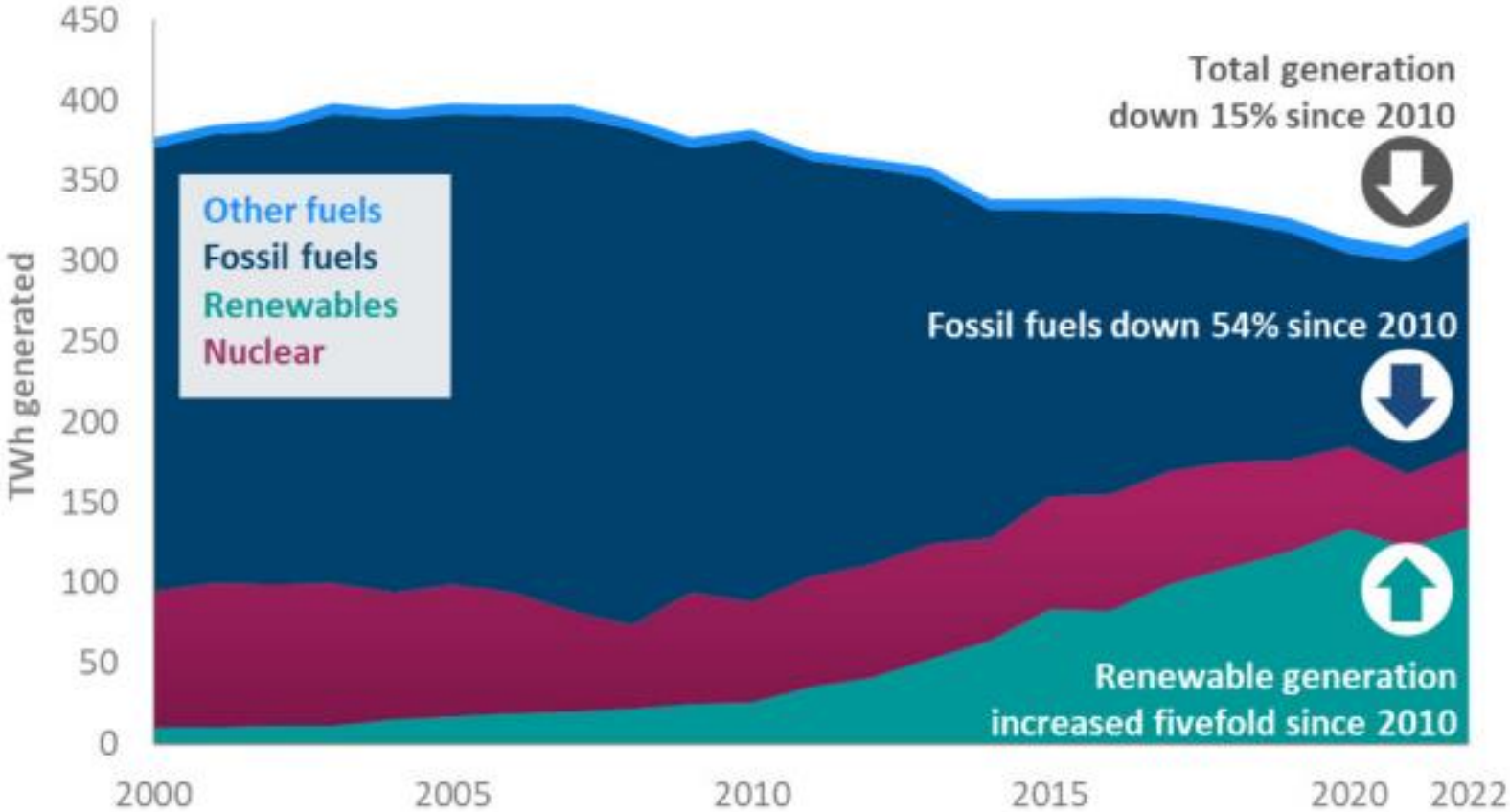
Chart 5.1 Electricity consumption by sector, 2000 to 2022 (Table 5.1)



# Offshore Wind Primer

## Some government statistics

Chart 5.3 Electricity generated by fuel, 2000 to 2022 (Table 5.6)



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## Why Offshore Wind?

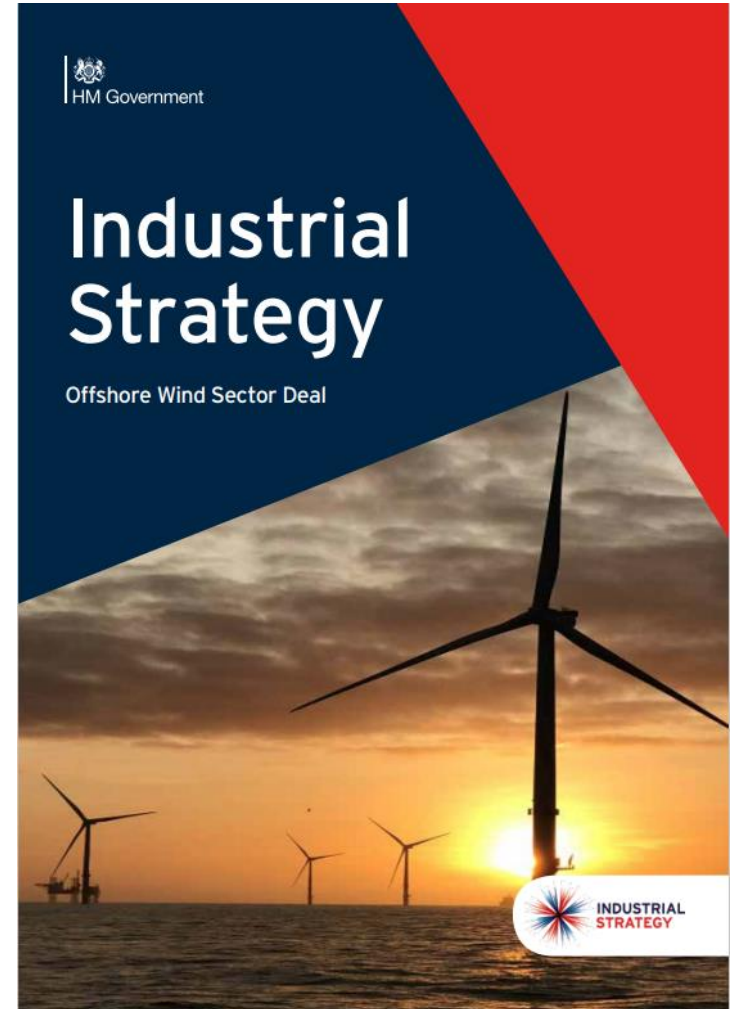
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# Expert insight into offshore wind in the UK

## Why offshore wind?

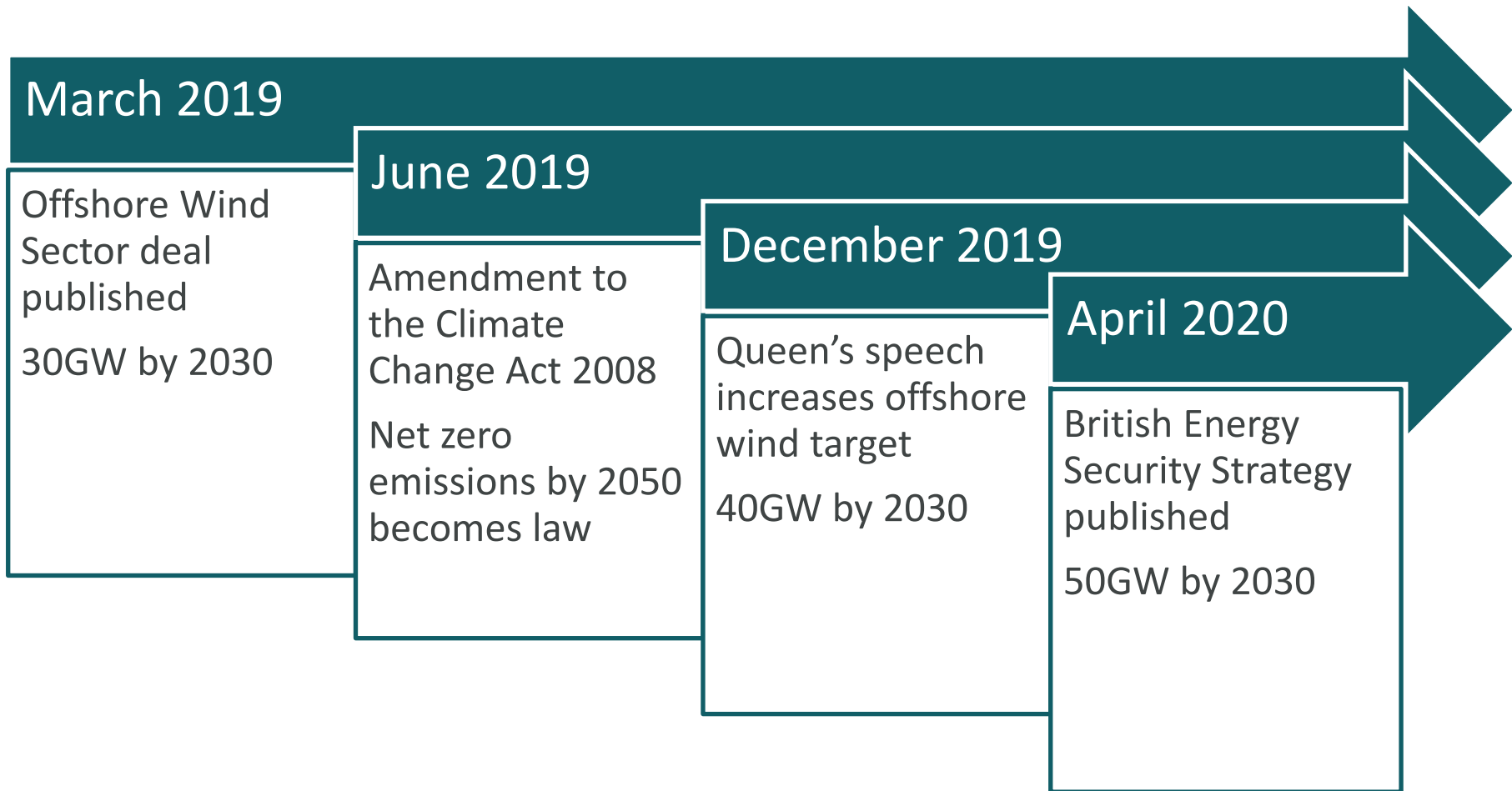
### GEOGRAPHY:

- We are an island!
  - Territorial waters – up to 12 miles
  - Continental shelf – extended “renewable energy zone”
- Abundant and free natural resource + geography to support it
- Economics
  - Port infrastructure/ redevelopment
  - Job creation/ growth
  - Export expertise
- Government made a deliberate decision to pursue offshore wind



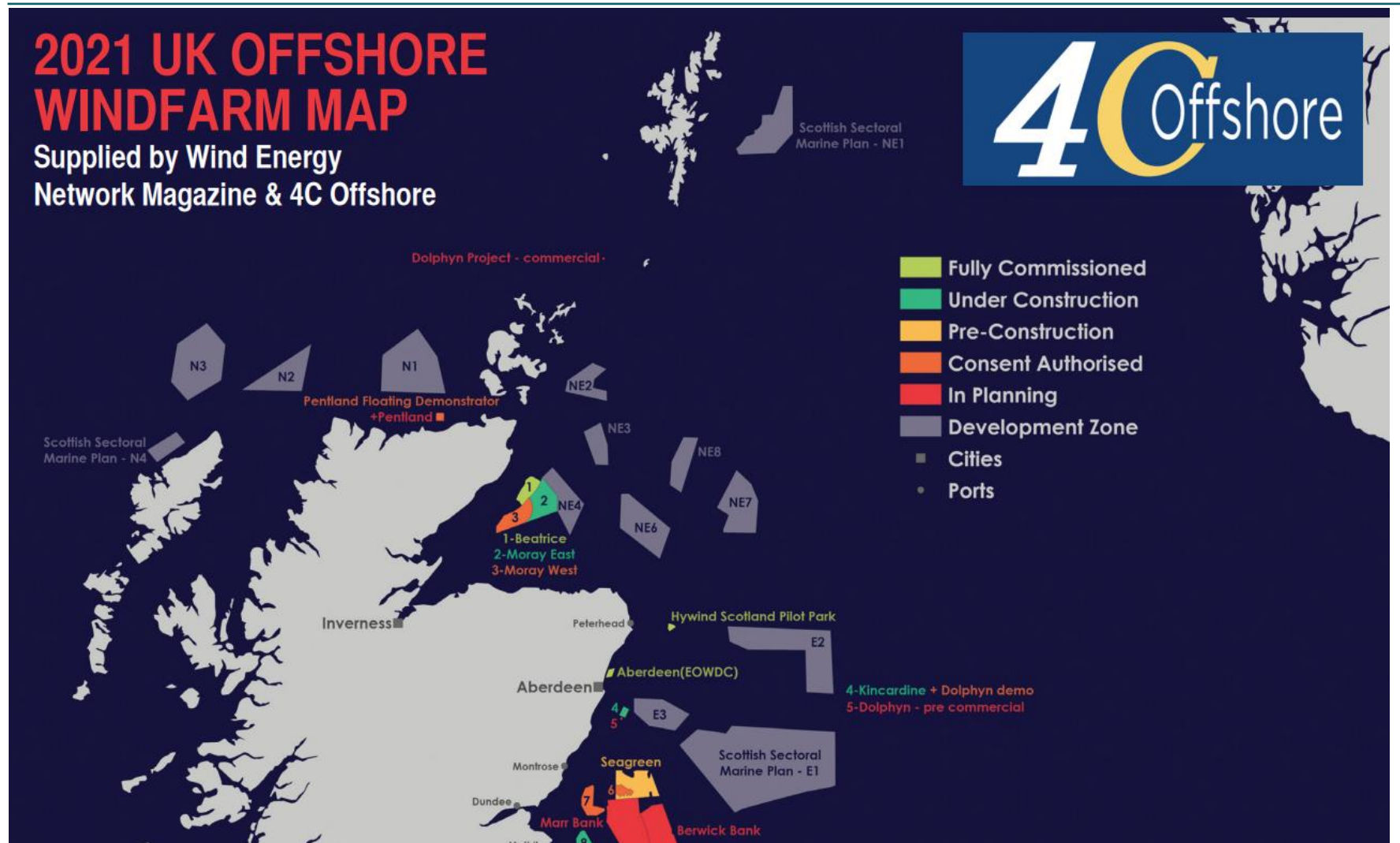
# Expert insight into offshore wind in the UK

## Increasing ambition

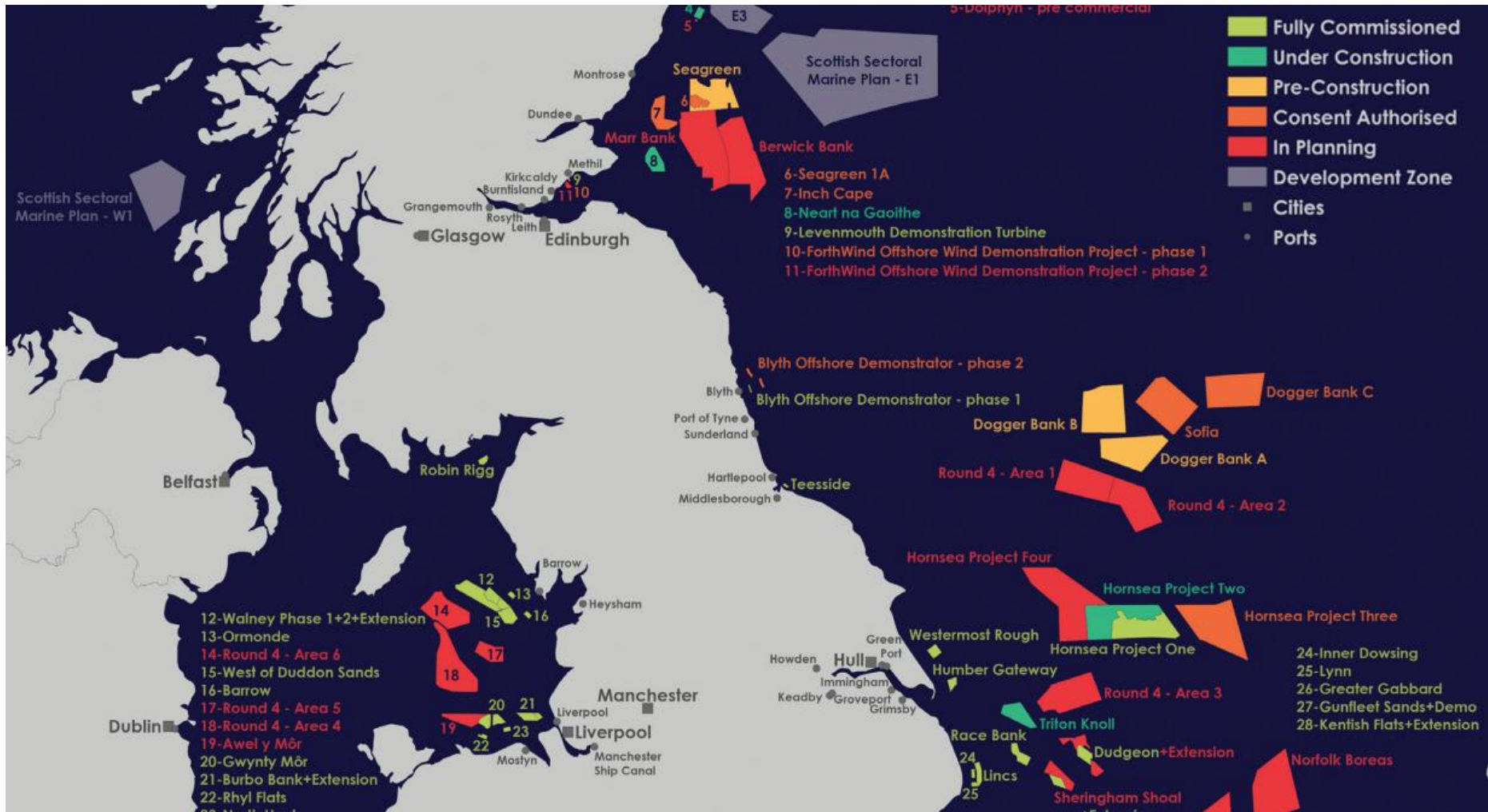




# Expert insight into offshore wind in the UK Pipeline



# Expert insight into offshore wind in the UK Pipeline



# Expert insight into offshore wind in the UK

## Pipeline



# Expert insight into offshore wind in the UK

## Why privatise?

Year	£/MW (millions)	£/100 MW (millions)	£/1 GW (billions)
2006	1.37	137	1.37
2009	1.54	154	1.54
2013	3.17	317	3.17
2017	3.48	348	3.48
2026	2.5 (estimate)	250	2.5

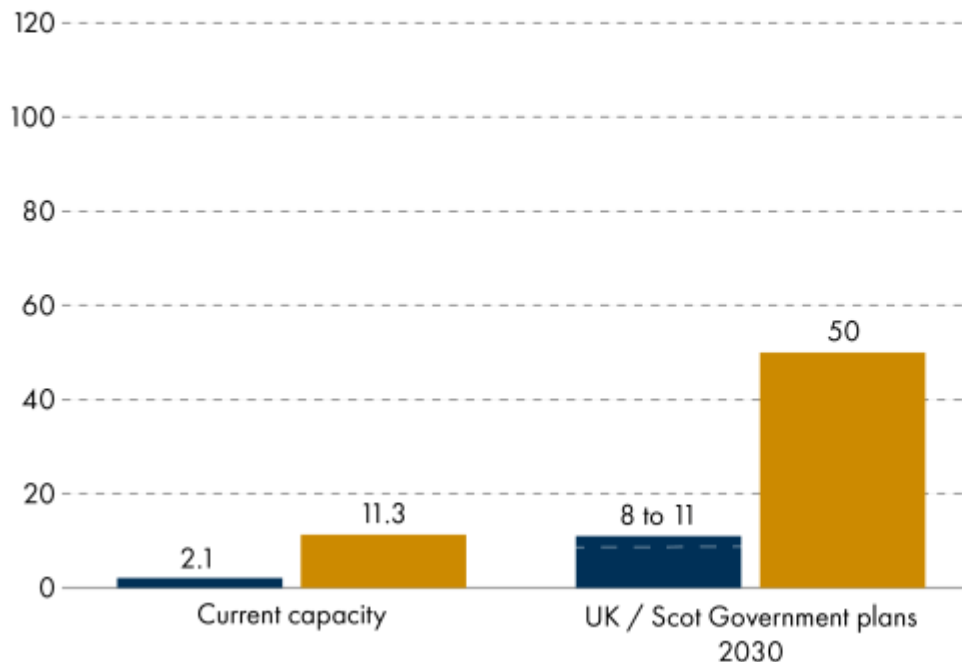
Scale of early offshore wind farms

Scale of current offshore wind farms

# Expert insight into offshore wind in the UK

## Why privatise?

### Offshore wind capacity forecast (GW)



Marianne's easy maths

50 GW – 11 GW = 39 GW

39 GW x £2.5b =

**£97.5b by 2030**

(i.e. in the next 6 years)

Source: Scottish Parliament Information Centre, April 2023

<https://spice-spotlight.scot/2023/04/26/wind-energy-in-scotland-current-position-and-future-plans/>

# Expert insight into offshore wind in the UK

## The key players

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 Orsted

equinor 

 sse  
Renewables

VATTENFALL 

MASDAR 

 RWE

 MACQUARIE  
Green  
Investment  
Group

GREENCOAT  
UK WIND 

CIP  
Copenhagen Infrastructure Partners

 DALMORE CAPITAL

 ScottishPower  
Renewables

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# The Challenges

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# Expert insight into offshore wind in the UK

## Challenges to overcome

### INFRASTRUCTURE

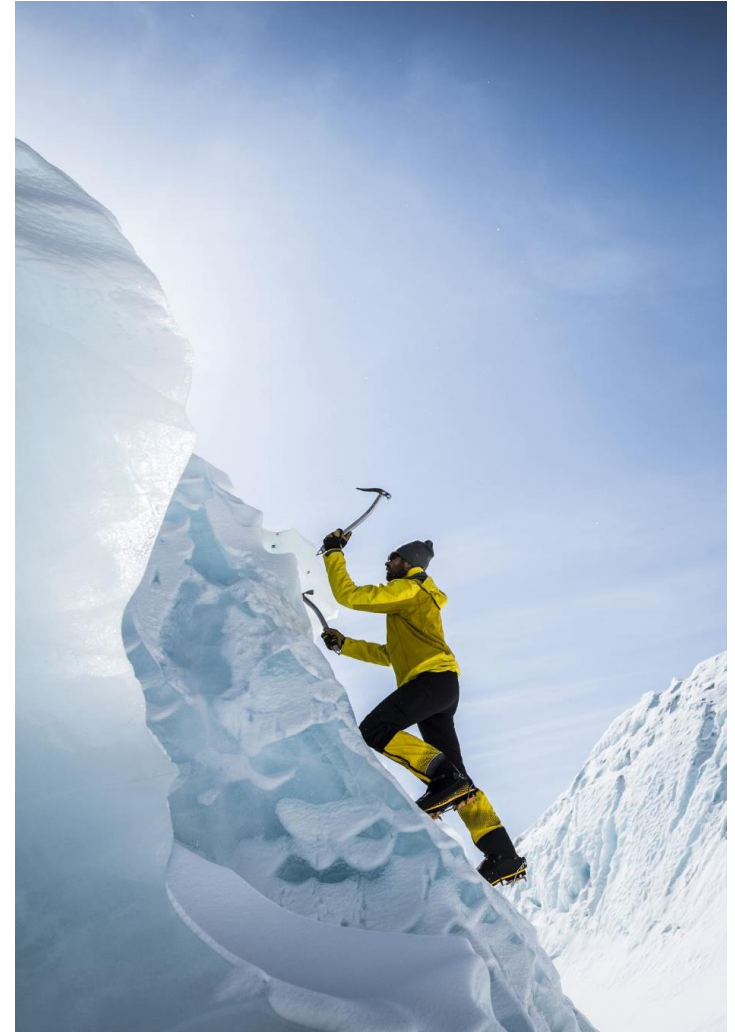
- Underinvestment in grid reinforcements across the country for decades
- It will take time to catch up so that the grid can support the level of wind planned

### INSUFFICIENT SUPPLY CHAIN

- Global demand has increased – we are not the only country reinforcing grid networks and building offshore wind farms!
- We will need a work force covering R&D, manufacturing, supply, installation and operation

### INTERMITTENCY

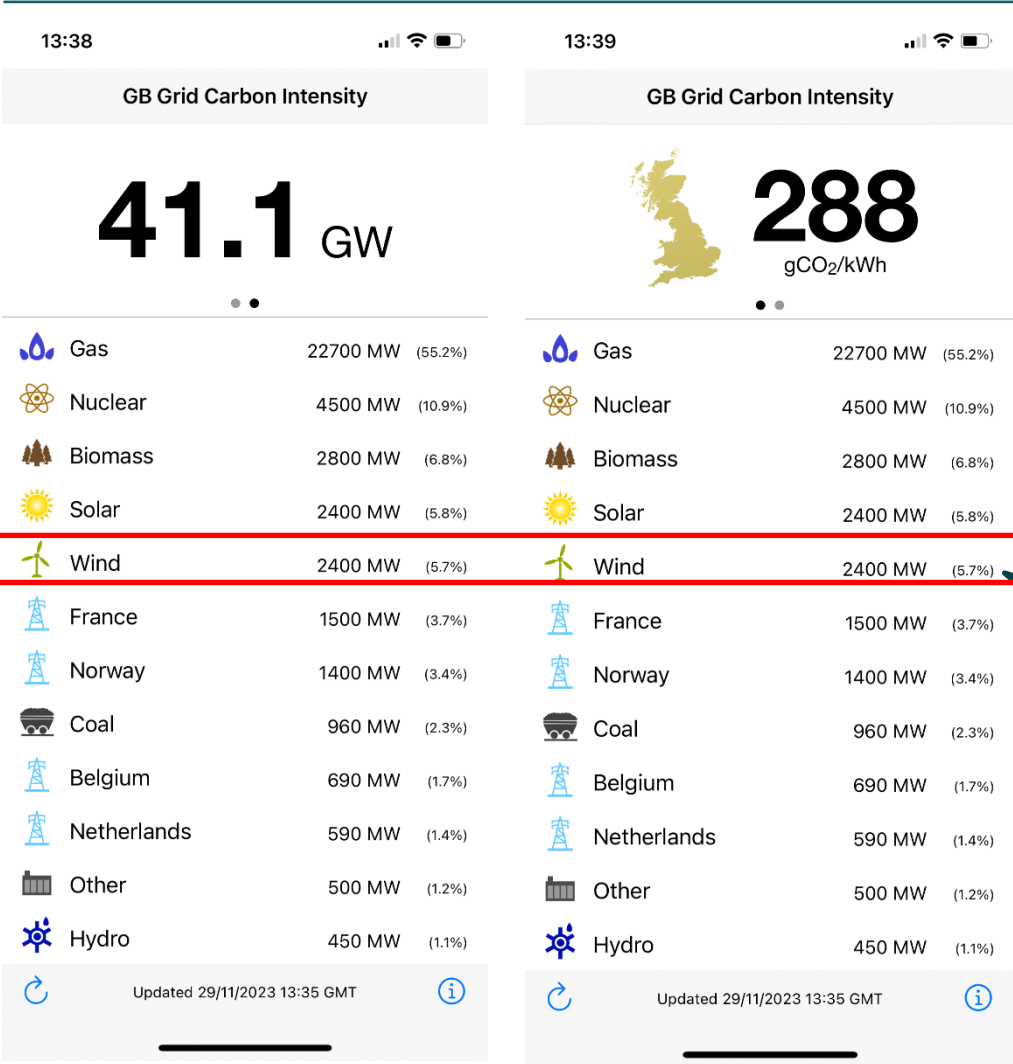
- Wind is free and abundant, but unpredictable
- What do we do when the wind is not blowing?





# Expert insight into offshore wind in the UK

## A closer look at intermittency

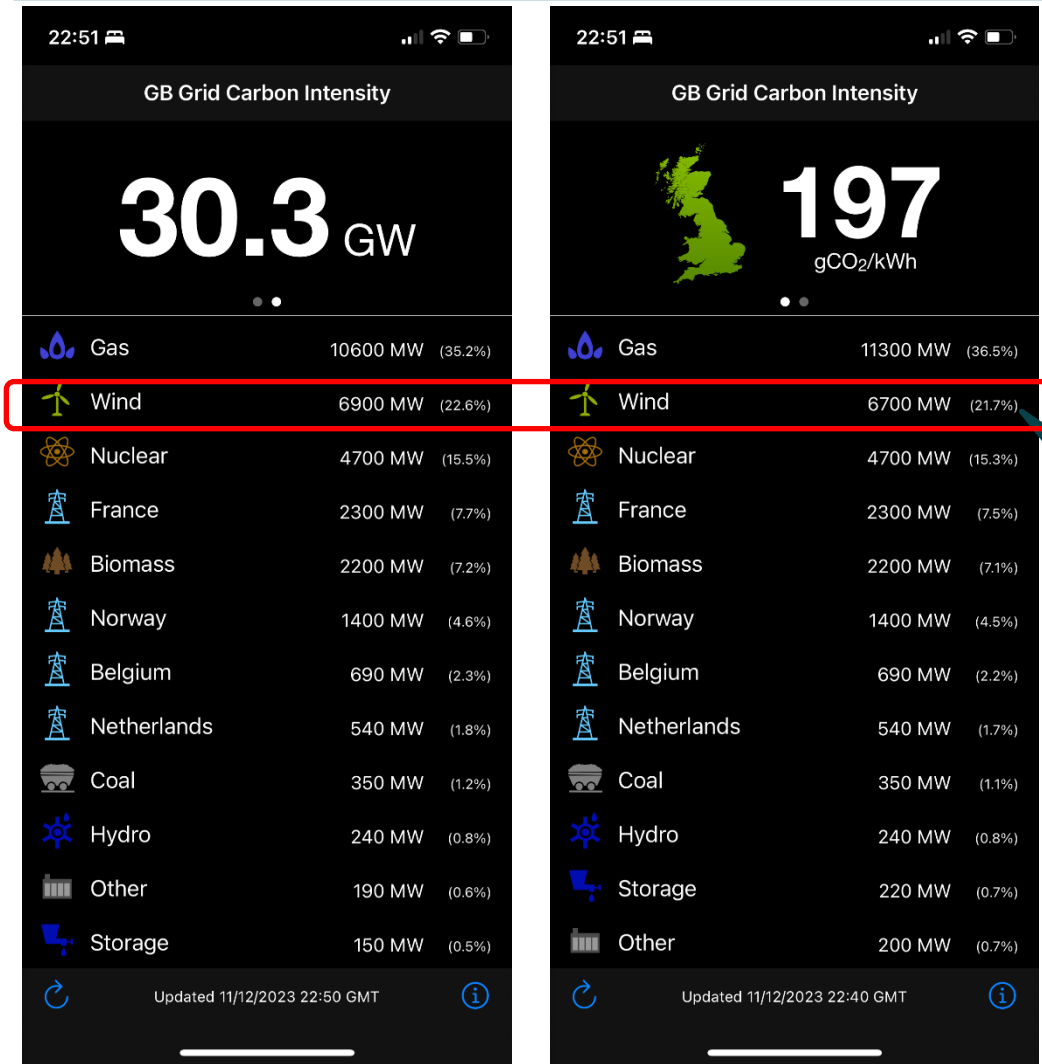


A still day in November 2023

5.7%

# Expert insight into offshore wind in the UK

## A closer look at intermittency



A windy night in December 2023

21.7%

# Expert insight into offshore wind in the UK

## A closer look at intermittency

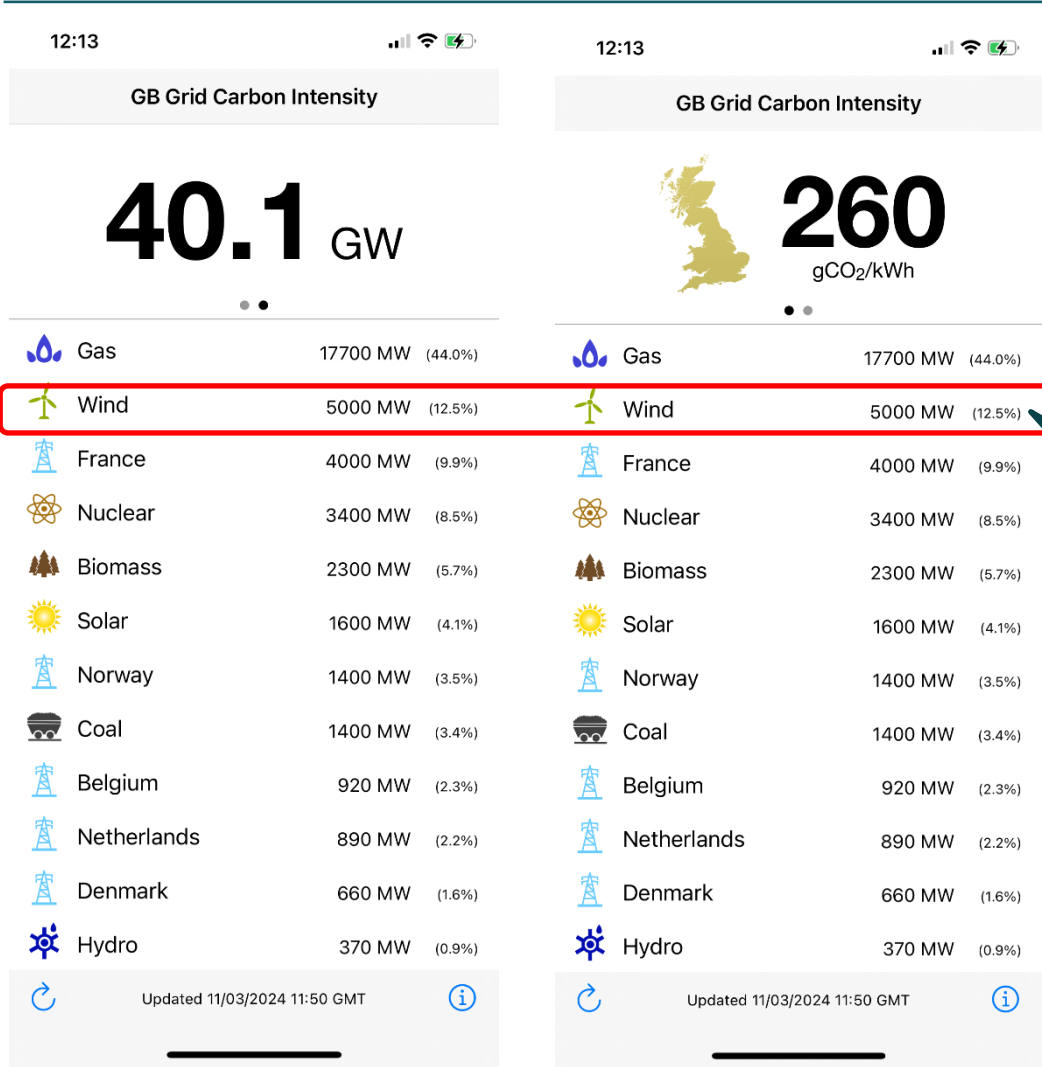


A much windier night in January 2024

38.8%

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## A closer look at intermittency



A still day in  
March 2024

12.5%

# Expert insight into offshore wind in the UK

## Conclusions

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### OFFSHORE WIND:

- Has been and will continue to be a UK success story
- Will play a big part in reaching net zero by 2050
- Not a silver bullet



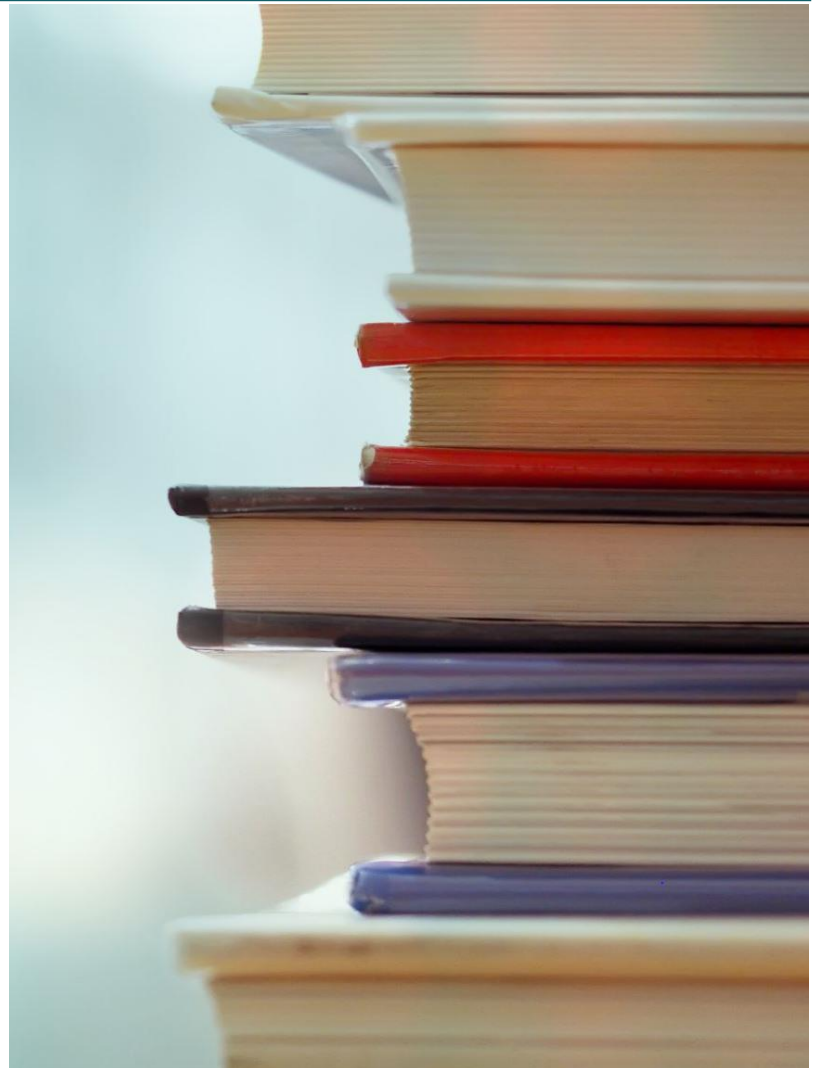
# Questions



# Expert insight into offshore wind in the UK

## Resources

- 4C Offshore - <https://www.4coffshore.com/>
- The Crown Estate Offshore Wind - <https://www.thecrownestate.co.uk/our-business/marine/offshore-wind>
- Ofgem Offshore Transmission - <https://www.ofgem.gov.uk/energy-policy-and-regulation/policy-and-regulatory-programmes/offshore-electricity-transmission-ofto>
- British Energy Security Strategy - <https://www.gov.uk/government/publications/british-energy-security-strategy>
- Offshore Wind Sector Deal - <https://www.gov.uk/government/publications/offshore-wind-sector-deal>
- Offshore Renewable Energy Catapult - <https://ore.catapult.org.uk/>
- Government electricity statistics - <https://www.gov.uk/government/collections/electricity-statistics>



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