

26th February 2020

Future Renewable Energy Opportunities

Anthony Kinsella

First integrated energy utility generating 100% green energy Focus on renewable generation, smart grids and customer solutions



£6bn UK investment
between 2018 - 2022



Over **2,000 MW**
of wind capacity



5 million electricity and gas
retail customers across UK



3.5 million Network supply points
and over **110,000 km** of power lines



A team of over
5,600 people



2000



Dun Law Windfarm
600kW Vestas WTG
26 Turbines
17MW Site

2005



Black Law Windfarm
2.3MW Siemens WTG
42 Turbines
96MW Site

Next Gen



Image: Siemens Gamesa Renewable Energy

Arecleoch Extension

12 Turbines
72MW site

Technology Development

2014



WoDS
3.6MW turbines
108 turbines
389MW site

2019



East Anglia ONE
7MW SGRE WTG
102 Turbines
714MW Site

202?

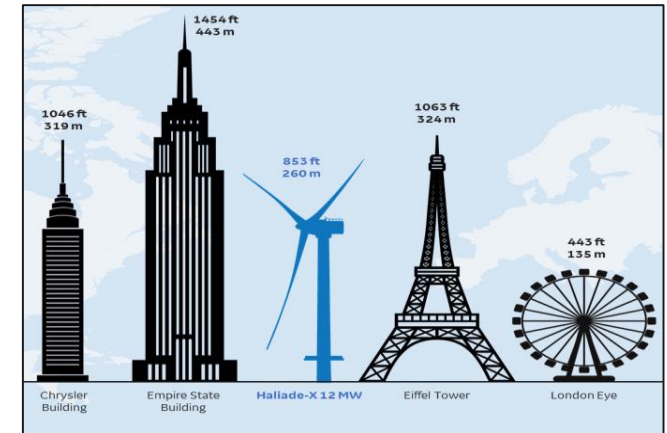


Image: GE Halidade

EA Hub
3.1GW Site

Reducing Cost of Energy

ROC Scheme (2003-17)

- Established supply chain
- Enabled growth
- Encouraged scale

£100+
/MWh

Post ROC (2018-)

- Lowest cost of energy
- Moving towards subsidy free prices
- Attracting industry leaders

£45
/MWh*

Offshore demonstrators (2011)

- Proved technology
- Enabled supply chain growth

£142
/MWh*

CfD Allocation 3 (2019)

- Competitive CfD process
- 55% cheaper than nuclear

£39.65
/MWh

The Telegraph

HOME » NEWS » UK NEWS

Celebrities join wind farm protest

By Stewart Payne

12:00AM GMT 13 Nov 2002



Made for minds.

Winds of change: France faces challenges as it embraces offshore wind power



INDEPENDENT
UK'S LARGEST QUALITY DIGITAL NEWS BRAND

Environment > Green Living

Half of planned wind farms blown away by force of local protests

By Lewis Smith and David Prosser | Monday 11 July 2011 00:00 |

THE NATIONAL INTEREST | APR. 2, 2019

Trump Says Wind Turbine Noise Causes Cancer.

By Jonathan Chait [@jonathanchait](#)

Public Perception



Source: BBC



Source: The Independent



Source: USA Today



offshore wind goal

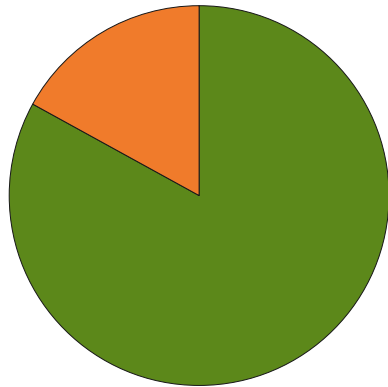
Source: RECharge News



Source: BBC

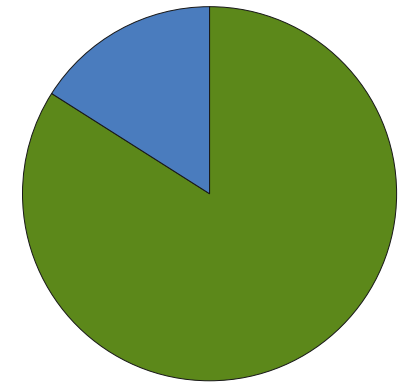
Public Perception

YouGov poll - 17% of people oppose onshore wind¹

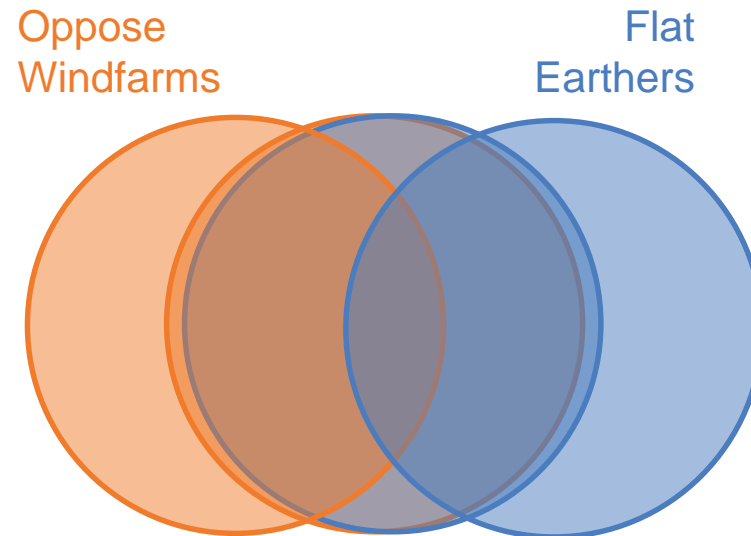


■ Not Opposed ■ Oppose

84% of people believe the world is round²



■ Believe World is round ■ Don't believe



The Future Market



Where are we now?

What has been achieved?

Low-cost renewable electricity



Mature technologies and supply chains



Widespread public and political support



What do we need?

Further growth of onshore and offshore renewables

Decarbonisation of heat and transport

Providing baseload and balancing the grid

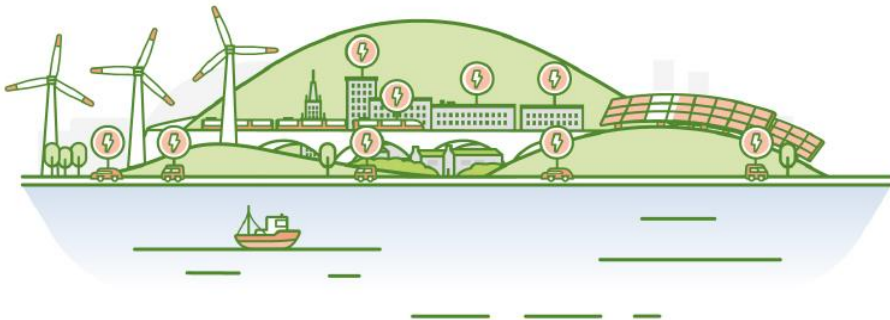
The Market – our energy system is changing

The energy system is changing...



- Legally binding climate goals will drive a fundamental change in the system
- Shifting from a model of large power stations and one-way flows of electricity
- Decreasing proportion of fossil fuels gives way to intermittent renewables

... Creating new opportunities



- Balancing the grid currently costs £1.4bn annually
- 93% of these services are provided by fossil fuel generators

Net Zero in the Electricity Sector



Net Zero in the Electricity Sector

What Does Zero Carbon look like?

- Removing thermal plants leaves a generation gap which will have to be filled
- Renewables can fill the gap, but thermal plants also help to balance the system
- Future renewable projects have to deliver power and help balance the grid

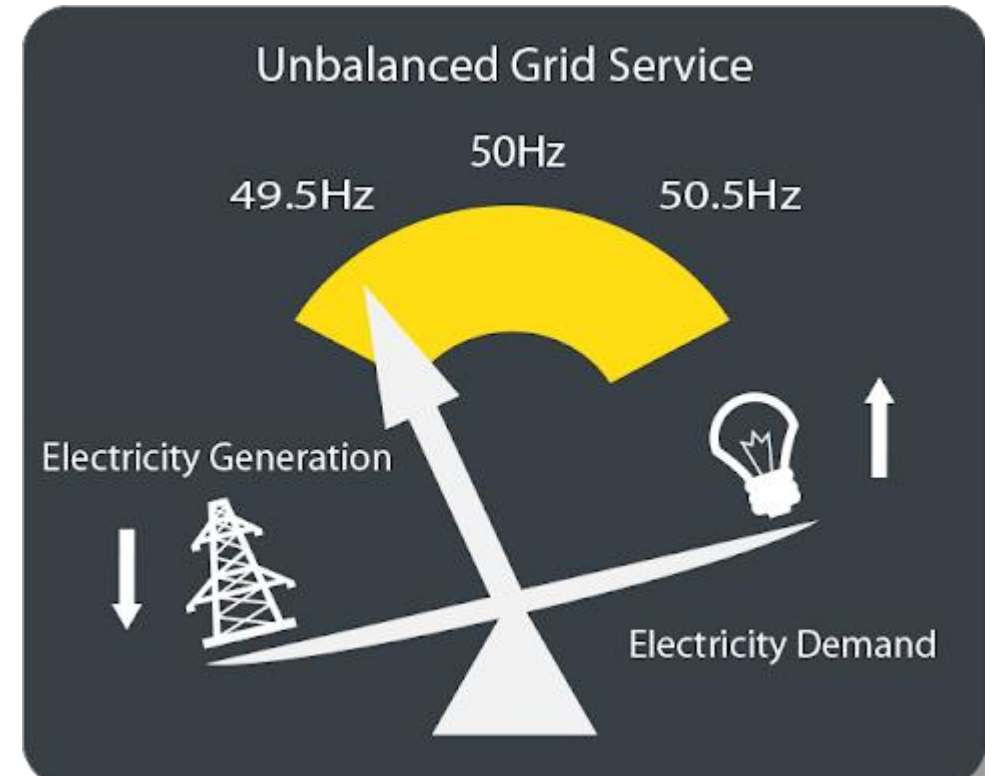


Image: Northern Utilities

Energy Storage and Intermittency

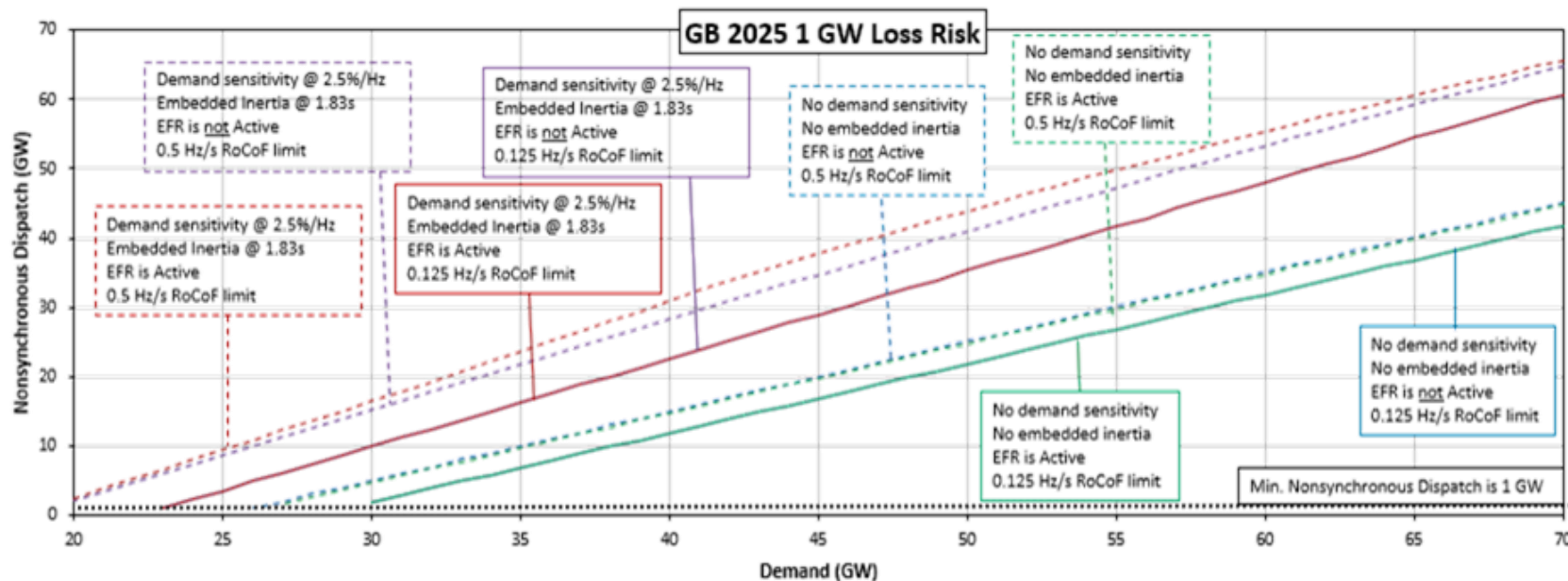
- Lithium Ion batteries provide 1-4 hours of peak shaving and time-shifting opportunities
- Multi-technology hybrid sites allow the generator to trade-off renewable resource
- Long periods of low wind/low solar requires substantial storage volumes



Image: Renewable Energy Magazine

Balancing the System

- The electricity system is operated between 49.5Hz and 50.5Hz
- Coal and Gas power stations operate at 50Hz and provide inertia
- The system also has to balance generation and demand
- Reducing inertia limits the system operator



Balancing the System

- Electrification is key to decarbonisation
- We will need to remove CCGTs and coal from the system
- Reduction in inertia and stops inherent balancing
- Low inertia limits renewable generation


We need renewable solutions to provide inertia and balance the grid

Balancing the Grid



Summary

Innovation has driven the renewables industry forward
Progress has been made with decarbonisation



Zero carbon requires removal of conventional plants
A lack of inertia reduces the renewables limit



We need new solutions to balance the grid
Future sites have to be designed for grid balancing