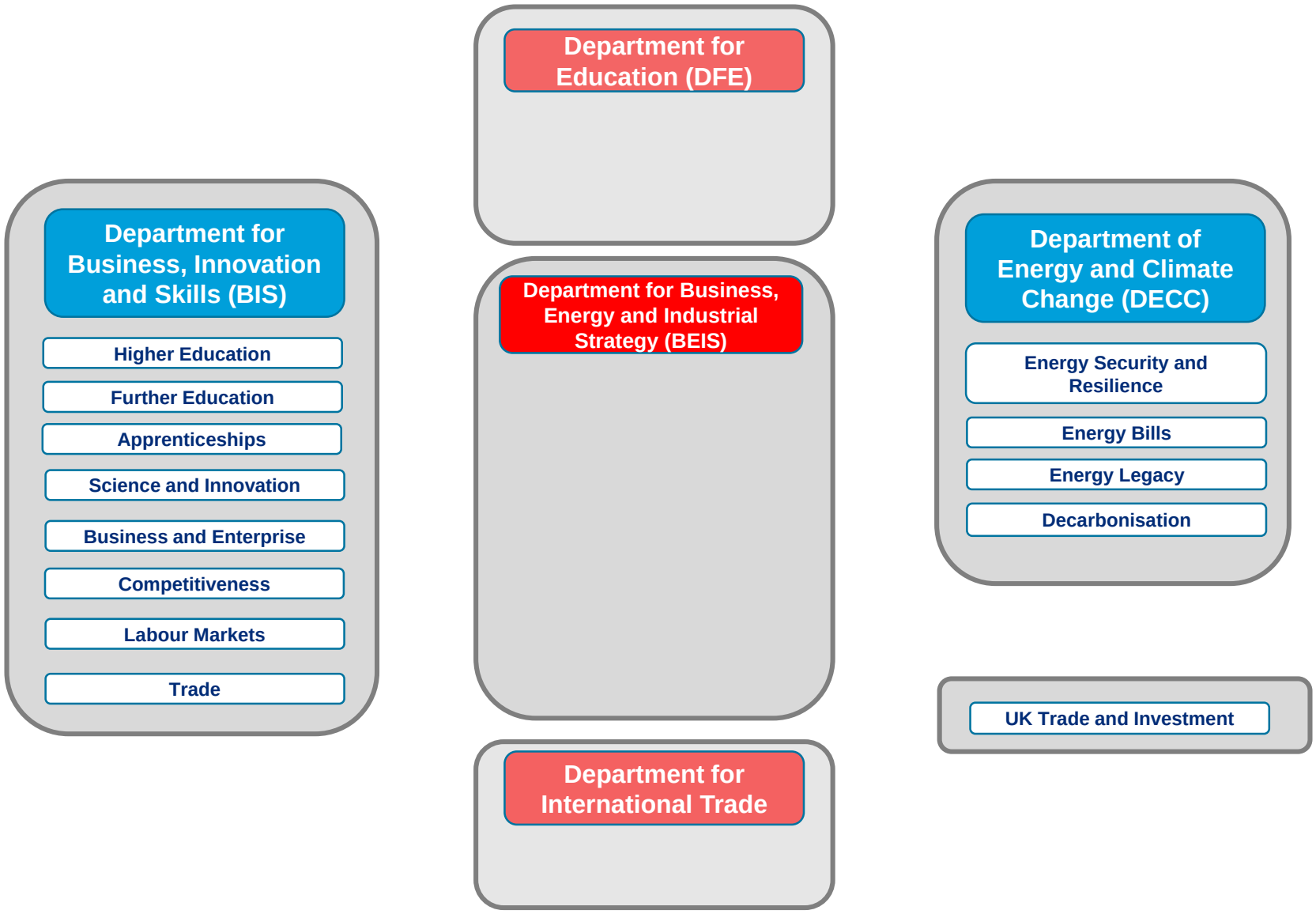
The View from Here

Professor John Loughhead OBE
Chief Scientific Adviser


Department for Education (DFE)
Department for Business, Energy and Industrial Strategy (BEIS)
Department for International Trade
Department for Business, Innovation and Skills (BIS)
Higher Education
Further Education
Apprenticeships
Science and Innovation
Business and Enterprise
Competitiveness
Labour Markets
Trade
Department of Energy and Climate Change (DECC)
Energy Security and Resilience
Energy Bills
Energy Legacy
Decarbonisation
UK Trade and Investment

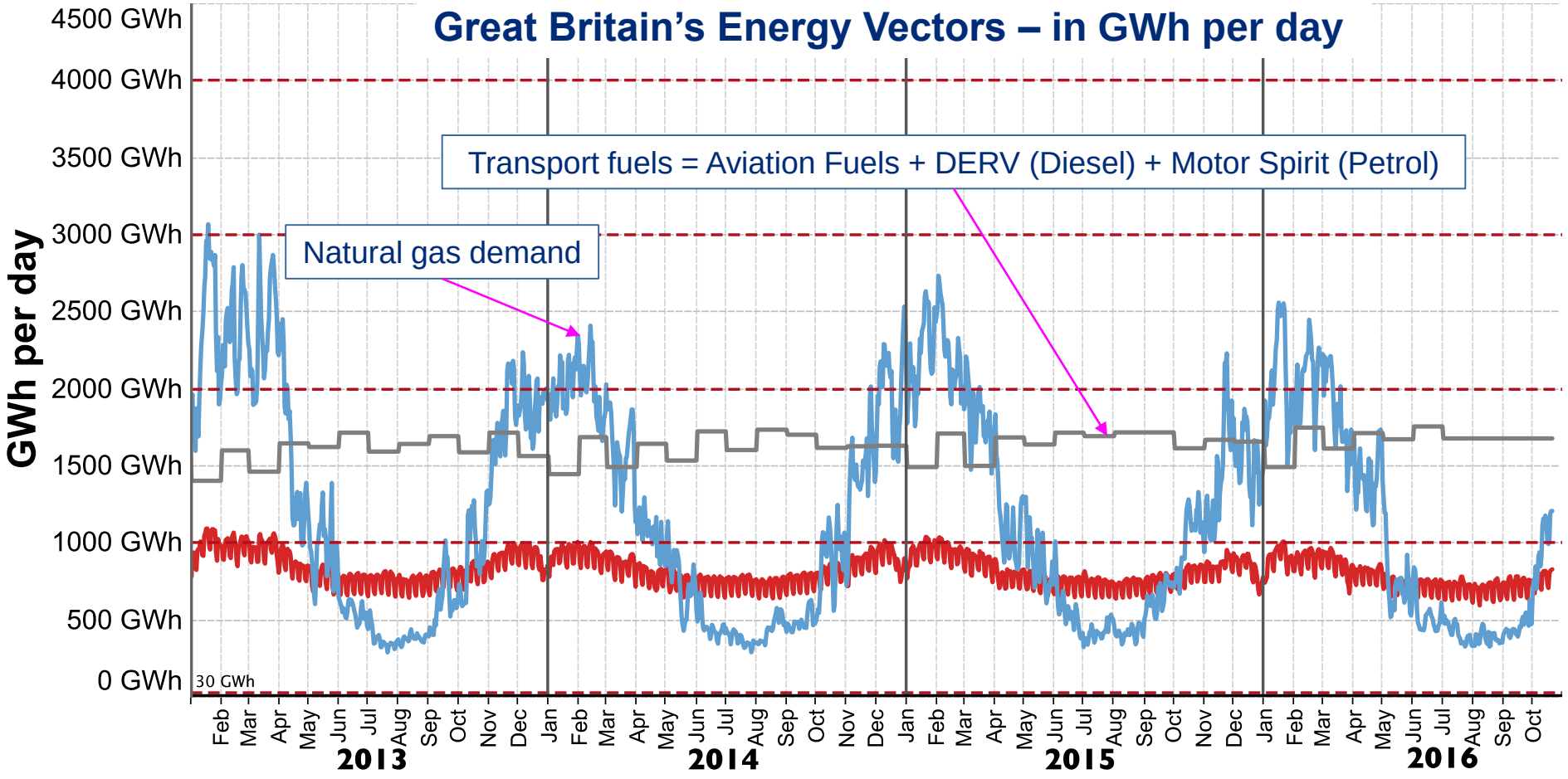
BEIS Priorities

Industrial Strategy	Energy	Research and Innovation	Climate Change	Business and Markets
Developing and delivering a comprehensive industrial strategy – utilising the UK's strength in science and innovation.	Ensuring that the country has secure energy supplies that are reliable, affordable and clean.	Maintaining the UK's position at the leading edge of science, research and innovation.	Working at home and abroad to reduce greenhouse gas emissions by investing in low-carbon energy sources.	Promoting investment and enabling competitive markets for a strong economy that safeguards consumers and workers.

Fourth and Fifth Carbon Budgets

Emissions Reduction (heating, industrial energy efficiency, transport and decarbonising power)

Smart Technologies



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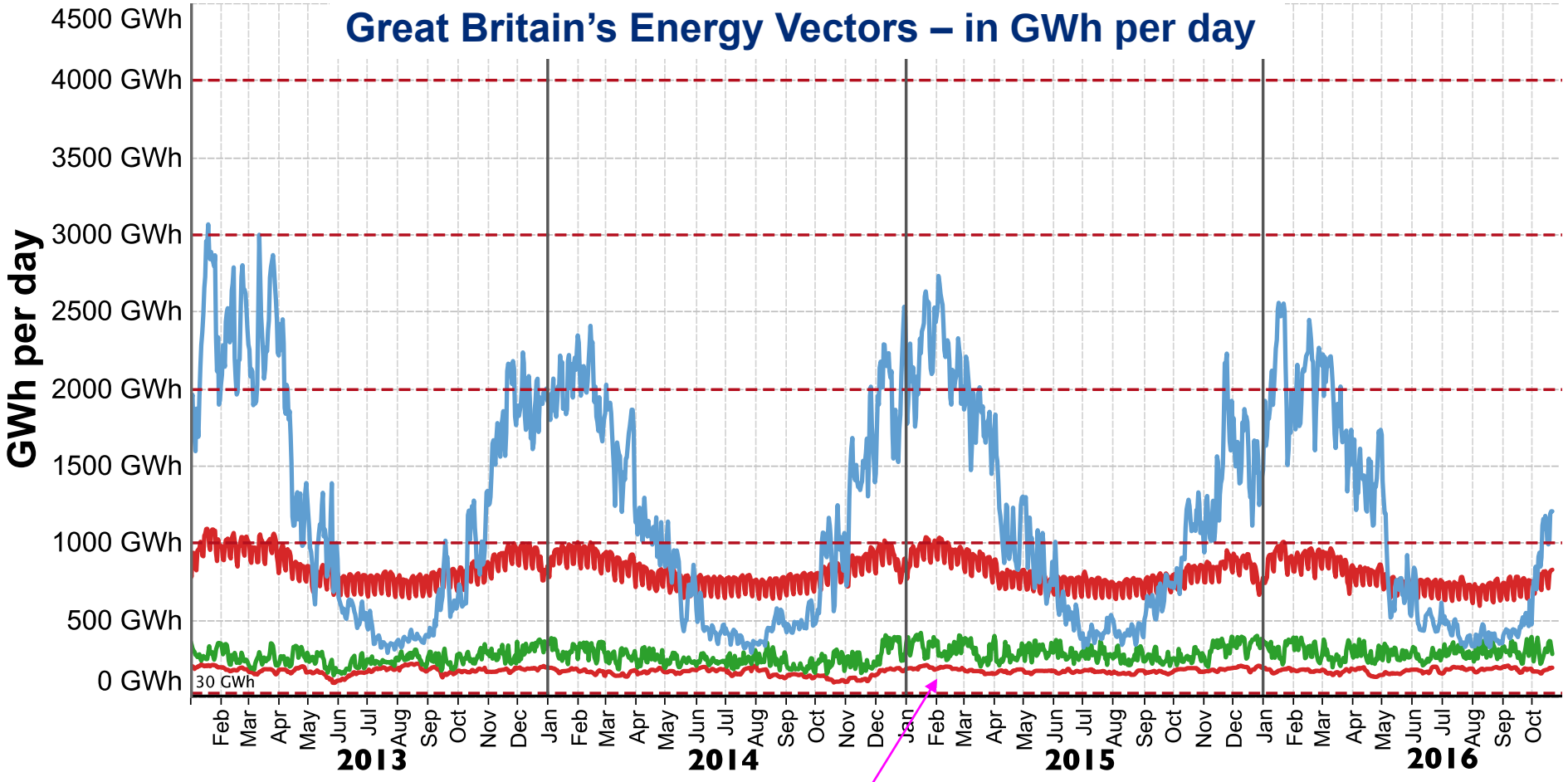

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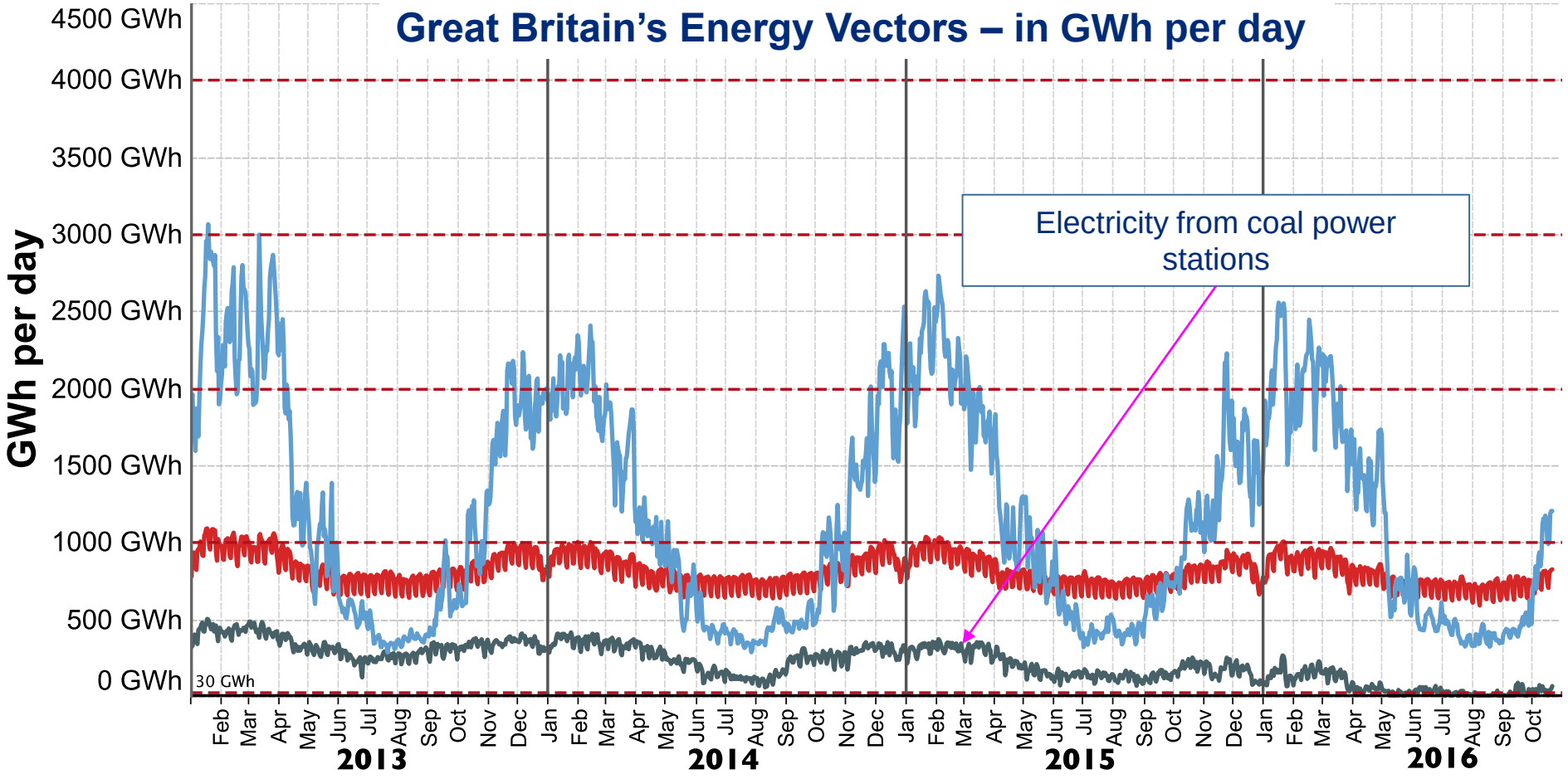
Electricity from nuclear (red), Low-carbon electricity including nuclear (Green)



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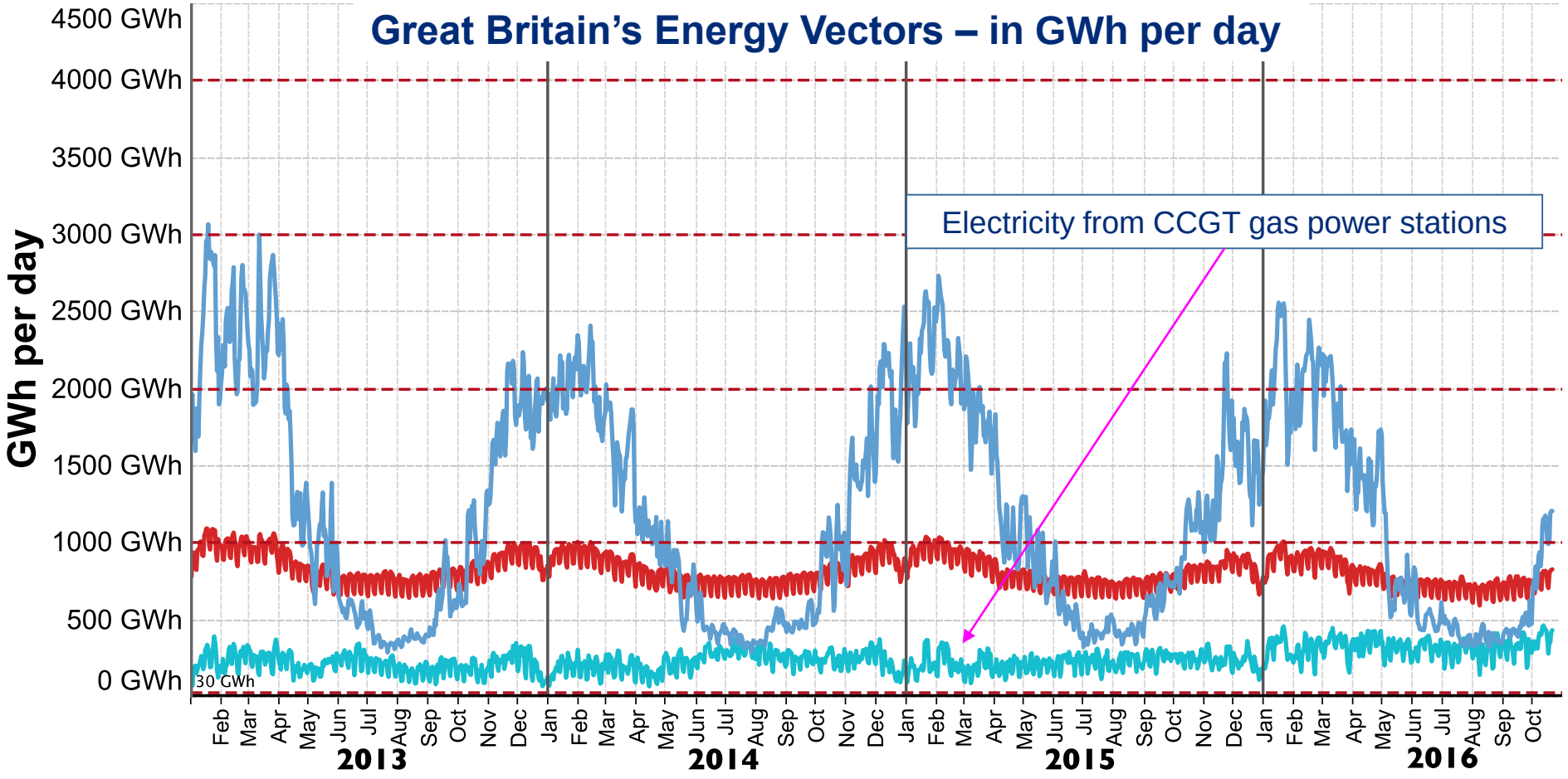

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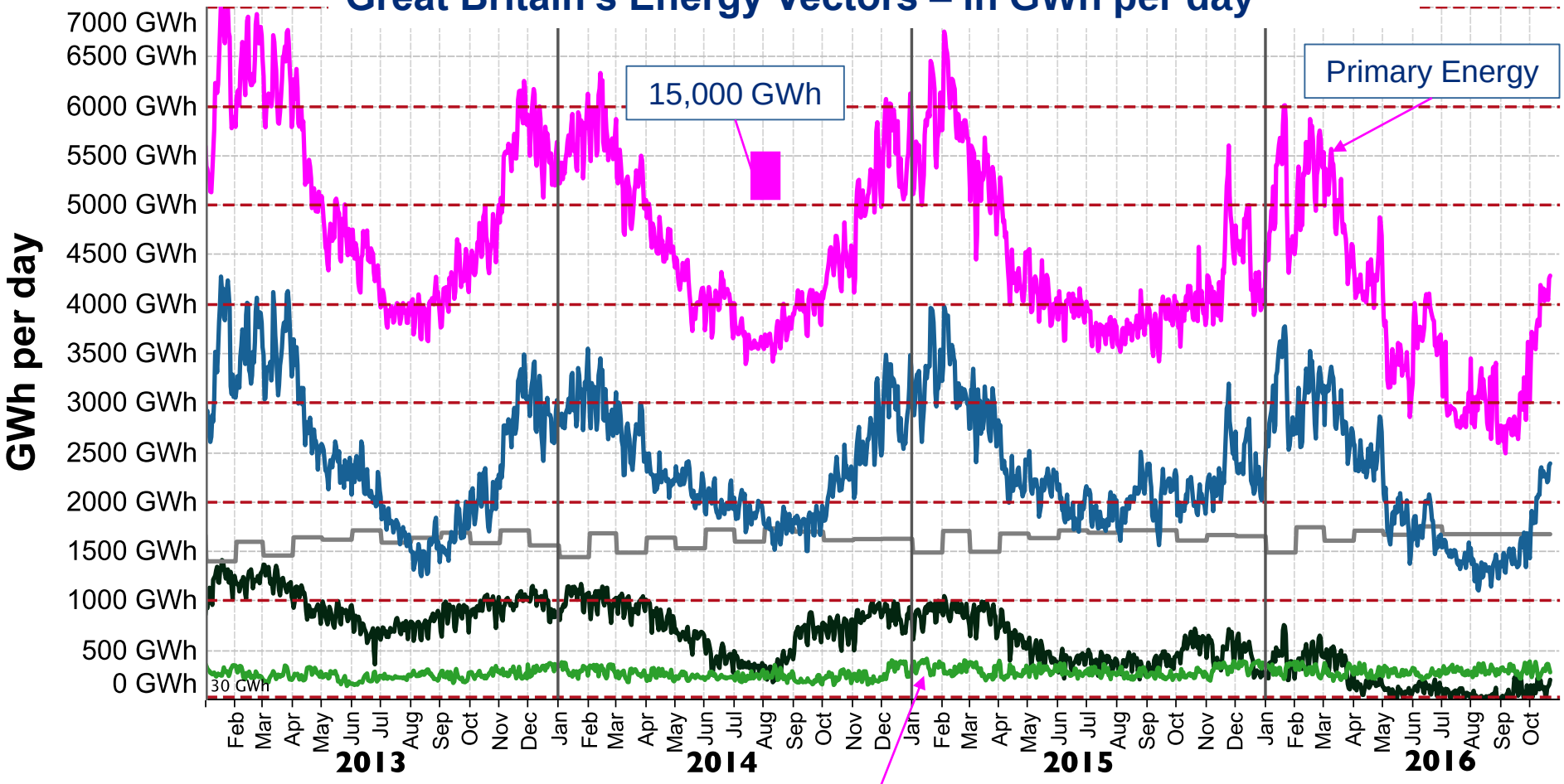
Great Britain's Energy Vectors – in GWh per day



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Coal to power stations (black), Low-carbon electricity (Green)

New Nuclear: Hinkley and Beyond

- Part of an affordable and clean energy system which will keep the lights on in the decades ahead.
- Hinkley Point C will provide up to 7% of UK's electricity
- Not just about Hinkley; there are proposals for 18GW of new nuclear capacity to be built by around 2030.
- An engineering challenge – one of the largest, most advanced reactors in development (1800 Mw)

EDF ENERGY

HORIZON NUCLEAR POWER

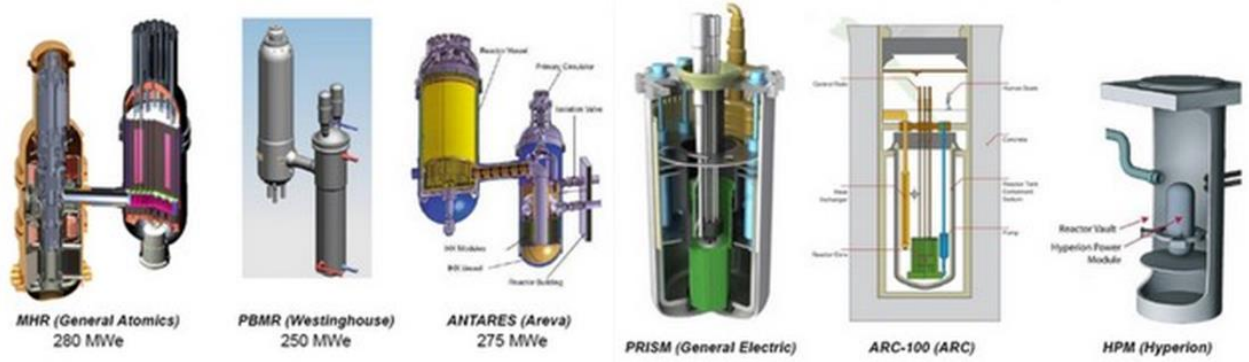
NU'GEN

Nuclear Innovation

- At Spending Review 2015, government committed to invest at least £250 million over the next 5 years in an ambitious nuclear research and development programme.
- Aim is to revive the UK's nuclear expertise and position the country as a global leader in innovative nuclear technologies.
- Part of this programme is a competition to identify the best value Small Modular Reactor design for the UK.
- Also includes at least £30 million to support Small Modular Reactor-enabling advanced manufacturing research to help develop skills capacity.

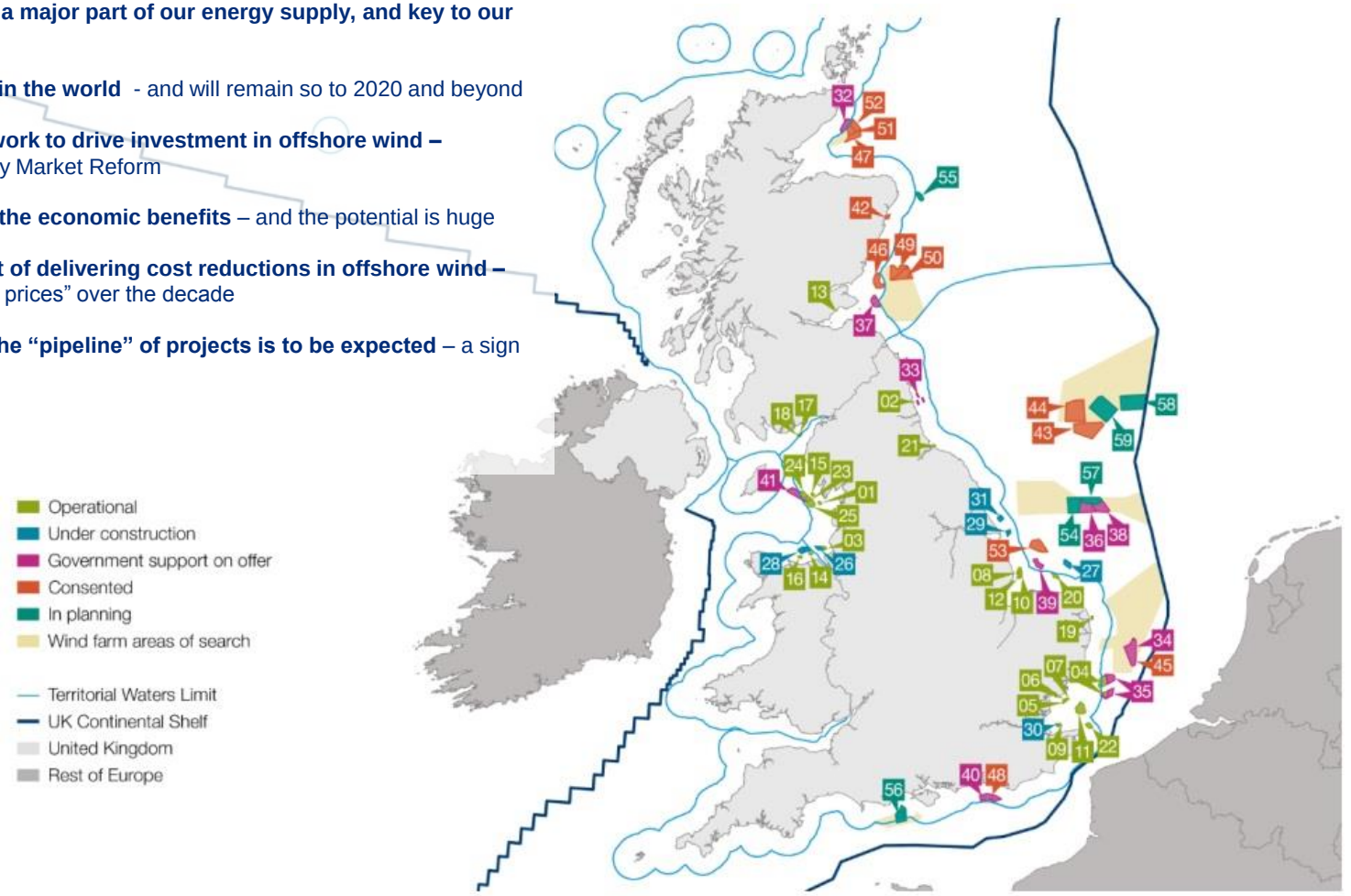
Small Modular Reactors

- Small Modular Reactors (SMRs) are a new approach to civil nuclear power generation.
- Typically a tenth of the capacity of a large reactor with a high degree of factory fabrication, potentially allowing economies of mass production.
- If SMRs achieve predicted learning rates they could be cheaper than comparative technologies.
- Mature technologies could be deployed in the UK by 2030.
- Novel technologies are more likely to deploy in the UK after 2030.
- Government recognises the potential of SMRs and is committed to exploring that through the competition.



Offshore Wind

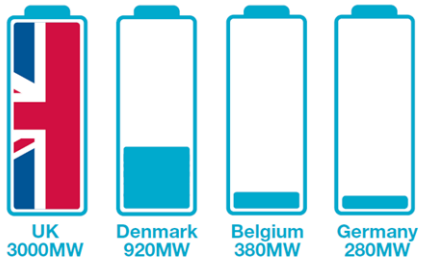
- **Offshore wind is already a major part of our energy supply, and key to our future**
- **UK market is the largest in the world** - and will remain so to 2020 and beyond
- **We have a strong framework to drive investment in offshore wind –** delivered through Electricity Market Reform
- **We are already securing the economic benefits** – and the potential is huge
- **The UK is at the forefront of delivering cost reductions in offshore wind –** reflected in reduced "strike prices" over the decade
- **Some rationalisation of the "pipeline" of projects is to be expected** – a sign of the sector maturing



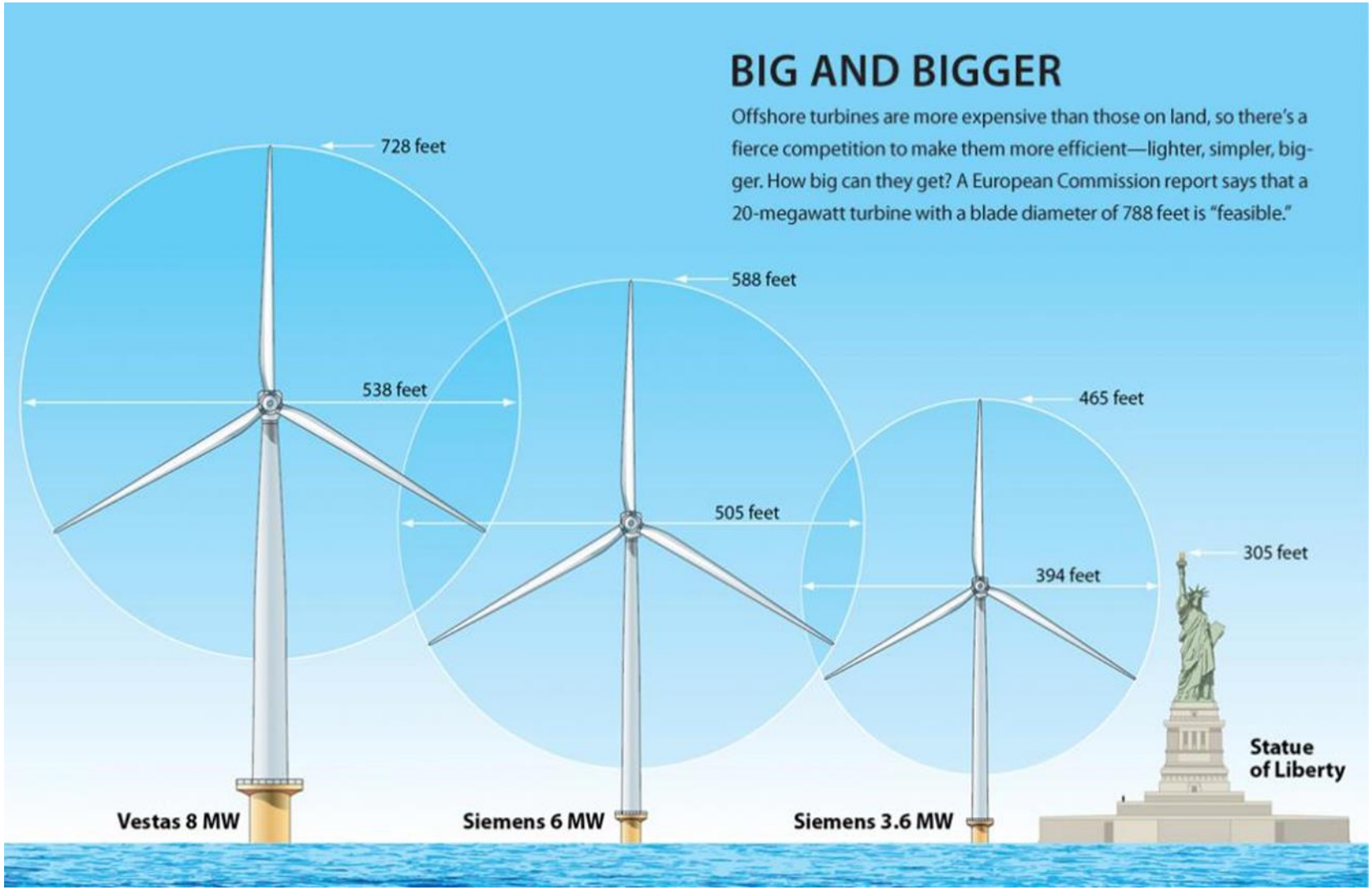
Offshore wind – benefits and potential

UK offshore wind industry has the potential to deliver in the order of **£7 billion each year** Gross Value Added (GVA) to the UK economy by 2020.

Electricity generated by **offshore wind more than doubled between 2010 and 2012**.

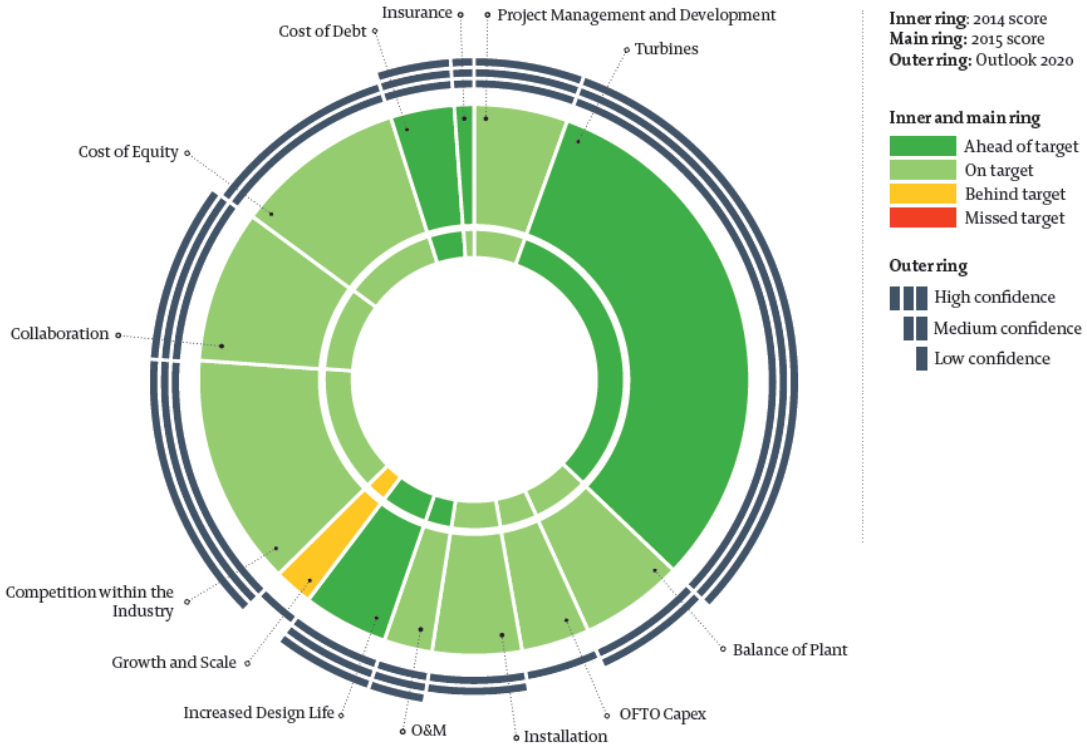


The UK is number 1 in the world for installed offshore wind capacity (2012 data).

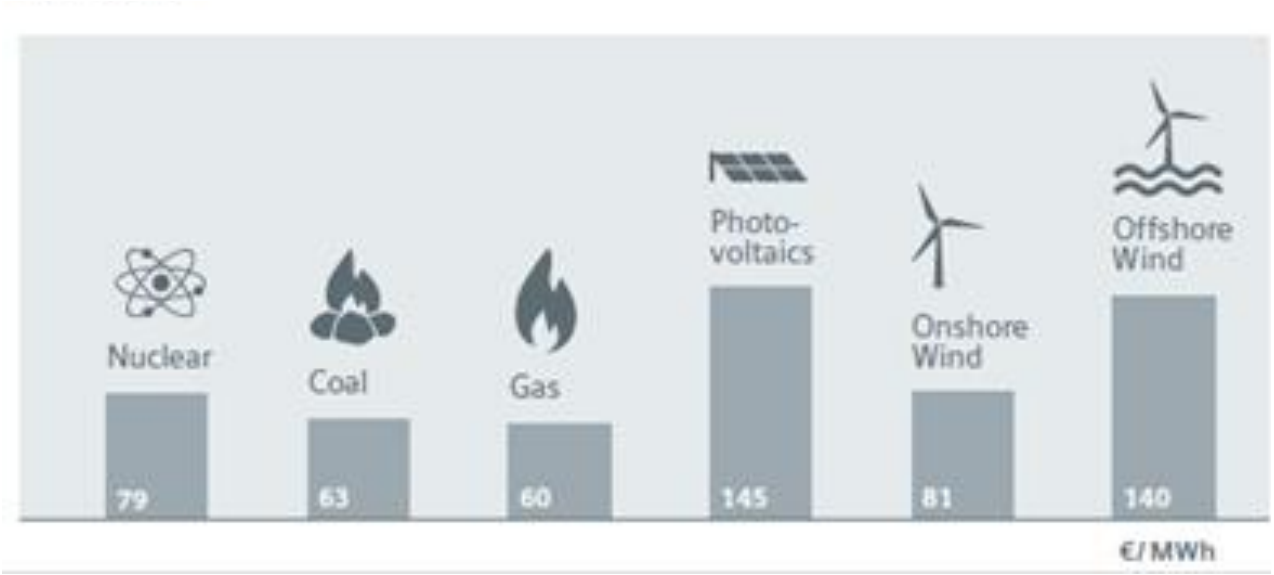

BIG AND BIGGER
Offshore turbines are more expensive than those on land, so there's a fierce competition to make them more efficient—lighter, simpler, bigger. How big can they get? A European Commission report says that a 20-megawatt turbine with a blade diameter of 788 feet is "feasible."
728 feet
538 feet
588 feet
505 feet
465 feet
394 feet
305 feet
Statue of Liberty
Vestas 8 MW
Siemens 6 MW
Siemens 3.6 MW

Delivering cost reductions in offshore wind

Cost Reduction Monitoring Framework

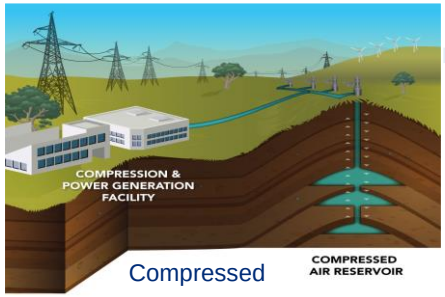


Levelized cost of electricity



LCOE (2013)

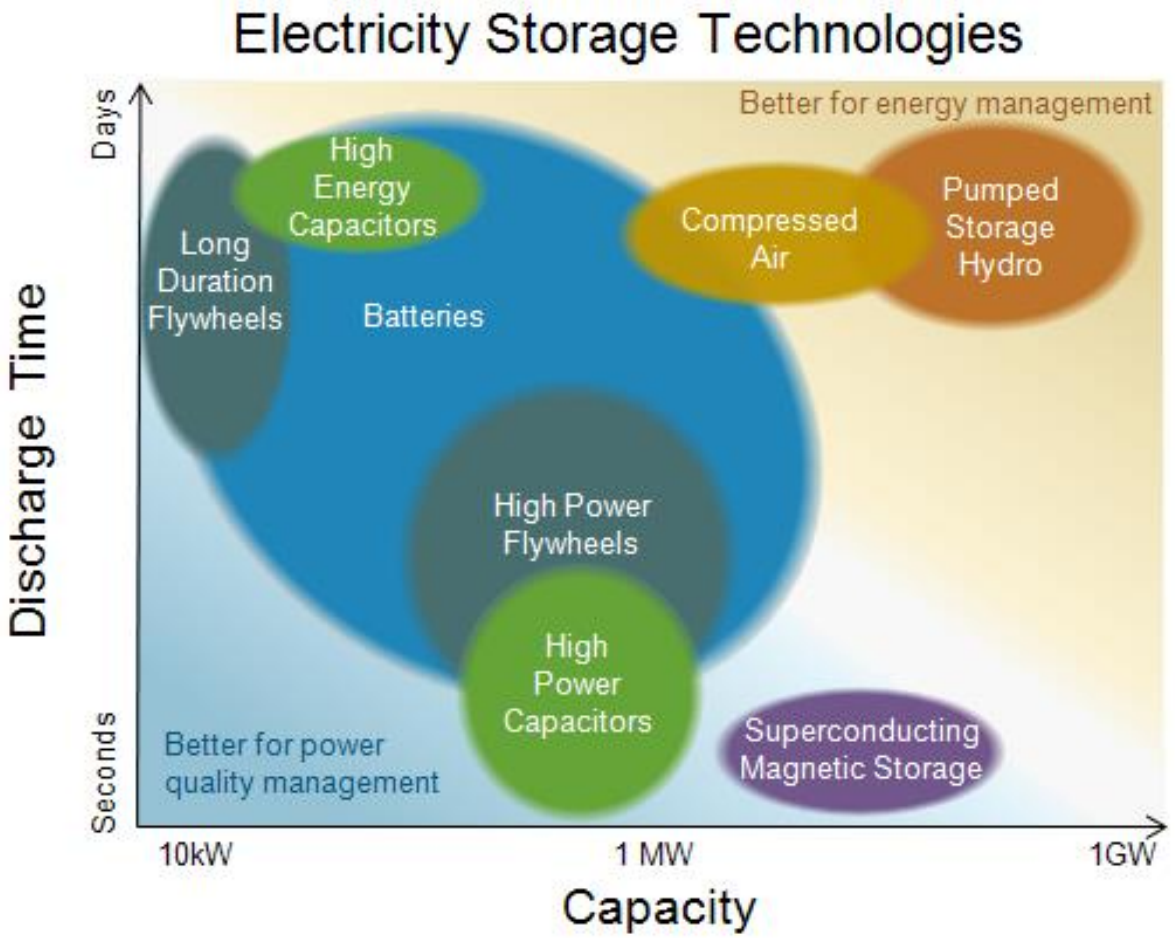
Smart Systems - Key Storage technologies



Compressed air energy storage

Grid scale Flow Battery

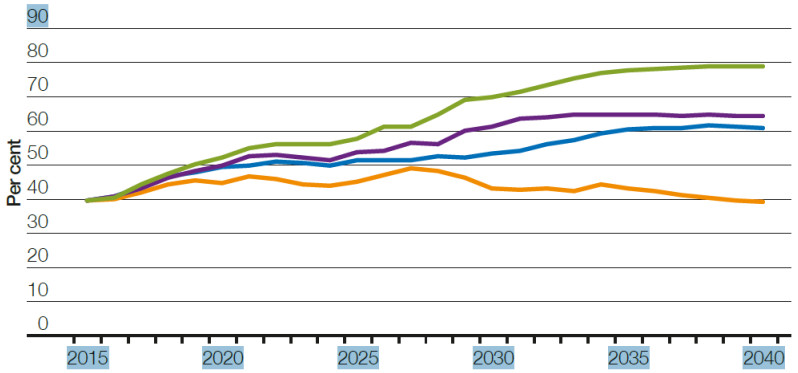
Lithium ion domestic battery



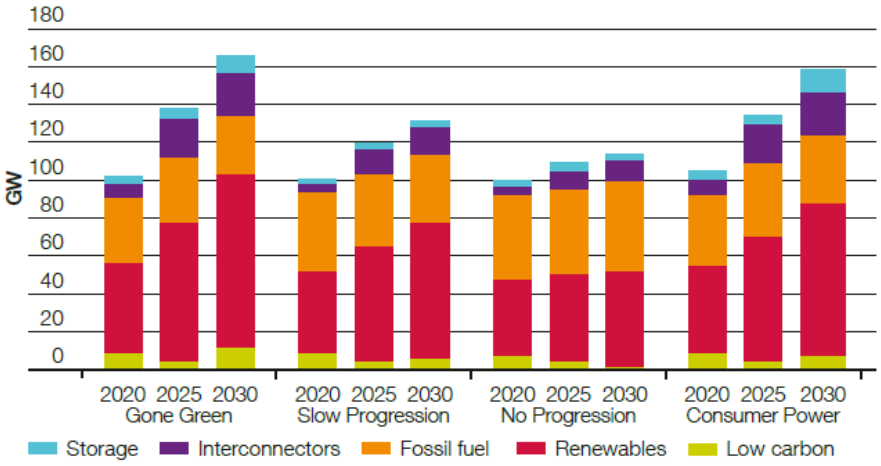
Peak electricity demand scenarios – National Grid

Electricity generation

Percentage from low carbon sources



Amount of installed generation by type 2020–2030

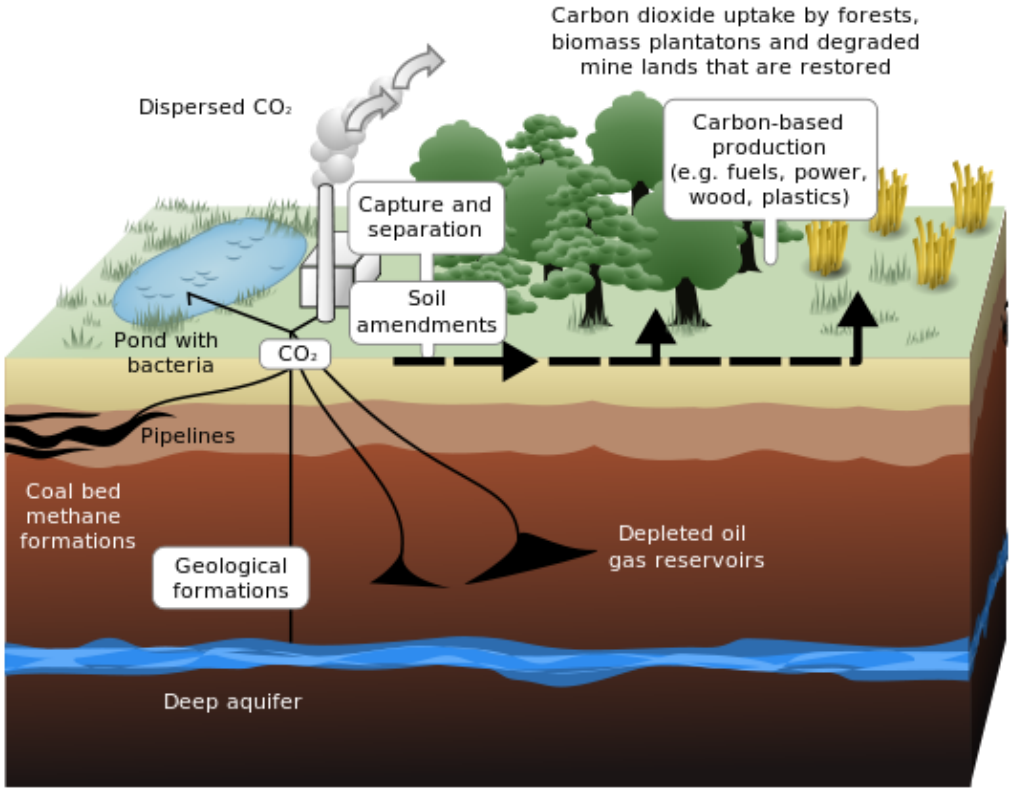


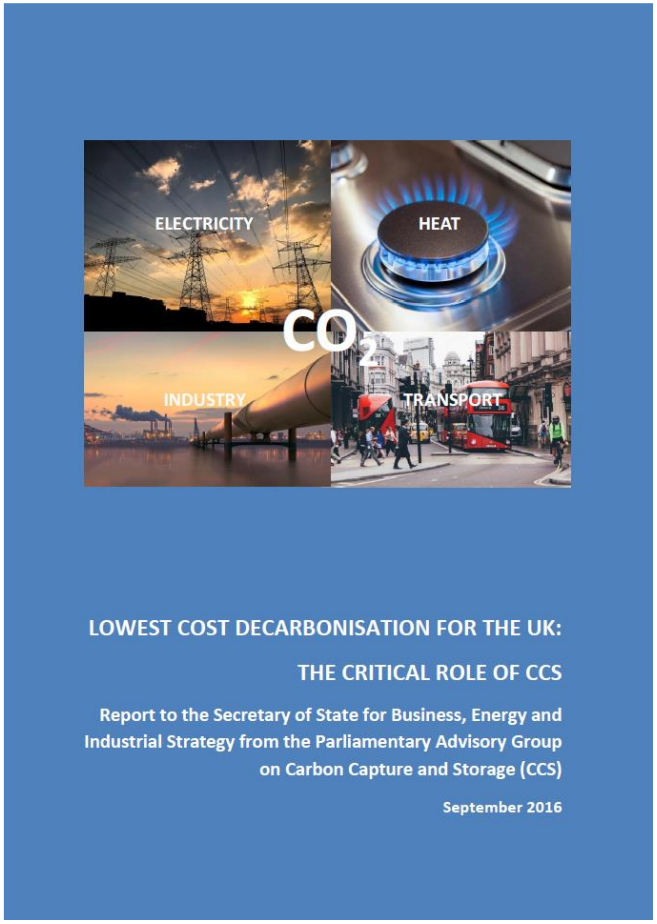
Source:
National Grid, Future Energy Scenarios, July 2016 (http://fes.nationalgrid.com/)

BEIS Policy Work on Energy Storage

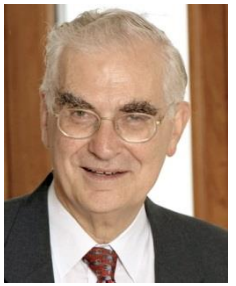
Levelling playing field for smart technologies	• Address **barriers to storage deployment** • **Clarify role of aggregators**
Delivering clearer price signals	• **Incentivise consumers** to offer up their flexibility
Catalysing further innovation	• Support through **innovation funding** those areas critical to the development of a smart energy system.
Examining case for more fundamental changes	• Consider what **system functions** are required in a future smart energy system and what are the resulting shifts in roles and responsibilities (e.g. from DNO to DSO).
Developing our analysis and evidence base	• Assess **costs and benefits**; how much flexibility might be '**least regrets**'; and identifying **evidence gaps** more broadly in this area.

Carbon Capture and Storage (CCS)





Lord Oxburgh



- ***CCS is essential for lowest cost decarbonisation***
- ***CCS works and can be deployed quickly at scale***
- ***CCS in the power sector has an essential enabling role***
- ***A system of economic regulation is needed***
- ***CCS infrastructure then facilitates decarbonisation in industry***
- ***Heat may be the most important sector for CCS in the long-term***
- ***CCS Certificates and a CCS Obligation provide the long-term assurance and incentive framework for the private sector***
- ***The government should act now. There is no reason for delay***

MISSION INNOVATION

Accelerating the Clean Energy Revolution

www.mission-innovation.net

Fostering greater multilateral collaboration to make clean energy widely affordable

World leaders launch *Mission Innovation* at the United Nations Climate Change Conference 2015 (COP21) in Paris-Le Bourget, France, November 30, 2015.
Photo credit: Gobierno de Chile, "Ceremonia de lanzamiento de la Iniciativa "Mission Innovation", November 30, 2015, Creative Commons Attribution 2.0 Generic License.

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Membership

- Australia
- Brazil
- Canada
- Chile
- China
- Denmark
- European Union
- France
- Germany
- India
- Indonesia
- Italy
- Japan
- Mexico
- Norway
- Republic of Korea
- Saudi Arabia
- Sweden
- United Arab Emirates
- United Kingdom
- United States

- Mission Innovation is a high-profile initiative seeking to strengthen international clean energy Research, Development & Demonstration.

- It was launched by heads of state/government on the first day of COP21, in Paris, in November 2015. To date it has 22 members.

- 29 high net worth investors led by Bill Gates formed the Breakthrough Energy Coalition (‘the Coalition’).

- The Steering Committee for the initiative is chaired by the US, with the UK, India and Indonesia as vice-chairs.

MISSION INNOVATION
Accelerating the Clean Energy Revolution
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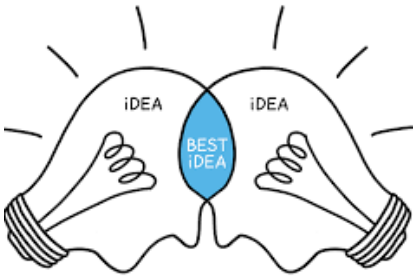
There are two parts to Mission Innovation:

Doubling Governmental Investment in Clean Energy Innovation

- $30 billion per year by 2021.
- The UK's commitment is to double Research Development & Demonstration investment to over £400 million in 2020/21.



Fostering increased transparency and strengthening collaboration

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Work undertaken by a number of sub-groups:

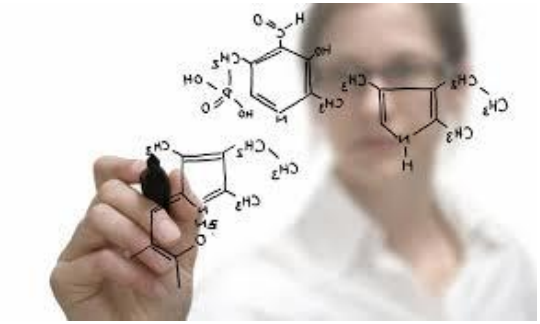
- Information Sharing
- Business & Investor Engagement
- Analysis & Joint Research

COP22

- Marks the near 1st anniversary of the initiative;
- 14 November - MI Ministerial event will include a number of announcements, including a new delivery approach;
- New delivery approach not sole MI activity - work under all sub-groups will continue.

MARRAKECH COP22|CMP12
UN CLIMATE CHANGE CONFERENCE 2016
مؤتمر الأمم المتحدة لتغير المناخ
ⵜⴰⵙⴷⴰⵡⵉⵜ ⵏ ⵜⴰⵎⵙⵙⵓⵔⵉ ⵜⴰⵎⴰⵡⴰⵙⵜ ⵏ ⵜⵣⵔⴼⵜ ⵏ ⵜⵉⵣⵡⵔⵉ

Summary




CREDIT CARD STATEMENT
Southern Electric
BT
BILLS
Overdue final bill - payment needed now
Total due £131.33
Payment Slip
Bank Giro Credit