

UK Nuclear & Public Opinion

Hong Kong University Symposium on Nuclear Safety
Trust and Governance

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Public Trust in Nuclear in UK

Three broad phases:

Technological Euphoria
1950 - 1970

Growing Doubts
1970 - 1990

Rebuilding Trust
2000 - present

UK Context

Military focus

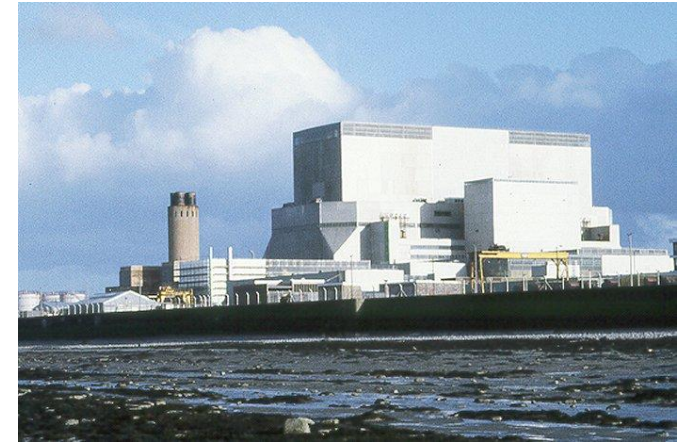
**Construction of
Reactors**

**Climate Change &
Energy Security**

UK Nuclear – Diverse Experience



Calder Hall Magnox
50MWe August 1956



Hinkley Point AGR
2 * 660MWe 1976



Dounreay PFR
250MWe 1975



Sizewell B PWR
1195MWe 1995

Current Nuclear Contribution

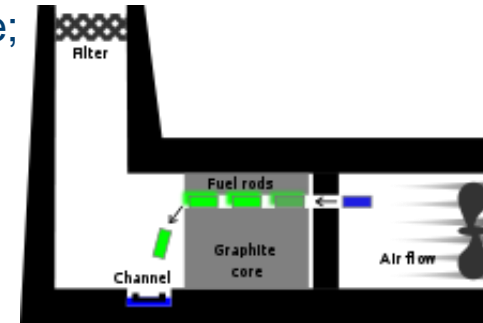
- 15-20% of electricity supply from nuclear – major electricity elements: gas and coal – nuclear energy supplied by:
 - Fourteen 660MWe AGR reactors built between 1972 and 1990,
 - Last 300 MWe Magnox reactor at Wylfa;
 - One 1100MWe PWR at Sizewell.



**Heysham 1 A&B and 2 A&B
AGR**

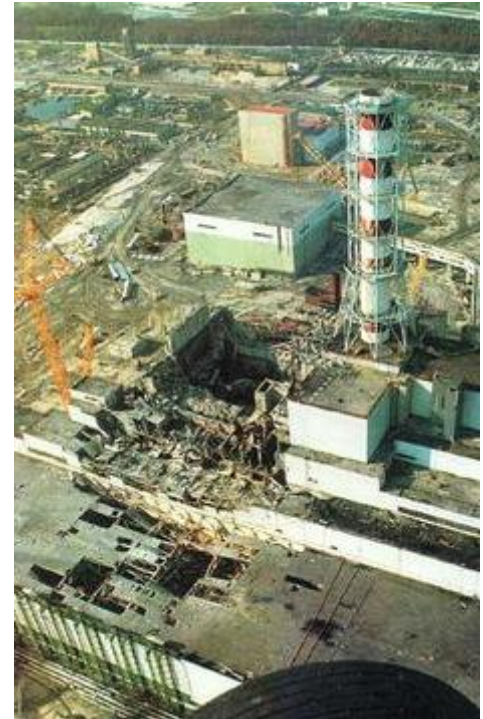
Nuclear Safety and the Windscale Fire [1]

- In October 1957 - one of two military production reactors caught fire;
- Windscale reactors consisted of a uranium fuelled graphite core cooled by air - contained almost 2000 tonnes of graphite, and measured over 7.3 metres by 15.2 metres;
- Fire destroyed the core of Cs-137 and 740 TBq of Iodine-131;
- Led to a major national alert – level 5 INES;
- As a precautionary measure, milk from surrounding farming areas was destroyed;
- Changed attitude to nuclear power, to safety and emergency response forever;
- Establishment of independent and effective nuclear safety regulator and local emergency response plans.



Attitudes to Nuclear Safety - UK

- Nuclear Energy was first applied for weapons - which had the effect of:
 - Confusing nuclear reactors with nuclear bombs;
 - Amplified the fear of radiation because of death toll of bombs at Hiroshima & Nagasaki in 1945;
 - Technology was both clouded in secrecy and impenetrable to the general public;
- In 1970s UK concerns came to a head around the THORP reprocessing plant and investigations of childhood cancers in the Sellafield area;
- Though THORP was approved and the childhood cancers were shown not likely to be caused by radiation, the issue of lack of public trust was evident;
- These concerns about nuclear were amplified by first the loss-of-coolant accident in US at Three Mile Island and the much more serious explosive accident at Chernobyl.



**Chernobyl
disaster 1986**

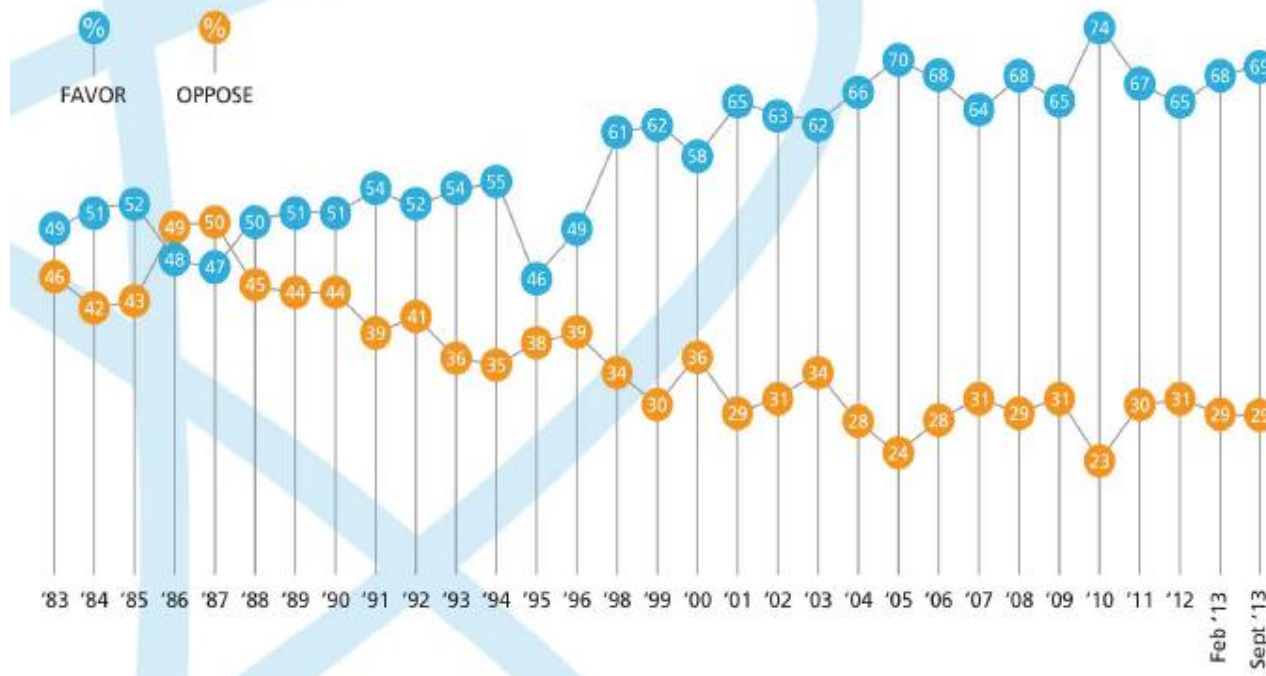
Moving Attitudes to Nuclear Safety - UK

- What has been done to attempt to re-gain public trust?
 - Issues such as public health, safety and nuclear waste should be resolved **by open** and **science-based** debate, including access for the **detractors**;
- What was done?
 1. Independent and competent safety regulator, established by law NII in 1965;
 2. All nuclear incidents reported publicly and immediately, however small – with open follow-up reviews of cause and lessons to be learned;
 3. All nuclear sites develop a consultative arrangement with local bodies;
 4. All nuclear sites develop an open emergency response plan with local bodies;
 5. Windscale childhood cancer concerns analysed by an external eminent scientist – not by the industry, or by the government;
 6. Nuclear waste policy considered by broad based, independent group (CoWRM), including opponents and critics of the policy.

US Public Views of Nuclear Power [2]

Percent Who Favor and Oppose Nuclear Energy: Annual Averages 1983 to 2013

"OVERALL, DO YOU STRONGLY FAVOR, SOMEWHAT FAVOR, SOMEWHAT OPPOSE OR STRONGLY OPPOSE THE USE OF NUCLEAR ENERGY AS ONE OF THE WAYS TO PROVIDE ELECTRICITY IN THE UNITED STATES?"



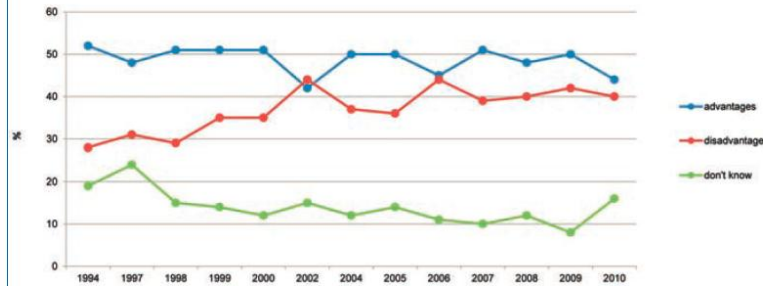
- Eighty-two percent believe that nuclear energy will play an important role in meeting the nation's electricity needs in the years ahead [2] - 2013;

Comparative Attitudes in Europe [3]

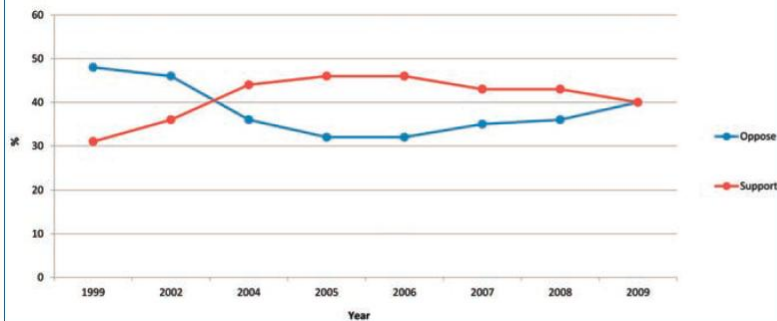
Advantages and drawbacks of nuclear

To your mind, the decision to produce three quarters of the French electricity production with nuclear power results in rather advantages or drawbacks?"

Source: CREDOC⁴



France



Should a fifth NPP be built in Finland?

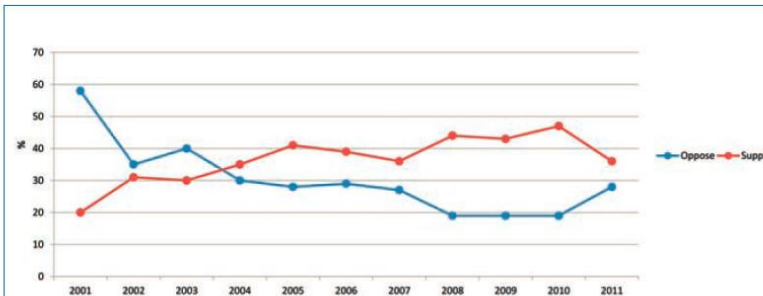
Source: "Finnish Attitudes Towards Energy Issues", TVO and Fortum⁵



Finland

To what extent would you support or oppose the building of new nuclear power stations in Britain to replace existing ones?

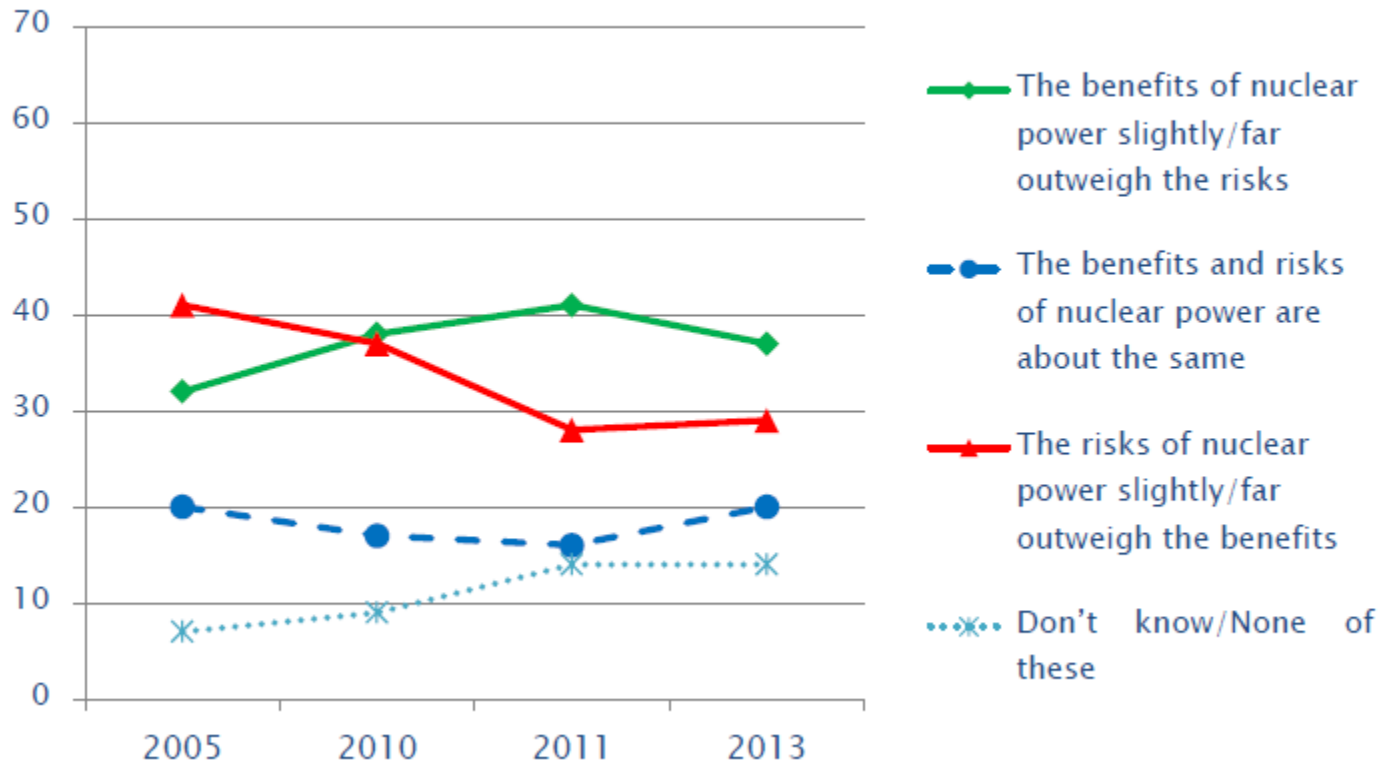
Source: Ipsos MORI



United Kingdom

Balance of Opinion tipped by Climate Change

Figure 3. Perceived risks and benefits of nuclear power (in %)



MORI Poll data analysed by U of Cardiff - Reference 4

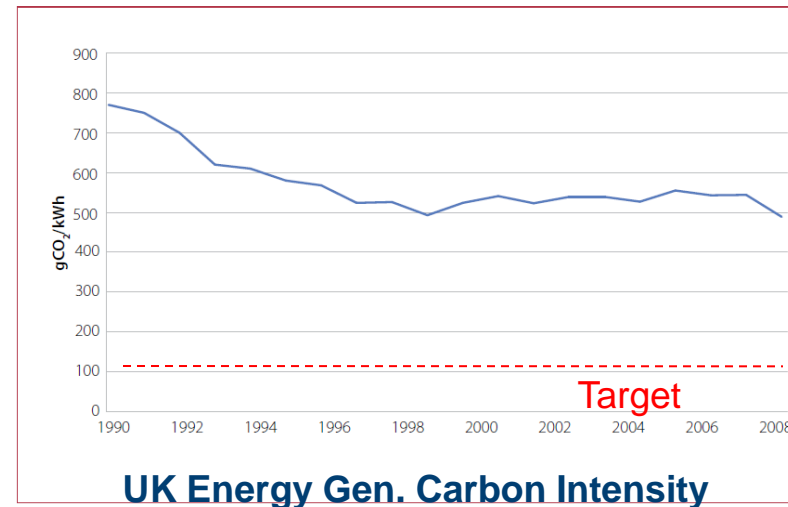
UK Public Opinion & Nuclear

- **Negative view of nuclear power as recently as 2002 – viewed as:**
 - Expensive – high cost to build risky to operate;
 - Fear of a nuclear accident – Effect of Chernobyl radiation spread & a view that many thousand would die as result of the accident;
- **What changed?**
 - Nuclear power advanced as a means of enabling both low-carbon electricity generation and energy security;
 - Evidence that dangers from Chernobyl radiation had been overstated;
 - Perception of climate change as a significant risk tends to make people more open to the idea of new nuclear facilities - ‘reluctant acceptance’; [4]

UK Energy - Why New Nuclear?

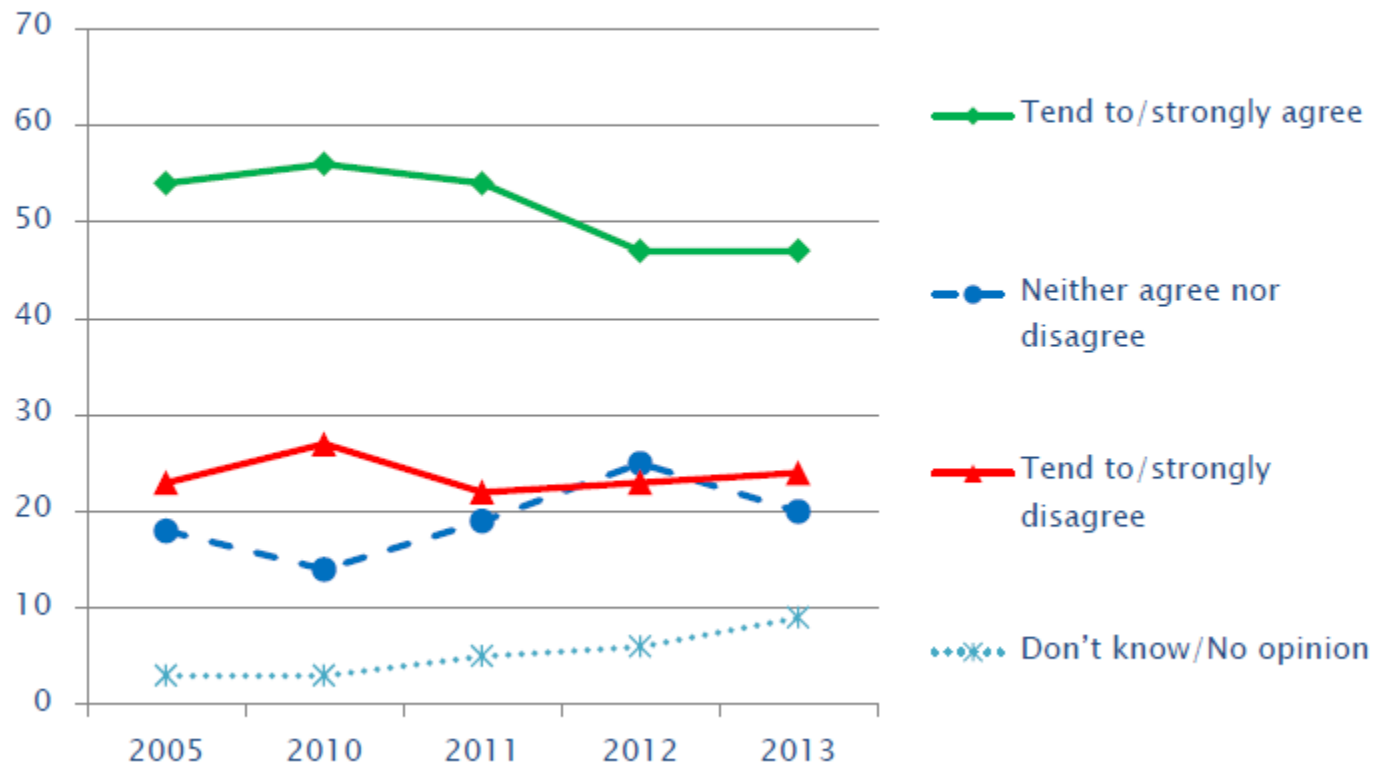
- Developed world is seeking to cut its green house gases by **80% by 2050**;
- Energy strategies are in three parts:
 - **Energy saving** – easy to justify but hard to implement;
 - **Energy efficiency** – a technological fix – contribute but in 10-30% range;
 - **Decarbonise** energy generation and use:
 - Energy carbon intensity cut by 80% or 90%
 - Replacement of energy sources with cleaner fuels – major growth in electricity;

Only energy sources that have a **carbon intensity** below **<100g CO₂/kWh** are viable in the medium term – which means renewables & nuclear.



Something has to be Done – ‘Reluctant Acceptance’

Figure 4. Willingness to accept the building of new nuclear power stations if it would help to tackle climate change (in %).



MORI Poll data analysed by U of Cardiff - Reference 4.

UK Public Opinion & Nuclear

- **What changed?**

- Nuclear power advanced as a means of enabling both low-carbon electricity generation and energy security;
- Evidence that dangers from Chernobyl radiation had been overstated;
- Perception of Climate Change as a significant global risk tends to make people more open to the idea of new nuclear facilities - 'reluctant acceptance';

- British attitudes towards nuclear have been largely unchanged in the wake of the Fukushima accident [4];
- At the same time Fukushima had a profound effect on public attitudes to nuclear in Japan [4].

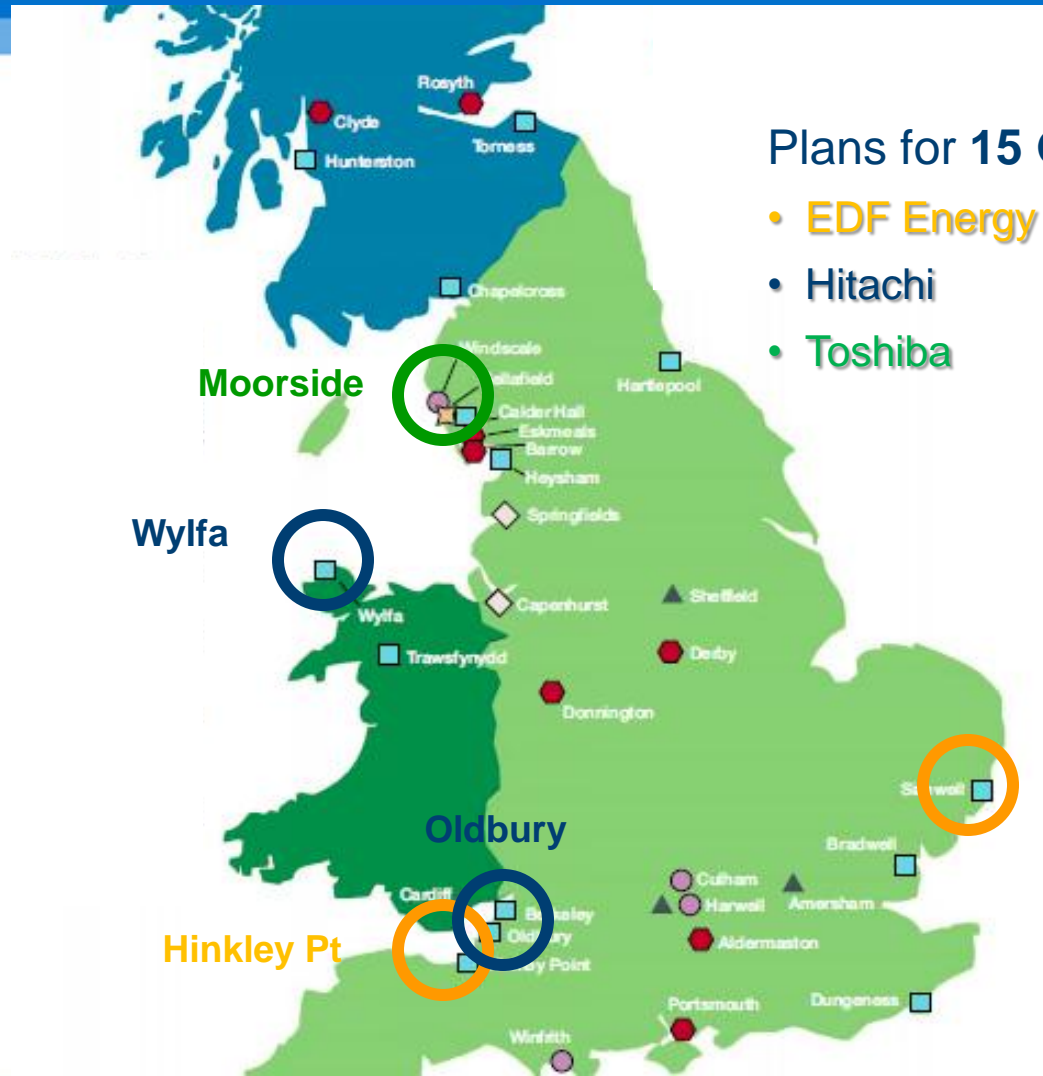
UK Energy Policy – a mix of clean sources

- UK Government **energy policy is now:**
 - **Double the scale of electricity** in our energy mix by 2050: - supplied by:
 - 30,000 large **windmills** ~80GWe (nominal) or 20-25 GWe (mean)
 - Some **gas** to fill the gap, balance the system and set the price level;



- One new **nuclear** power station completed each year from 2020 until ~2040
20-30 GWe – two or three times the recent installed nuclear base

New Build on existing Nuclear Sites



Plans for **15 GWe** new by 2030

- **EDF Energy** 6.4 GWe
- **Hitachi** 5-6GWe
- **Toshiba** 3.3 GWe

References

1. Windscale Fire. http://en.wikipedia.org/wiki/Windscale_fire: accessed 25 Apr 2014
2. Americans want Long-Range planning for a secure Energy Future, including Nuclear Energy
By Ann S. Bisconti, PhD, President, Bisconti Research Inc.- October 2013
3. What people really think about nuclear energy, Foratom. - January 2012.
4. Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, Wouter Poortinga, Nick F. Pidgeon, Stuart Capstick, and Midori Aoyagi
UKERC/WP/ES/2013/006 - Sep 2013.