

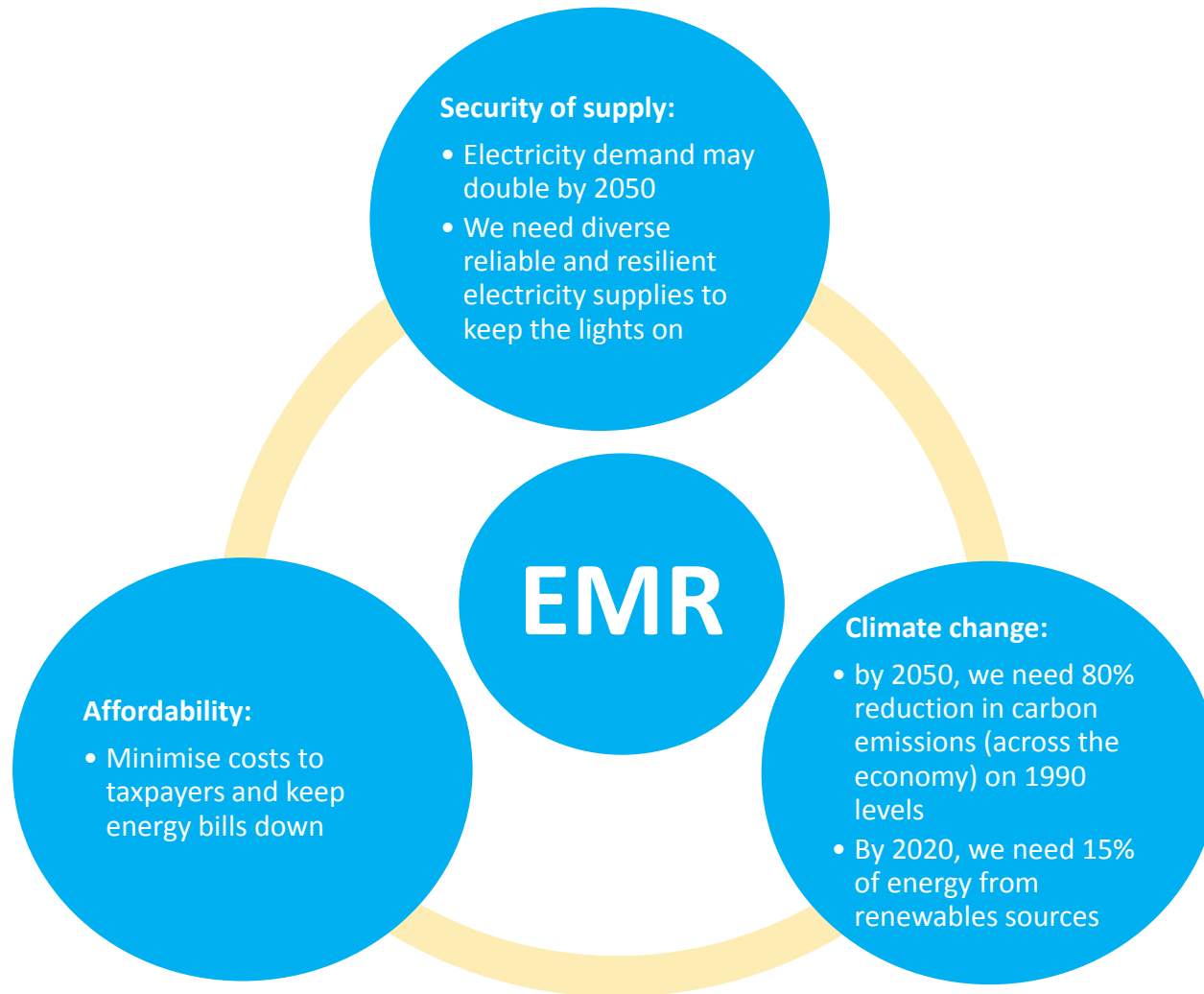


# **Why Nuclear? A UK Perspective**

Dr Keith Franklin  
First Secretary (Nuclear)  
British Embassy Tokyo



# The Energy Trilemma





# Market Dynamics

Changes in the market means new energy investment is needed:

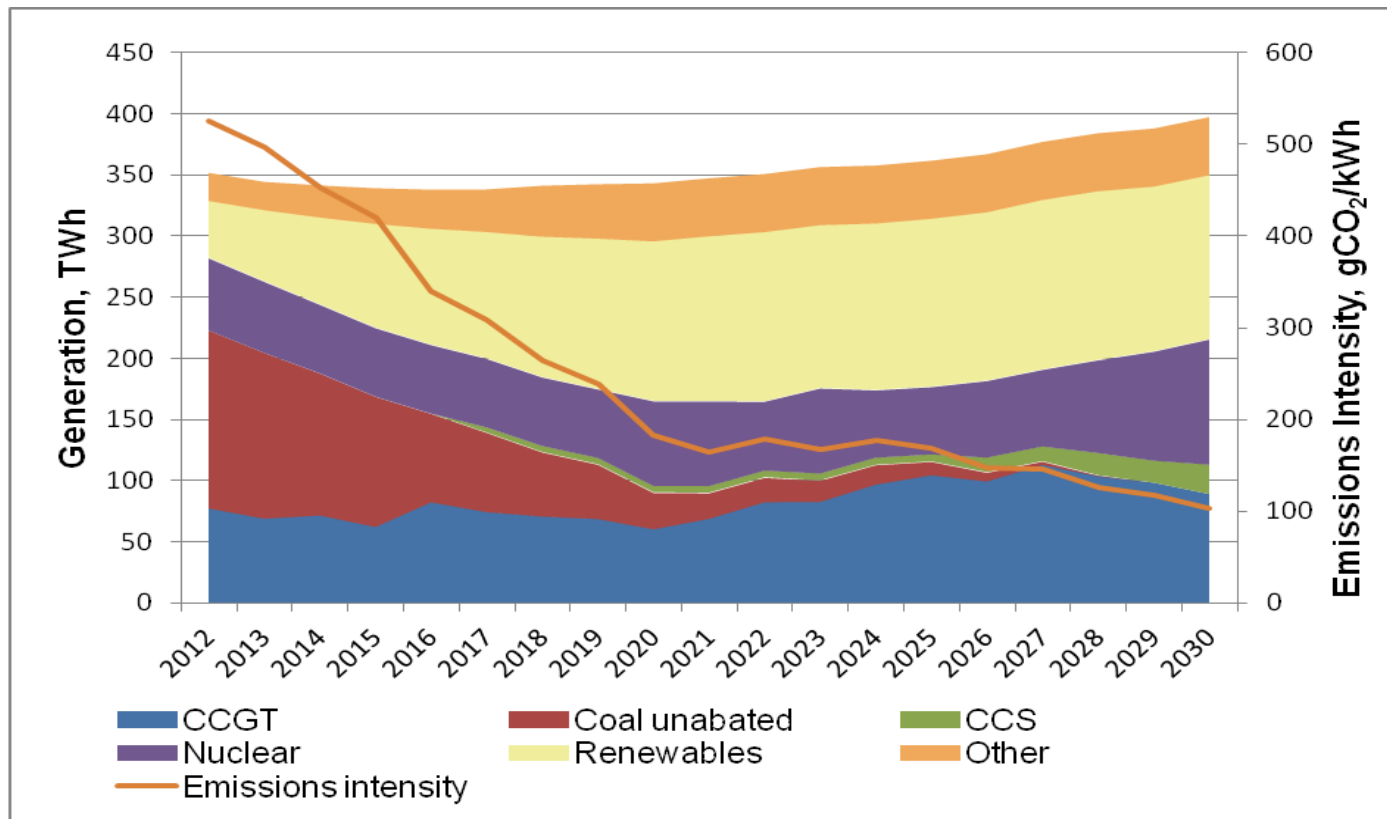
- Legally binding decarbonisation targets:
  - *15% of all energy from renewables by 2020; 80% by 2050.*
- 25% of all existing generating capacity (thermal and nuclear) decommissioned by 2020:
  - *The EU Large Combustion Plant Directive eliminates coal*
- Increased use of intermittent generation.
- Existing nuclear fleet is ageing; with most in life extension phase.
- Greater interconnection with other European electricity markets.

*Rather than specifying an energy mix, the UK believes the market is the best means to determine the energy balance.*



# UK Projected energy mix to 2030

Based on market forecasts, including both cost and decarbonisation objectives, the UK Department of Energy and Climate Change (DECC) projections estimate the following energy mix by 2030:



DECC planning assumptions suggest nuclear will remain around 20% of the UK's total energy mix, as new plant comes online from 2024, replacing the existing fleet.

# 2050 Pathways Calculator

A platform for an energy literate debate





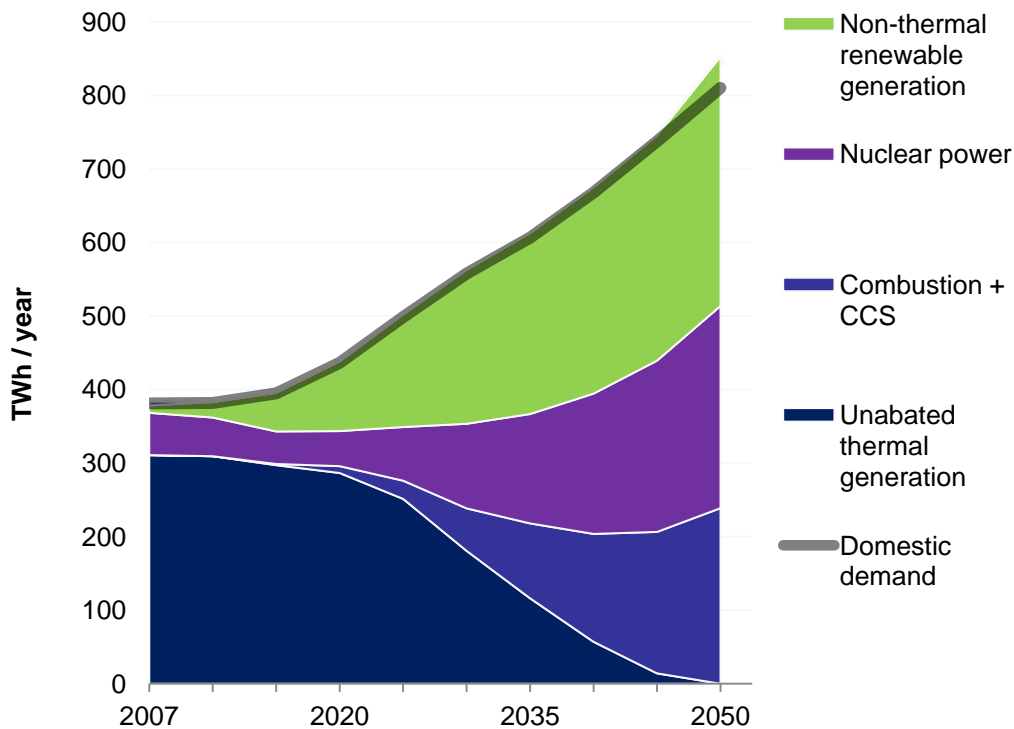
# Japanese 2050 Calculator: 日本版2050 パスウェイ・カリキュレーター



[www.2050-low-carbon-navi.jp](http://www.2050-low-carbon-navi.jp)



# Nuclear as Part of a balanced energy mix – Example from the DECC 2050 pathway analysis



The “balanced” scenario means that by 2050:

- 30-60% of home heating is electric
- 80% of cars miles are in electric cars
- 33% improvement in insulation properties in buildings
- Electricity demand doubles
- 25-40 new CCS power stations built by 2050
- An average of one new nuclear power station a year
- About 1000 new wind turbines a year
- Bioenergy crops cover 12% of UK land



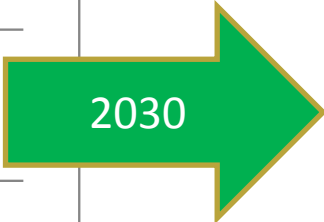
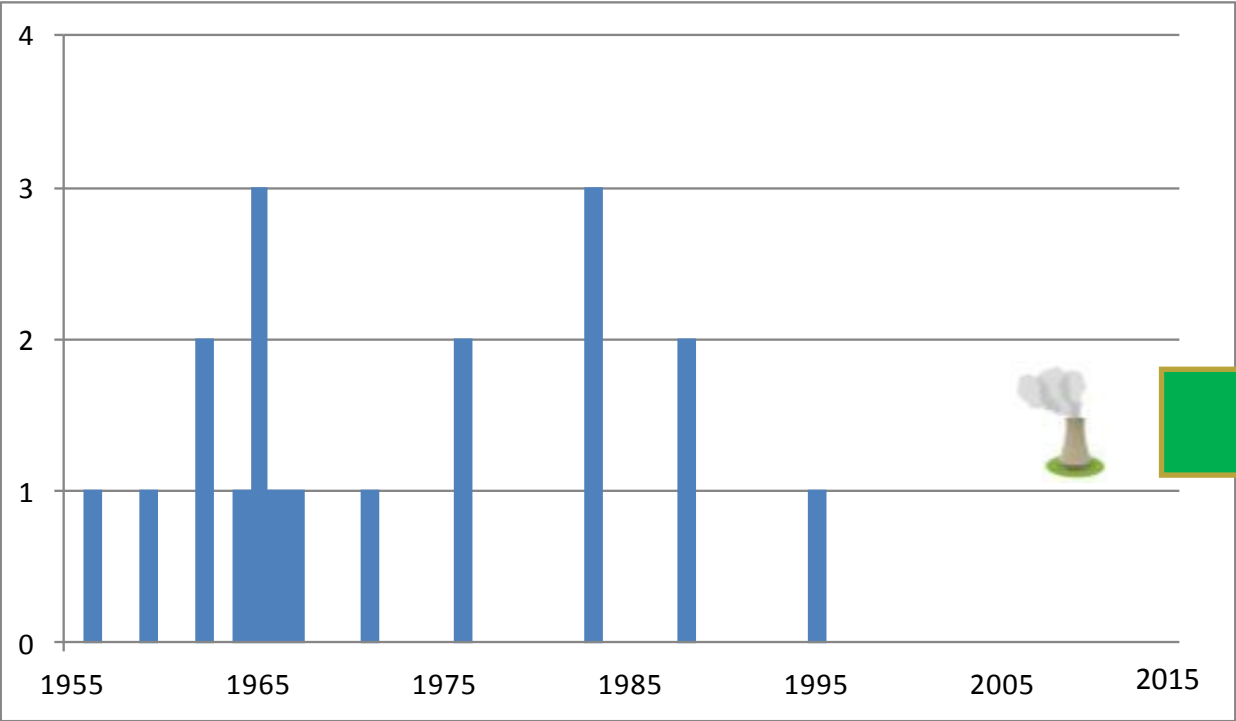
## UK Nuclear Policy

- UK Government decided in 2008 that new nuclear should have a role to play in the UK's future energy mix, on the basis that nuclear power is low-carbon; dependable; safe; and capable of increasing diversity of energy supply.
- Active steps to facilitate nuclear new build to reduce regulatory and planning risks for investors, and ensuring that owners and operators have robust funding plans for waste management and decommissioning.
- Industry current plans for up to 16GW deployment by 2030.





# Nuclear Power Station Construction in the UK

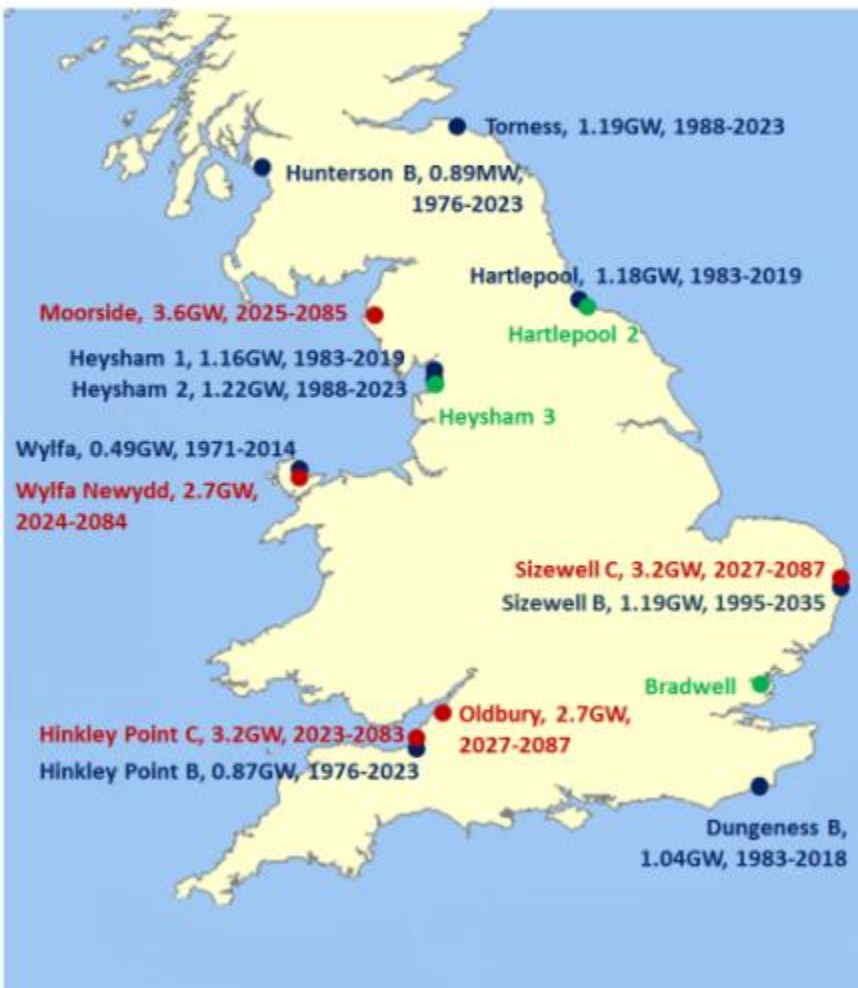


Up to 16GW

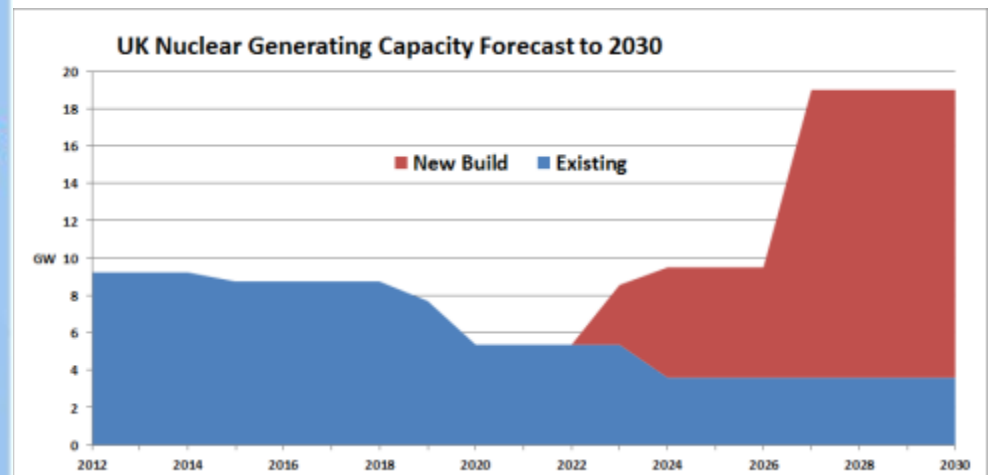


# Current nuclear generation and planned to 2030

- Sites currently generating
- *NPS sites with development in progress*
- *NPS Sites, no firm plans at present*



- Current nuclear capacity in the UK is 9.23GW. This is expected to decline substantially as plants 'end of life' approaches in mid-2020's.
- 8 new nuclear designated sites contained within Nuclear National Policy Statement. Firm site development plans for Hinkley, Sizewell, Wylfa, Oldbury and Moorside.





## **UK new nuclear delivery plans**

**NNB GenCo (EDF)** intends to build four new EPR reactors (amounting to 6.4GW) at Hinkley Point and Sizewell.

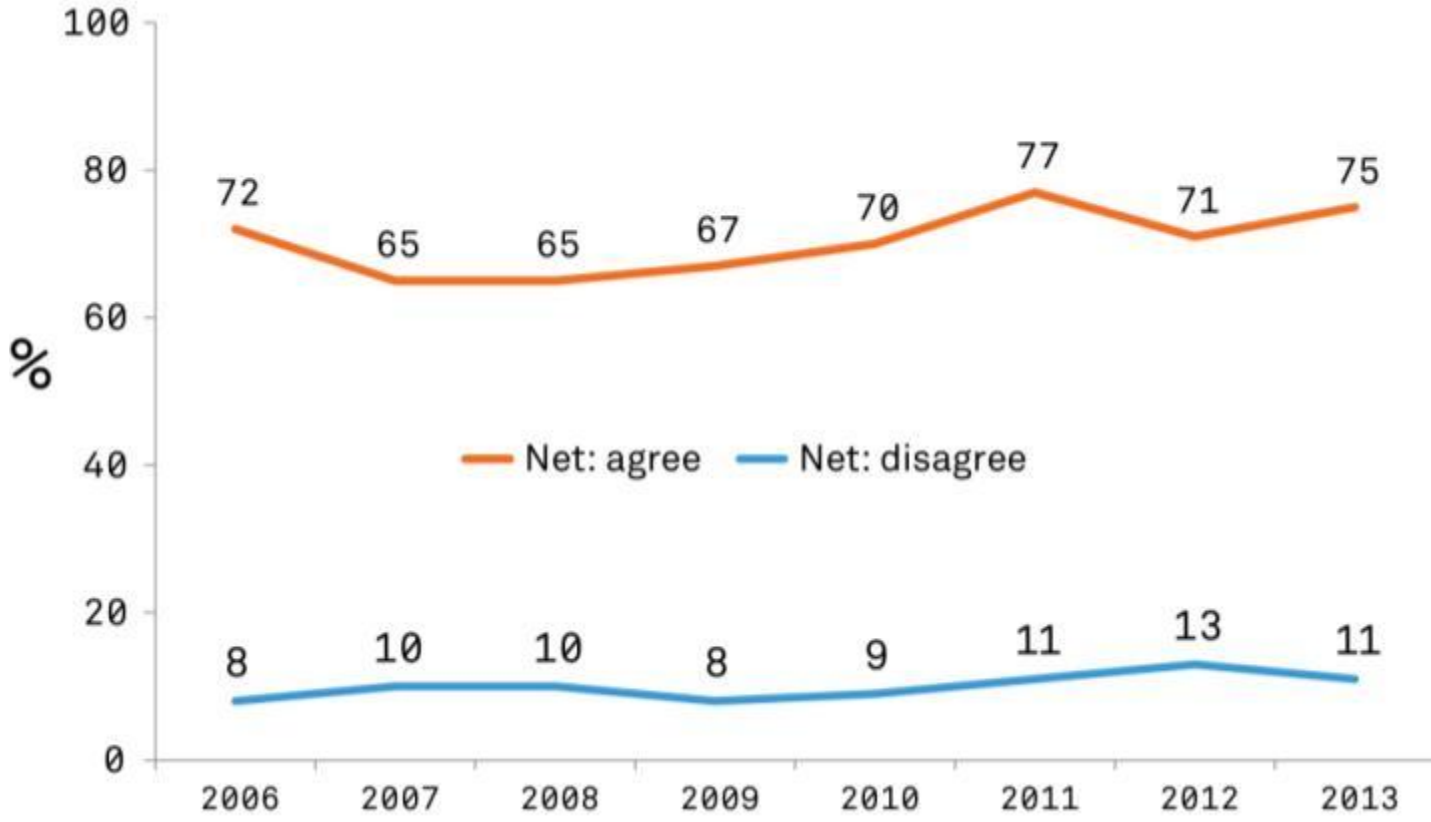
**Horizon Nuclear Power**, a wholly owned subsidiary of Hitachi Ltd, plans to develop up to 7.8GW of new nuclear capacity at sites in Wylfa and Oldbury.

**NuGen, (Westinghouse – Toshiba)** have plans to build up to 3.6GW of new nuclear capacity at Moorside near Sellafield with Westinghouse/Toshiba AP 1000 technology



# Recognising the problem of climate change, the UK public remains broadly supportive of nuclear

Britain needs a mix of energy sources to ensure a reliable supply of electricity, including nuclear power and renewable energy sources?

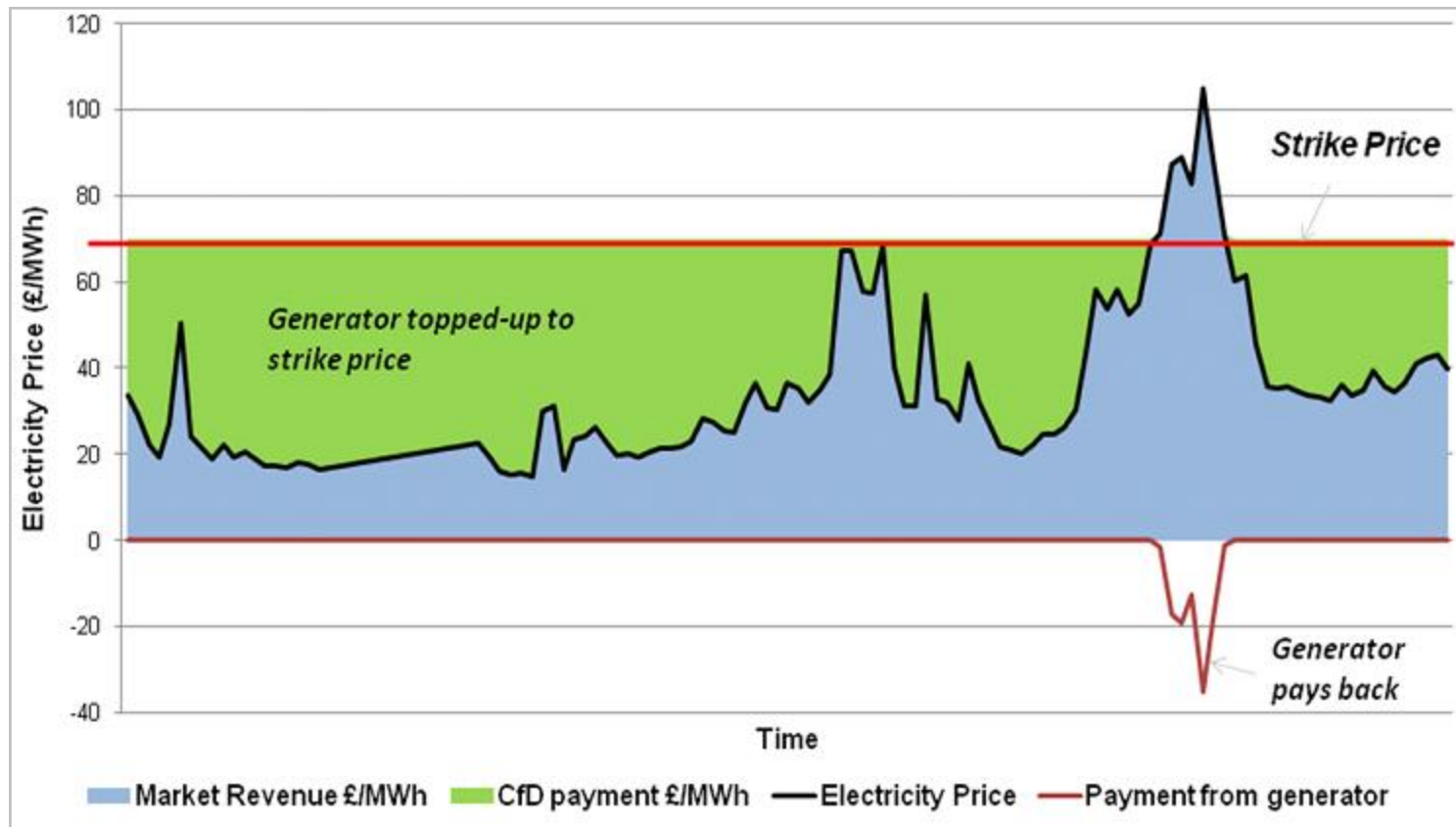


Source: YouGov Poll November 2013



# Financing Nuclear: The Contract-for-Difference

## 差額決算方式固定價格買取制度



CfD for Hinkley Point C agreed a strike price of £92.5 MW/H for 35 years, falling to £89.5 when Sizewell C comes online. Like other sectors, Government would hope to see ongoing cost reductions as future reactors come forwards.

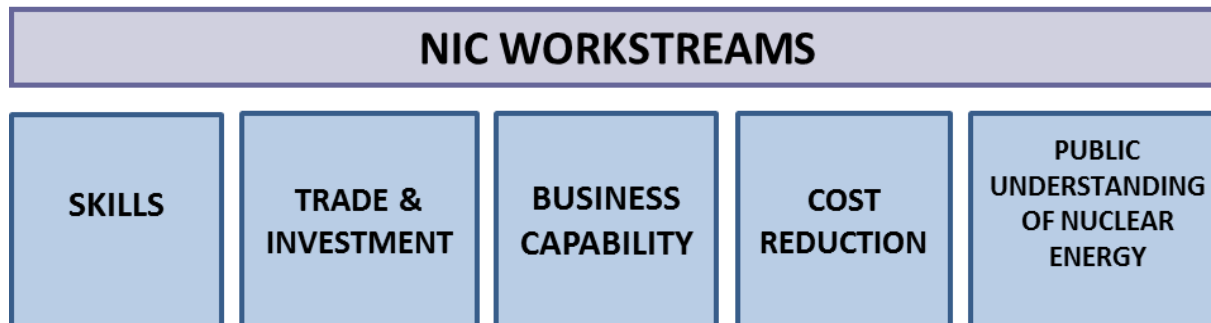


# How Nuclear?

HM Government

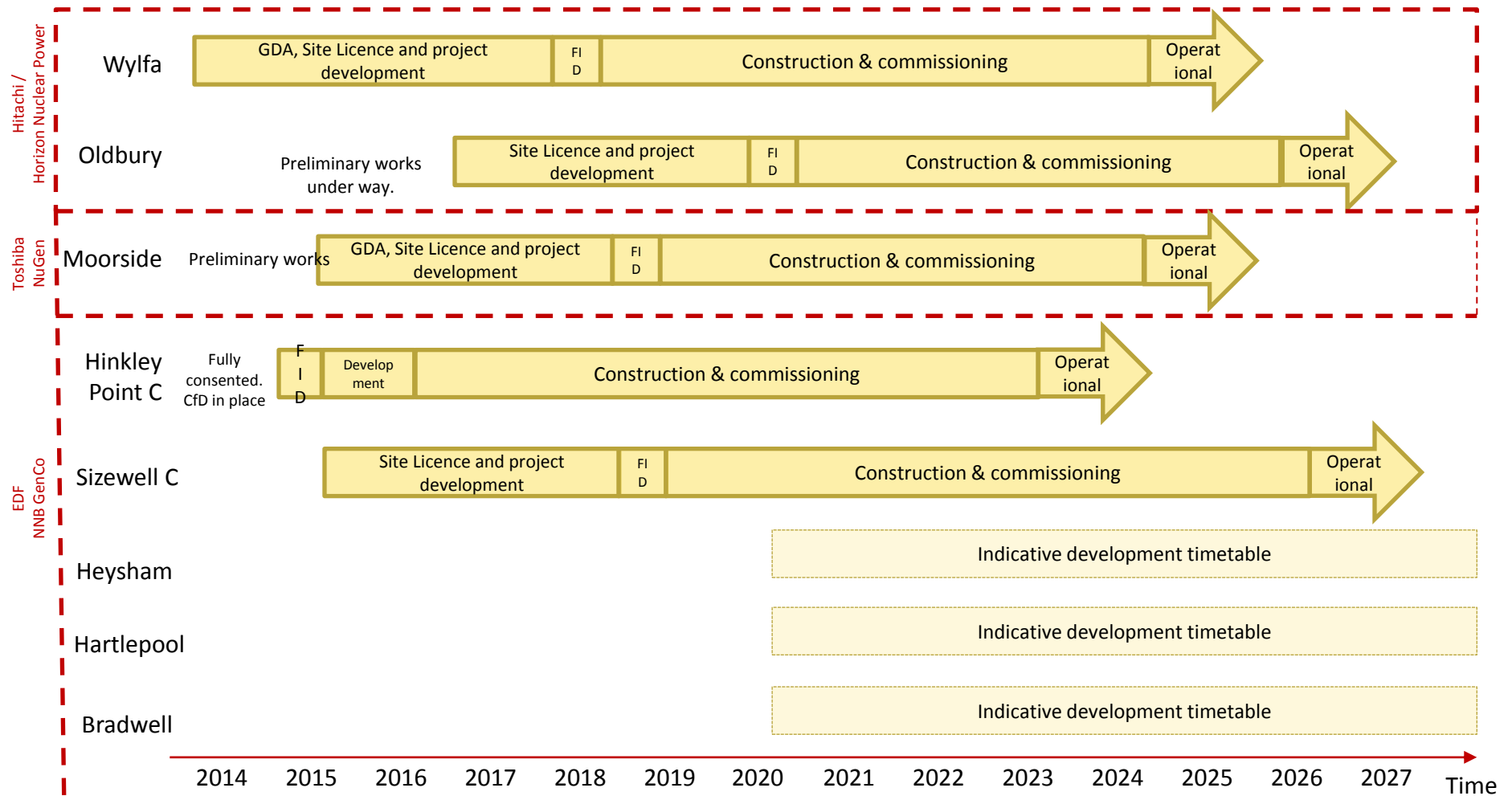
Industrial strategy: government and industry in partnership

## The UK's Nuclear Future





# How Nuclear? - Estimated project delivery schedules





# Why Nuclear? – Plant Life Extension

- UK plants are the oldest in the world.
- The arguments which apply to new nuclear also apply to life extension of existing plant.
  - Low carbon
  - Security of supply
  - Economic
- e.g. Oldbury Power Station additional 5 years of operation
  - UK companies such as AMEC involved in working with the operators and regulators in order to secure a successful life extension to the plant.





# History of Nuclear Power in the UK

## Magnox Power Stations (11) (original planned lifetime, 25 years)

Wylfa (part-closed)	1971	2015 (44 years)
Bradwell	1962	2002 (40 years)
Chapelcross	1959	2004 (45 years)
Dungeness A	1965	2006 (41 years)
Hunterston A	1964	1989 (25 years)
Hinkley Point A	1965	2000 (35 years)
Calder Hall	1956	2003 (47 years)
Trawsfynydd	1965	1991 (26 years)
Berkeley (safestore)	1962	1989 (27 years)
Oldbury	1967	2012 (45 years)
Sizewell A	1966	2006 (40 years)



# Why Nuclear? - Decommissioning and New Build

- Demonstrating you can deal with the legacy of past nuclear activities helps in building public support for new nuclear.
- New nuclear operators are legally obliged to submit a Funded Decommissioning Programme (FDP) for approval by the Secretary of State.
  - Consent for a new plant will not be granted until an FDP is in place.
- Many of the UK companies involved in new build and also involved in decommissioning and life extension work.



# Why Nuclear?

