

Cambridge University  
MPhil in Nuclear Energy  
6 December 2012



## Nuclear New Build in the UK: EDF Energy's programme

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## Safety is Our #1 Priority

**It is our duty to ensure the safety of the public,  
our employees, our power stations and the  
environment**

We ensure safety through:

- **Safety in design**
- **Regulation**
- **Training**

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## The challenge for the electricity sector

Diverse and secure energy mix

Decarbonisation of electricity



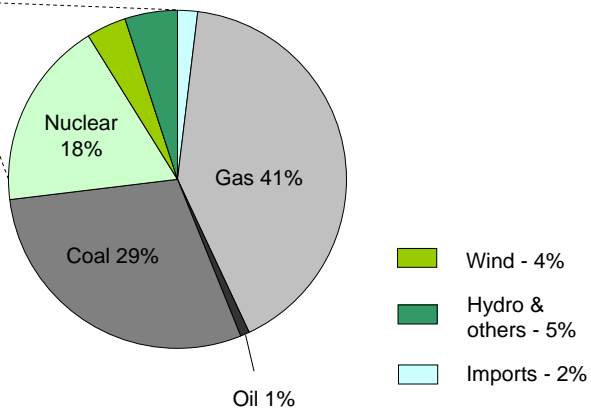
...and do it in a way we can afford

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## Need for New Nuclear: Low Carbon Generation (figures for 2011)

**Contribution of  
low-carbon  
electricity today**

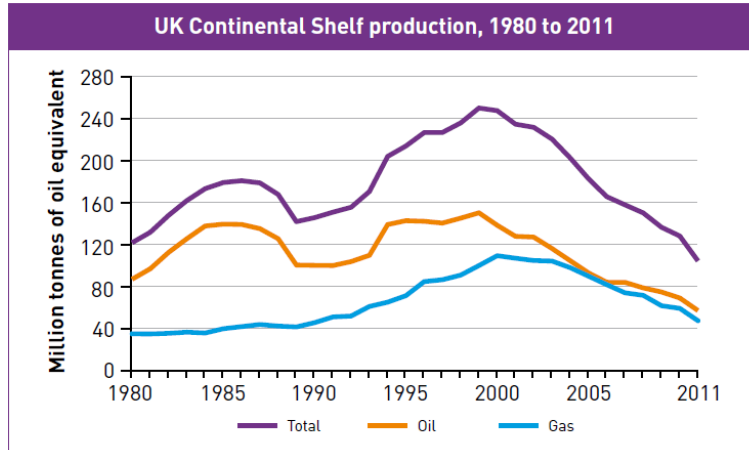


Source: UK Energy in Brief 2012

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## UK Oil and Gas Production



UK Energy in Brief 2012 Department of Energy and Climate Change

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## UK Government policy

**“For the UK to meet its energy and climate change objectives, the Government believes that there is an urgent need for new electricity generation plant, including new nuclear power. Nuclear power generation is a low carbon, proven technology, which is anticipated to play an increasingly important role as we move to diversify and decarbonise our sources of electricity. It is Government policy that new nuclear power should be able to contribute as much as possible to the UK’s need for new capacity.”**

*Overarching National Policy Statement for Energy (EN-1), July 2011*

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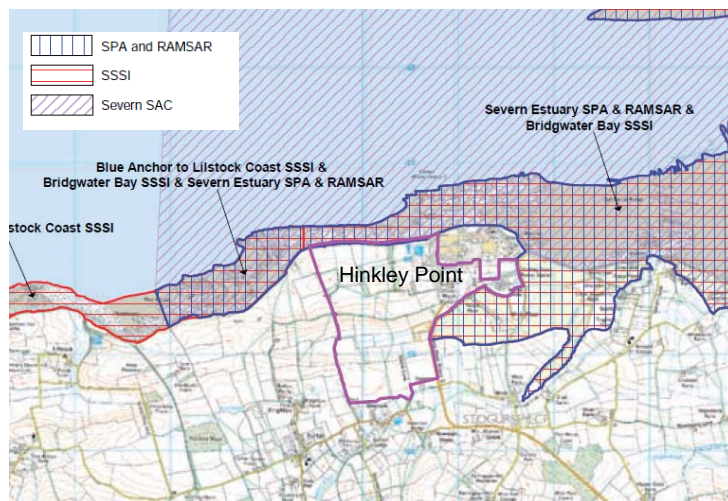
## Choosing a suitable site

- What are the factors to consider?

## Choosing a suitable site

- Proximity to centres of population
- Proximity to military facilities
- Proximity to civil aviation
- Proximity to hazardous facilities
- Flooding, tsunami, storm surge
- Coastal erosion
- Environmental sensitivity
  - Marine ecology
  - Terrestrial ecology
  - Birds
- Cultural heritage
- Landscape and amenity
- Availability of land
  - Greenfield or Brownfield?
- Access to cooling water
- Access to transmission connection
- Public opinion
  - Existing nuclear facilities

## National and International Protection

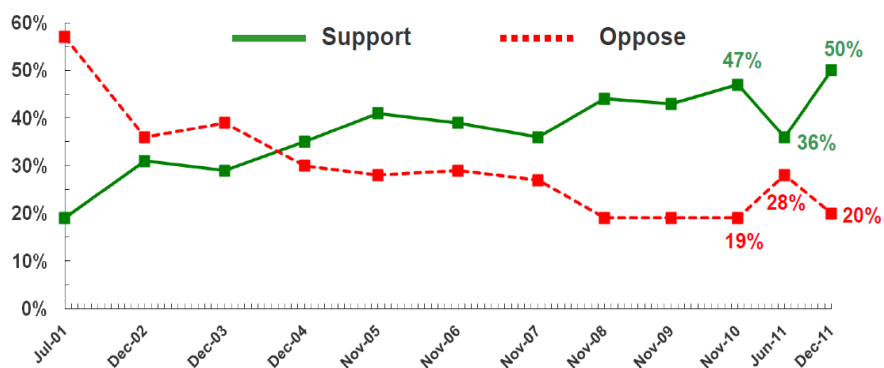


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## Support for replacement newbuild reaches a new high point of 50%

Q To what extent would you support or oppose the building of new nuclear power stations in Britain TO REPLACE those that are being phased out over the next few years? This would ensure the same proportion of nuclear energy is retained ie 18%.

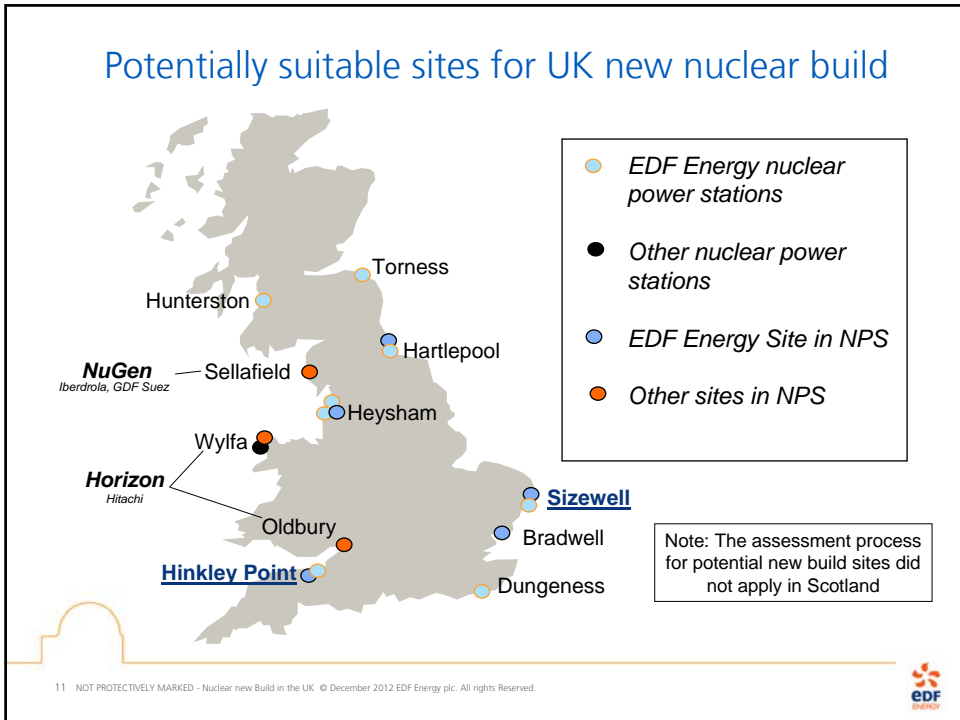


Ipsos MORI Base: All respondents c1,000-2,000

\* Wording in 2001 was "To what extent would you support or oppose the building of new nuclear power stations in Britain?"



## Potentially suitable sites for UK new nuclear build





## Hinkley Point C: Key Facts

- Two UK EPRs generating low carbon electricity for around **5 million homes**
- Capable of generating over **6% of the UK's electricity**
- Will avoid **10 million tonnes** of CO2 emissions a year
- **20,000 – 25,000** construction jobs
- **At least 5,000 jobs for Somerset people** during construction
- Contributes about **£100 million to the local economy** during peak years of construction
- Contributes around **£40 million to the local economy** a year during 60 years of operation
- **900 operational staff**, nearly all based in Somerset



## Flamanville 3 – April 2012



## Some key features of the UK EPR

- 60 year lifetime
- Single turbine
- Fuel efficient design
- Improved radiation shielding for operators
- Designed for shorter refuelling and maintenance shutdowns
- 4 loop design – developed from N4 and Konvoi



## Safety features

- Quadruple redundancy on safety systems
- Double wall containment
- Designed to be robust against aircraft crash
- Core meltdown collector
- Containment heat removal system
- Enhanced seismic resistance

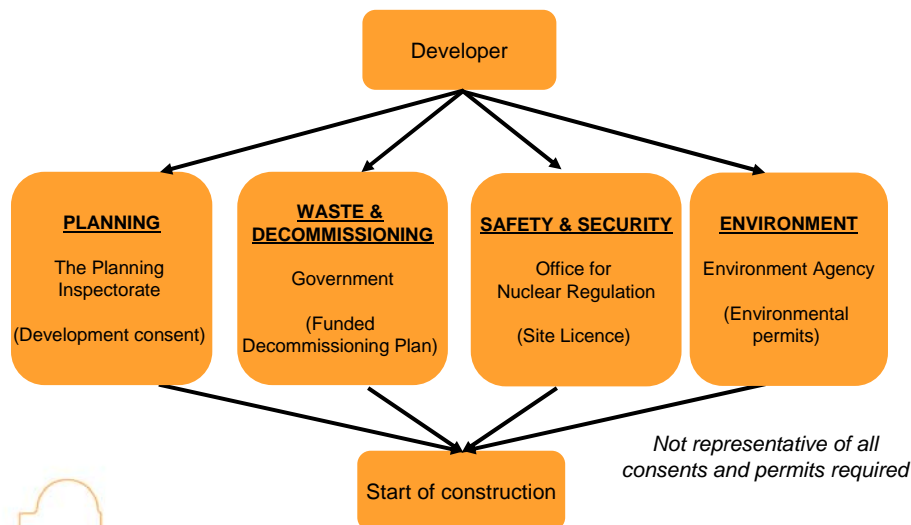
## The UK EPR – key parameters

- Thermal power 4500 MWth
- Electrical output 1630 MWe
- Reactor pressure vessel
  - Operating pressure 15.5 MPa
  - Test pressure 25.1 MPa
  - Operating temperature (hot leg) 328°C
  - Inner diameter 4870 mm
  - Weight (including vessel head) 526 tonnes
  - Base material 16MND5 (ASTM A508 Cl. 1)
  - Cladding austenitic stainless steel (<0.06% Co)
  - End of life fluence (>1 MeV)  $1 \times 10^{19}$  n/cm<sup>2</sup>
  - End of life RT<sub>NDT</sub> 30°C

## Structural integrity considerations – primary circuit

- All forged components
- Defence in depth – “multi-legged” approach
  - Design, materials and manufacturing
  - Operational surveillance
  - In service inspection
  - Prevention and limitation of accidents
  - Tolerance to large through-wall defects
  - Leak detection systems

## Approvals, Licences, Permits and Consents



## Key issues and next steps for NNB

### Public Engagement

- Continuing engagement with local communities and stakeholders

### Market Structure

- Appropriate framework to deliver Electricity Market Reform

### Planning and Consents

- All permits and consents required

### Licensing

- Finalise design and obtain nuclear site licence

### Waste Disposal

- Funding and arrangements for waste disposal

### Investment Decision

- Final Investment Decision – dependent on the above issues

thank you