



National Audit Office

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# **Hinkley Point C: Value for Money? Wider lessons?**

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RPI Conference  
25-26 September 2017

# What I will cover

1. How can/should the VfM of HPC be assessed?
2. What did the NAO conclude and why?
3. Why did we end up with this deal?
4. Some wider lessons

# The NAO

- We help Parliament **hold government to account** for how it uses public money
- Our work should also help **improve public sector performance and service delivery**,
- Independent of government
  - C&AG – officer of the House of Commons
  - Statutory access and reporting rights
- Main outputs in 2016-17
  - 372 accounts certified
  - 68 Value for Money reports
  - 62 PAC hearings supported

# What is Hinkley Point C?

The first nuclear power station to be built in the UK since 1995

- **By NNBG:** owned 66.5% EdF, 33.5% CGN
- **Capacity:** 3.2 GW. Expected to generate 7% of Great Britain's electricity supply
- **Estimated construction cost:** £19.6bn
- **Due for completion:** 2025 (subject to some uncertainty)
- **Reactor design:** European Pressurised Water Reactor (EPR) – no working example of this technology in the world



# Timeline

- 2006: Government's Energy Challenge review
- 2008: White Paper on Nuclear Power; industry announces plans to develop 16GW new nuclear by 2025
- 2009: Jan - EdF buys British Energy and its 8 nuclear power stations;  
April - govt nominates HPC as one of 11 potential sites
- 2011: March - Fukushima
- 2012: Nov – Govt starts discussions with EdF on HPC; ONR grants site licence;  
Dec – ONR grants GDA for EPR
- 2013: Oct – Govt and EdF agree on strike price
- 2014: Oct – European Commission gives State Aid approval
- 2015: Sept – Chancellor announces £2bn debt guarantee;  
Oct – CGN agrees to invest £6bn
- 2016: July – EdF Board takes FID;  
Sept – govt approves deal after new PM orders a review

# Overview of the deal

- **Contract for Difference (CfD)**
  - Agreement to buy the electricity produced by HPC for £92.5 / MWh (2012 prices) for 35-years from the start of generation
  - Prices are inflation linked and include gain-share mechanism
- **Investor agreement (SoSIA)**
  - Regulates the relationship between the government, operating company and investors
  - Contains compensation and gain-share mechanisms
- **Funded Decommissioning Programme**
  - Intended to cover waste management and decommissioning costs
  - Fully born by investors
- **HM Treasury guarantees**
  - Initial guarantee of up to £2bn available (conditions met by Dec 2018, must be repaid by end 2020)
  - Further guarantee of up to £13.1bn “may be considered” by govt, subject to further conditions being met

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# The government's approach

- Developed 4 VfM tests (2012)
    1. Fair return to HPC investors
    2. Cost-competitiveness (LCOE)
    3. Social cost-benefit analysis
    4. Affordability
      - Impact on bills
      - Total top up payments relative to LCF
- Repeated in 2013, 2014, 2015 and 2016
- These sat within the 5-case business case framework (strategic, commercial, economic, financial/affordability, management/deliverability)
  - Approvals/challenge process
    - DECC Investment Committee
    - MPA/IPA
    - IUK (debt guarantee)
    - HMT (spending team)
    - MPRG



# The NAO's approach – which questions?

- Ex ante versus ex post VfM:
  - We won't know for sure until the 2150s,
  - but C&AG wanted to come to a view in 2016
- Two key questions: Is new nuclear the right choice? Is HPC the right nuclear choice?
- Billpayers or taxpayers?
- Hence our evaluative criteria

There is a compelling case for supporting new nuclear build that aligns with the government's decarbonisation objectives; and is at least cost to consumers and taxpayers.

The decision to proceed with HPC is informed by a balanced assessment of strategic, economic, affordability and deliverability considerations.

The government has identified residual risks to value for money, and has robust arrangements to mitigate those risks.

# The NAO's approach – what we did

- Document review
  - business cases, submissions, MPA reviews etc
  - contracts
- Interviews
  - Government officials – in post now and previously
  - Ex-Ministers and SpADs
  - EdF
  - Other industry people
  - Academics, lawyers and energy analysts
  - Campaign groups
  - Local Authorities
- Analysis
  - NNBG financial model, DECC's DDM, cost data

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# Our VfM conclusion

- Widely held view the UK needs some new nuclear
- But HPC deal has locked consumers into a risky and expensive project
  - Expensive mainly because of the risk allocation
  - Risky because of the technology and EdF financial position; past experience of risks/costs reverting to govt
- Govt did not sufficiently appraise alternative ways of financing
- VfM case weakened over time
- Increasingly relied on unquantified strategic benefits, including keeping the cost off balance sheet
- Didn't sufficiently consider costs/risks for consumers

# Risk allocation and financing

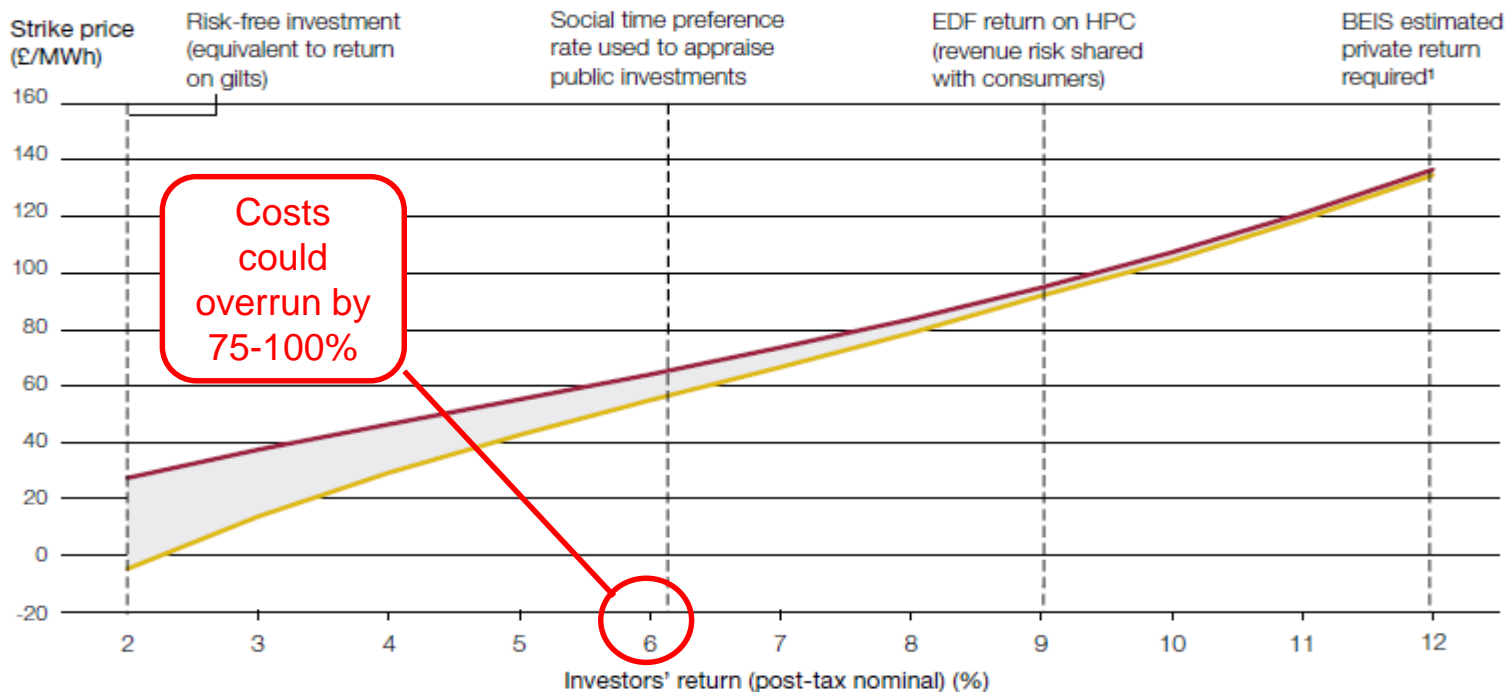
- Economics of nuclear different to wind and solar (much higher capital costs, decommissioning, unique risk profile)
- But 2010 Coalition Agreement required new nuclear to receive “no public subsidy”
- Hence choice of CfD with no govt/billpayer funding during construction, all the risk on the developer
- First time this financing structure for nuclear anywhere in the world

# Different financing structures mean different cost/risk allocations

**Figure 4**  
Strike price sensitivity to investors' return

The strike price is related to the investors' return, which varies according to the risk sharing arrangements

Private investors bear no risk (taxpayers or consumers bear all risks) ← **Some risk shared** → Private investors bear all risk



- Strike price at BEIS electricity wholesale price projections (March 2016)
- Strike price at HPC financial model electricity wholesale price projections

# Alternative ways of financing HPC

How	Description	Risks		
		Construction overruns	Operational risks	Financing
<b>HPC structure</b>	<b>Private investor finances, builds &amp; operates</b>	<b>Investor</b>	<b>Shared</b>	<b>Investor</b>
PPP	PPP with equity participation by government	Shared	Shared	Shared
Hybrid RAB	Regulated Asset Base model with guaranteed return during construction	Shared	Shared	Shared
EPC	Government contracts private investor to build HPC and buys off the plant after construction	Investor	Govt	Govt

# Alternative ways of support could have resulted in lower costs to consumers

How	Description	Potential strike price (£/MWh)	
		Low	High
<b>HPC structure</b>	<b>Private investor finances, builds &amp; operates</b>	<b>89.5</b>	<b>92.5</b>
PPP	PPP with equity participation by government	25.0	76.0
Hybrid RAB	Regulated Asset Base model with guaranteed return during construction	51.0	67.5
EPC	Government contracts private investor to build HPC and buys off the plant after construction	11.5	52.0

Note: This is a summary. For details behind the assumptions please refer to the NAO's report on Hinkley Point C. Appendix 4.



# Technical and financially risky

- **Other EPRs are behind schedule**

	Original		Latest	
Okiluoto	E3.2bn	2009	E8.5bn	2018
Flamanville	E3.3bn	2012	E10.5bn	2018
Taishan	Y50bn	2014/15	n/a	2018

- **EdF's financial position has deteriorated**



## INTENDED RISK ALLOCATION

## OUTCOME

HS1



- Private sector contractor finance, build and operate
- Govt grant towards construction

- Demand fell short
- Contractor unable to raise finance
- Govt agreed to guarantee debt



- PPP to modernise London Underground i/f
- Private sector bearing risk via contracts

- Poor governance led to financial difficulties
- Metronet into administration
- TfL paid £1.7bn debts

Devenport



- Private sector contractors finance, build and operate
- Bear all the risks, including cost overruns

- Costs increased dramatically
- MoD stepped in to meet extra costs

A400M



- Private sector contractors finance, build and operate
- Bear all the risks, including cost overruns

- Suppliers underpriced
- Delivery delayed
- MoD agreed to amend contract: 22 not 25 aircraft

# The VfM tests weakened

## Test 1: Fair Return

- Return to investors = 9%
- In line with comparable project return of 8.5% - 13.8%
- European Commission agreed

## Test 2a: Cost competitive

- LCOE plus (some) system costs
- More expensive than 4 out of 5 competing technologies

## Test 2b: Cost benefit

- Tries to capture more of the costs and benefits
- Most scenarios show net societal benefit with HPC
- But not all

## Test 3: Affordability

- Bills £21-24 per year higher with some alternatives; £6 lower with gas (out to 2030)
- BEIS did not assess against LCF

Results are marginal and subject to uncertainty.  
The government was effectively locked in to the deal.  
It has increasingly relied on unquantified strategic benefits.

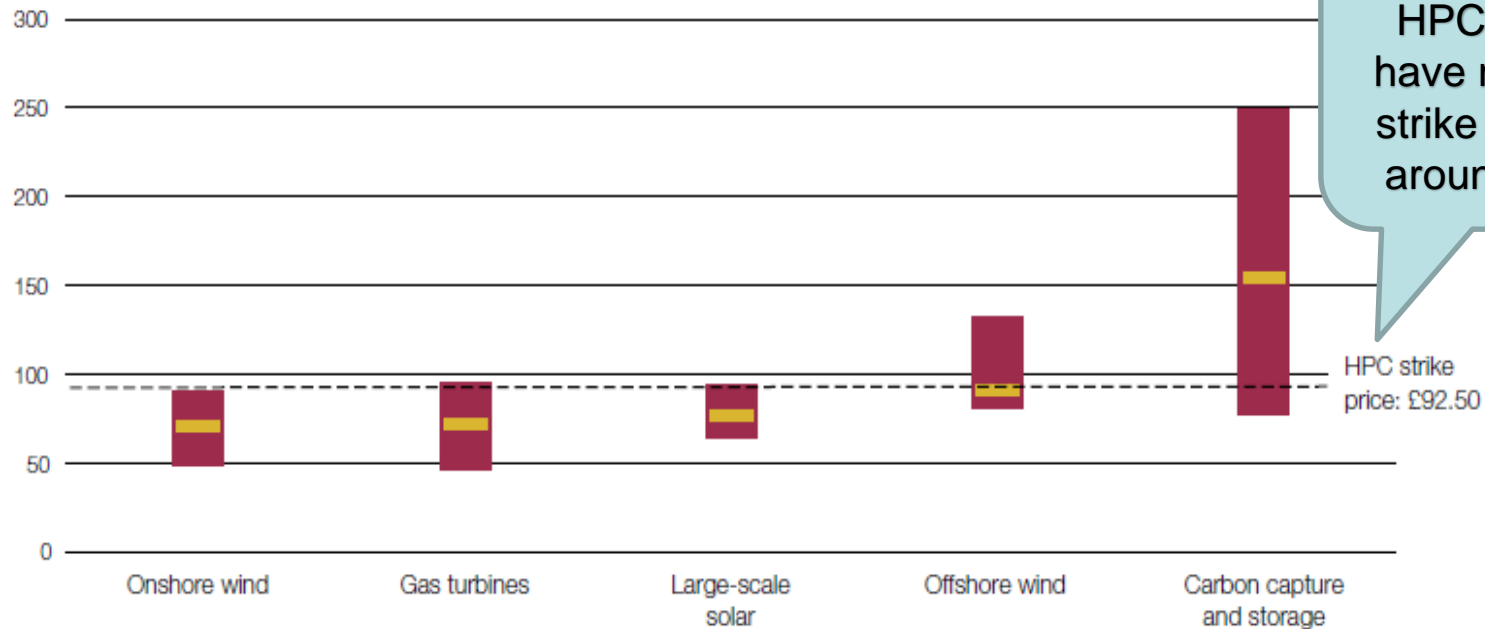
# VfM Test 2a: cost competitiveness (2016)

**Figure 6**

Expected strike price comparator costs for alternative large-scale power sources in the mid-2020s

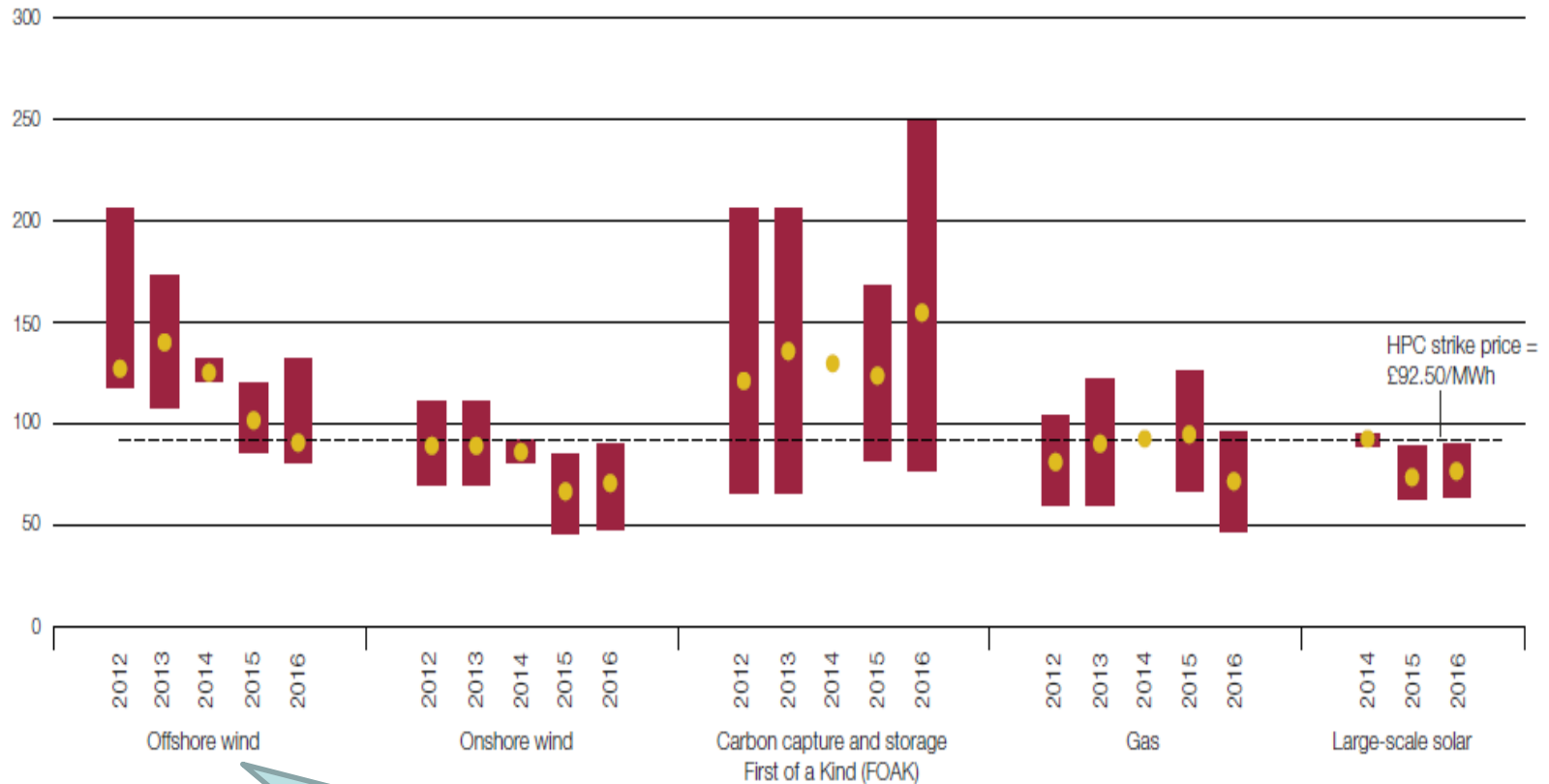
The Department's estimates show that the strike price for HPC (£92.50/MWh) is within or just outside the range of costs of alternative large-scale generation technologies

Strike price comparator cost – £/MWh (2012 prices)



# VfM Test 2a: cost competitiveness

Strike price comparator cost – £/MWh (2012 prices)



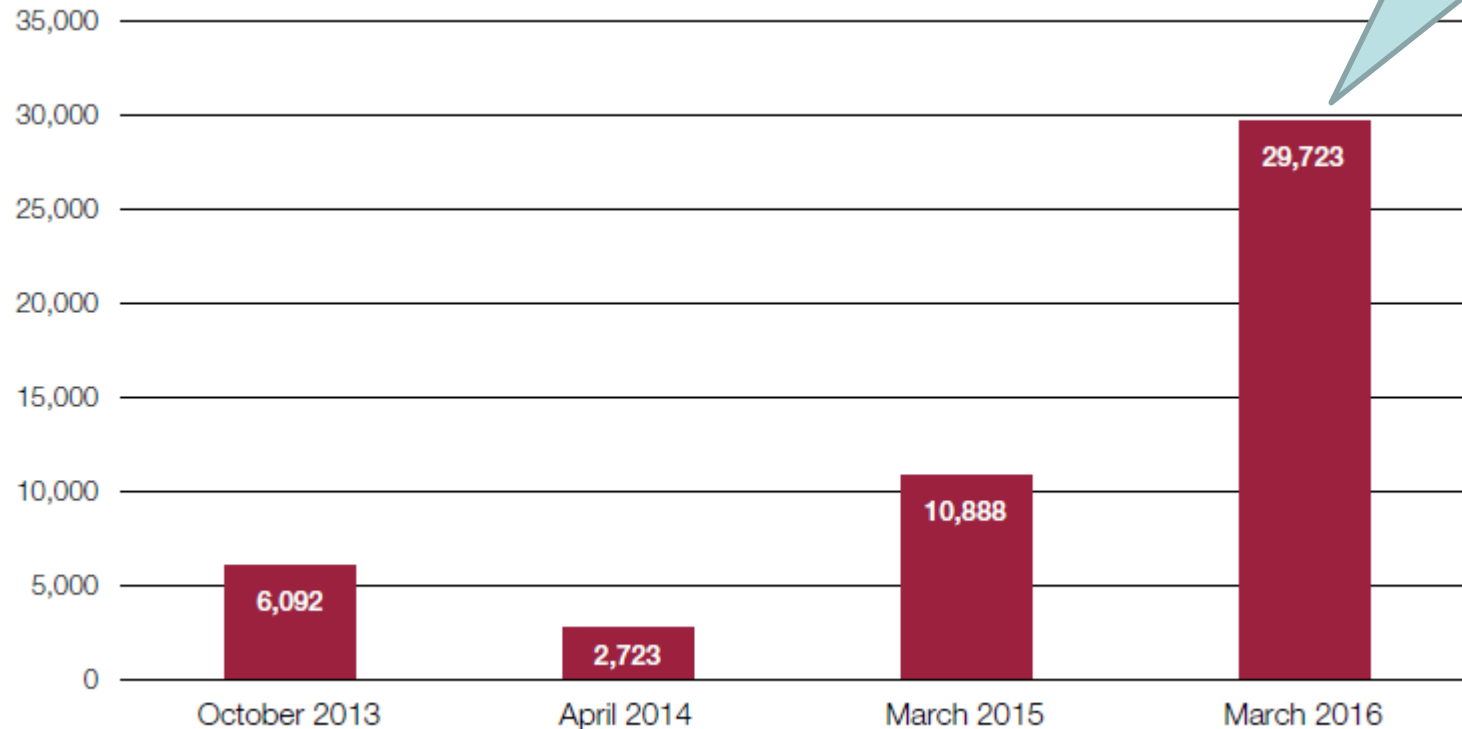
Latest auction £57/MWh (+c£10)

## VfM Test 3: impact on bills

- £12 on the average annual electricity bill in late 2020s
- If HPC delayed by 3 years and gap filled by
  - Onshore wind and solar: £21/year higher
  - Offshore wind and CCS: £24/year higher
  - Regular Gas: £6/year *lower*
- No assessment beyond 2030, even though CfD out to 2060

# VfM Test 3/Affordability

£ million discounted, 2015-16 prices

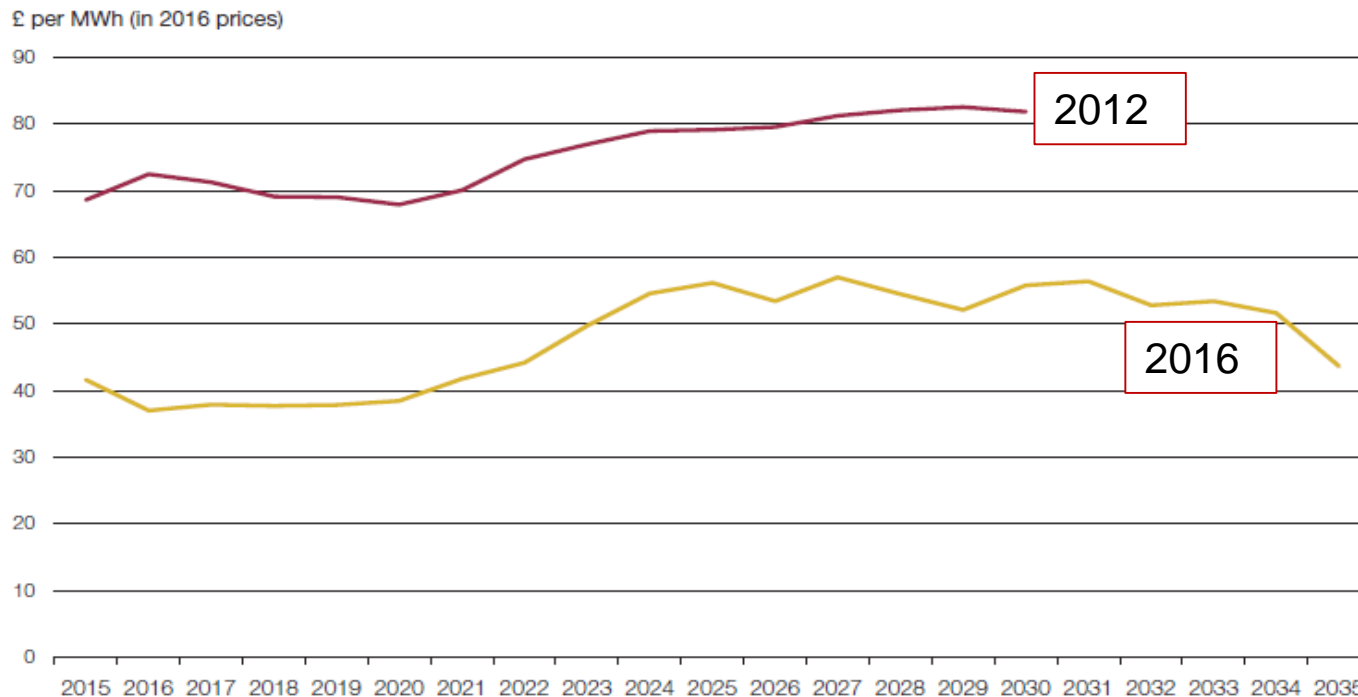


July 2017  
estimate  
£28.8bn

Wholesale electricity price projection

## VfM case weakened after 2012/13...

- Costs of low carbon alternatives (apart from CCS) fell
- Other new nuclear options caught up
- Expected future wholesale prices fell





## How DECC/BEIS responded...

- Ran VfM tests 3 times
- Increasing reliance on unquantified strategic benefits
  - Job creation
  - UK Nuclear renaissance
  - Option value of nuclear in the mix
- But strategic benefits largely outside their control; no plan in place (c/p HS2)

# How HMT responded...

- Aware of uncertain and deteriorating VfM case
- But its concerns moved over time
  - Jan 2013: HPC expensive c/p gas; reminded Chx no decarb target for power sector by 2030
  - Sept 2013: £92.50 plus debt guarantee “pushing the limits of VfM”, but overridden by strategic benefits
  - Sept 2015: highlighted delivery risks and balance sheet risks; no VfM view
  - Aug 2016: noted VfM case had weakened, but proceed because of “strategic and political” implications of pulling out

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# The various factors...

## Proximate

- Climate Change Act
- EdF strategy
- Coalition politics – “no public subsidy”
- Wishful thinking about FFPs
- The Chancellor
- HMT officials
- Brexit

## Underlying

- Nuclear is special – state to state
- Governance and accountability mechanisms

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## Three wider lessons

1. Financing options should always be fully considered, whatever the prevailing policy
2. Someone with clout needs to champion the (future) consumer's interests
3. We need to think harder about the political economy of big infrastructure and getting the right balance between lock-in and paralysis

# Spare slides

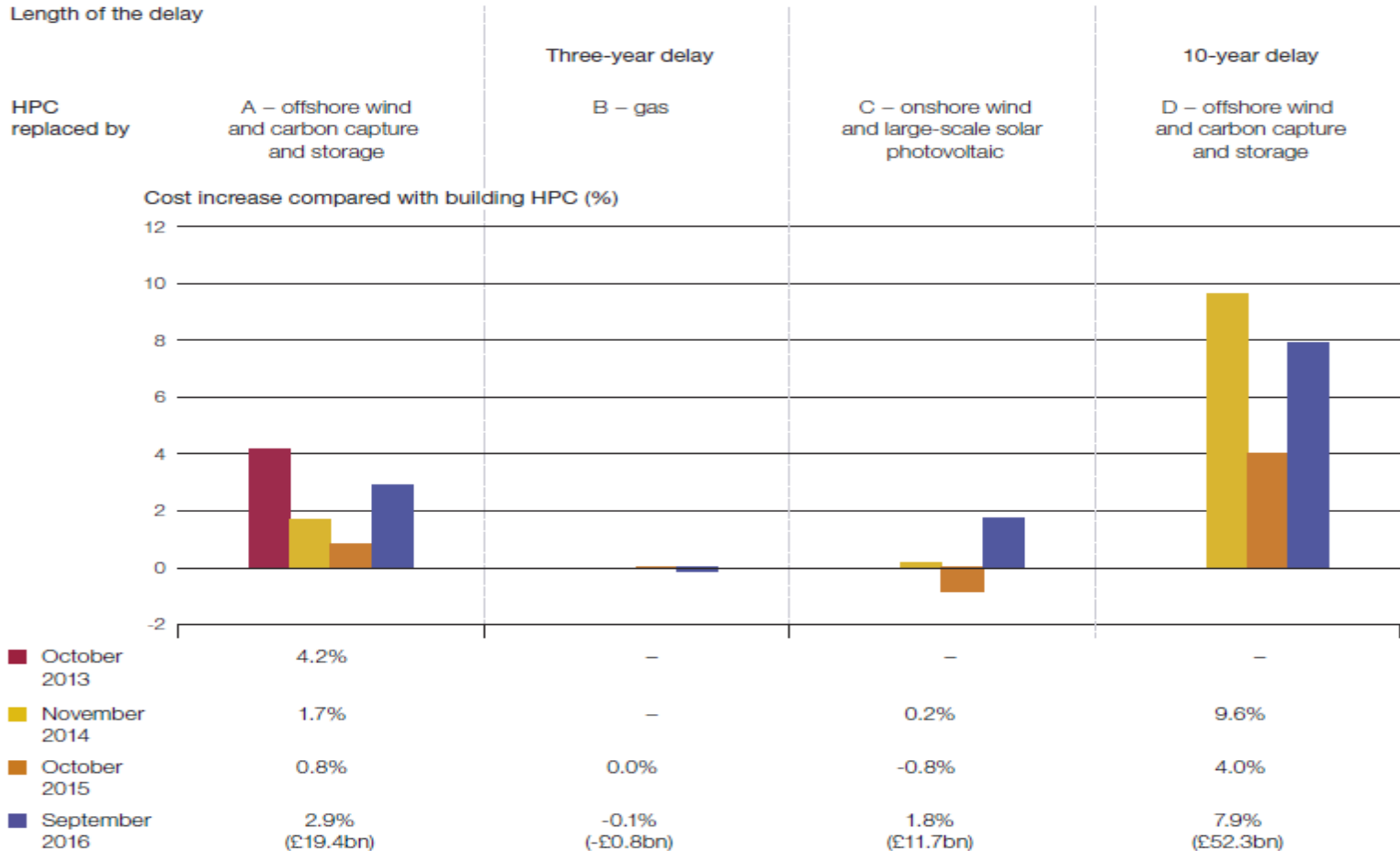
# VfM Test 2b: cost benefit analysis

**Figure 7**

Estimated cost impacts of delaying HPC and follow-on new nuclear build

The Department's analysis shows that delaying HPC and follow-on new nuclear build and filling the resulting power gap with low-carbon alternatives increases total power system costs, but the results are marginal

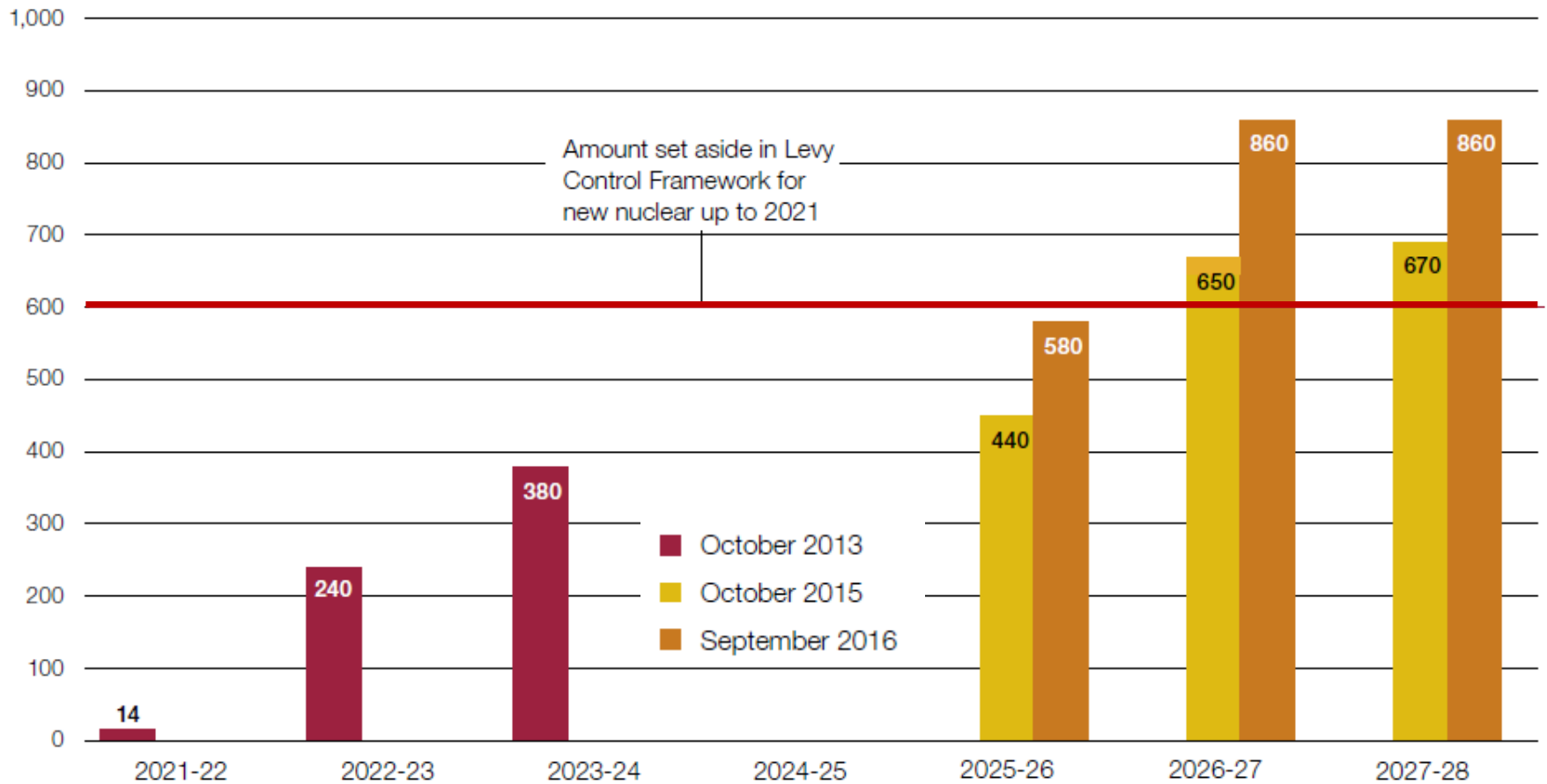
Length of the delay





# VfM Test 3/Affordability

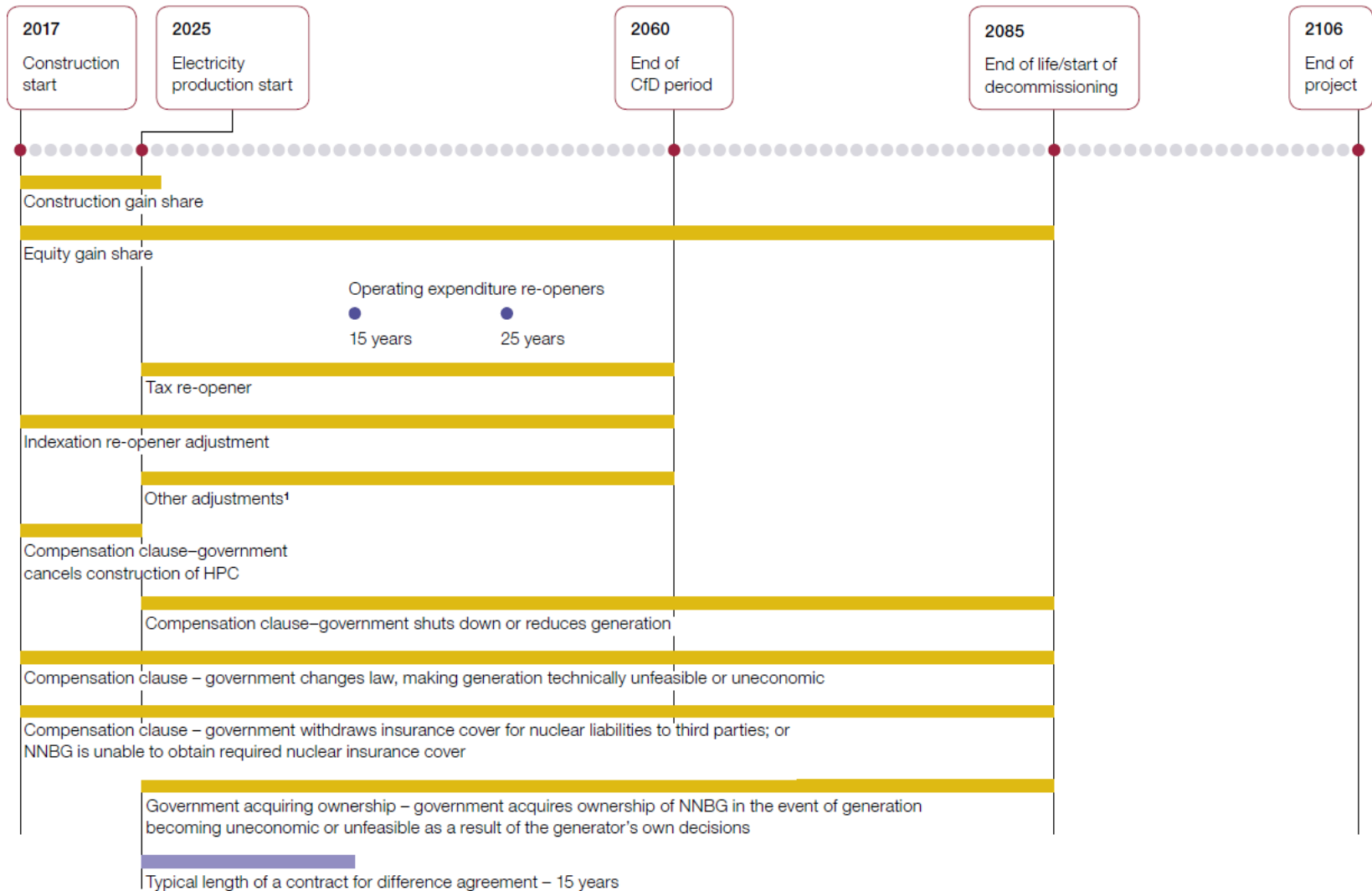
Annual cost of the CfD to consumers (£m)



# The dilemma of lock-in

- Renegotiation of terms was problematic
  - EdF returns falling; internal opposition
  - State Aids
  - Walking away not credible?
    - State-to-state dynamics
    - Brexit and damage to investor confidence in UK
- DECC did note the risk of “lock in” when it signed the outline deal in 2013
- But did they do sufficient scenario analysis and really test Ministerial risk appetite?

# VfM risks post-construction: contract management



# Recommendations

## For HPC

- Sort out the oversight arrangements
- Resources and governance to keep them working
- Develop and implement a benefits realisation plan

## For wider electricity system

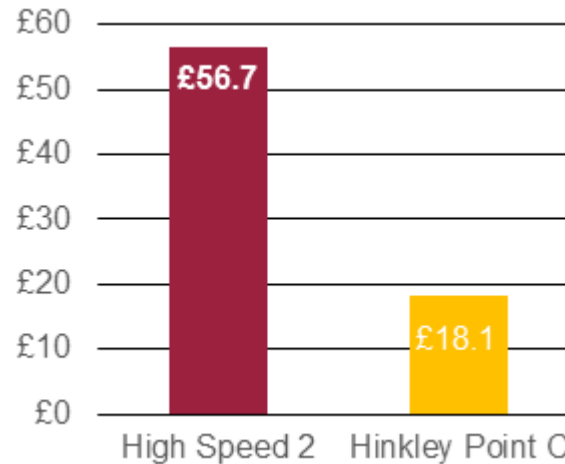
- Review and publish (periodically) the strategic case for nuclear
- Keep Plan B under review

## For big infrastructure

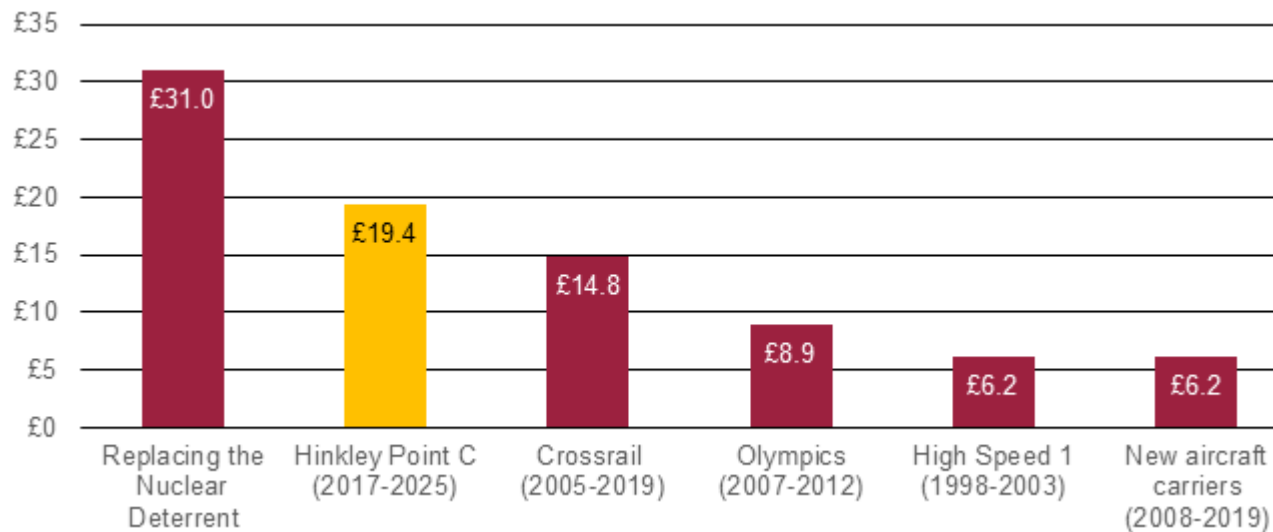
- Consider cost/risk implications of different approaches – even if contrary to current policy
- Understand and explain to decision makers the risks of lock-in
- Ensure effective and transparent mechanism for reviewing VfM and affordability – possible role for Ofgem?

# HPC versus other UK infrastructure

Construction costs  
(constant prices)



current prices



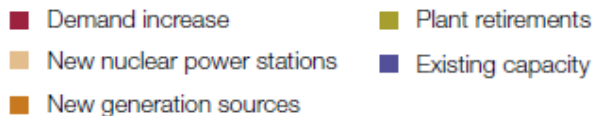
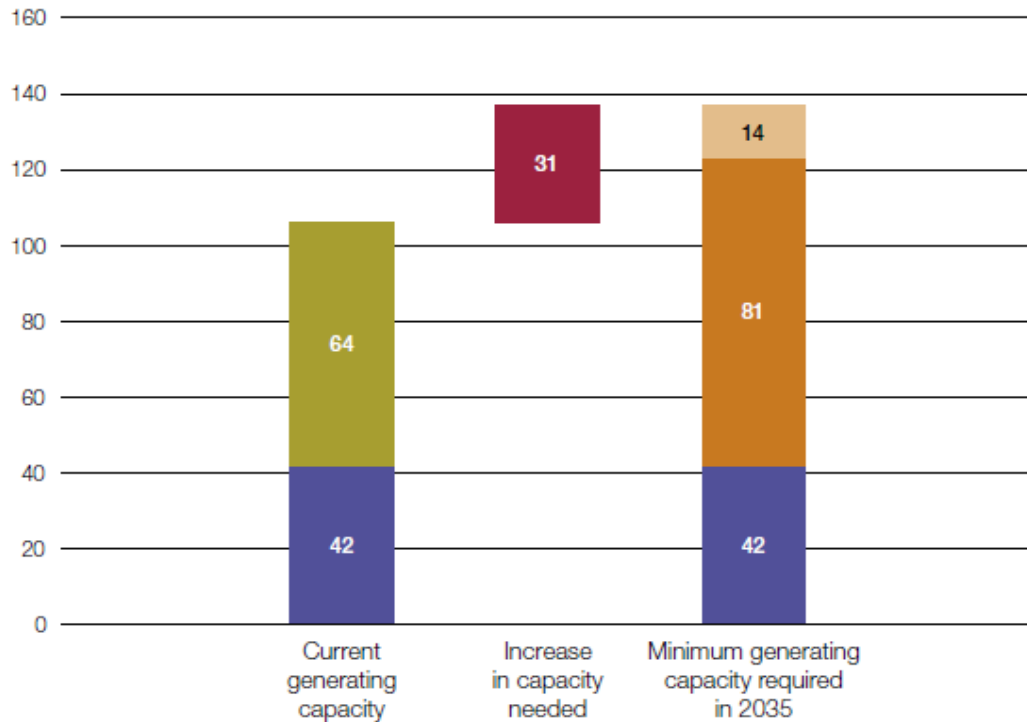
# The UK's Electricity System Challenge

**Figure 1**

The UK's energy challenge up to 2035

The Department projects that electricity demand may increase at the same time that a large proportion of existing generating capacity retires

Installed capacity (Gigawatts, GW)



Out to 2035:

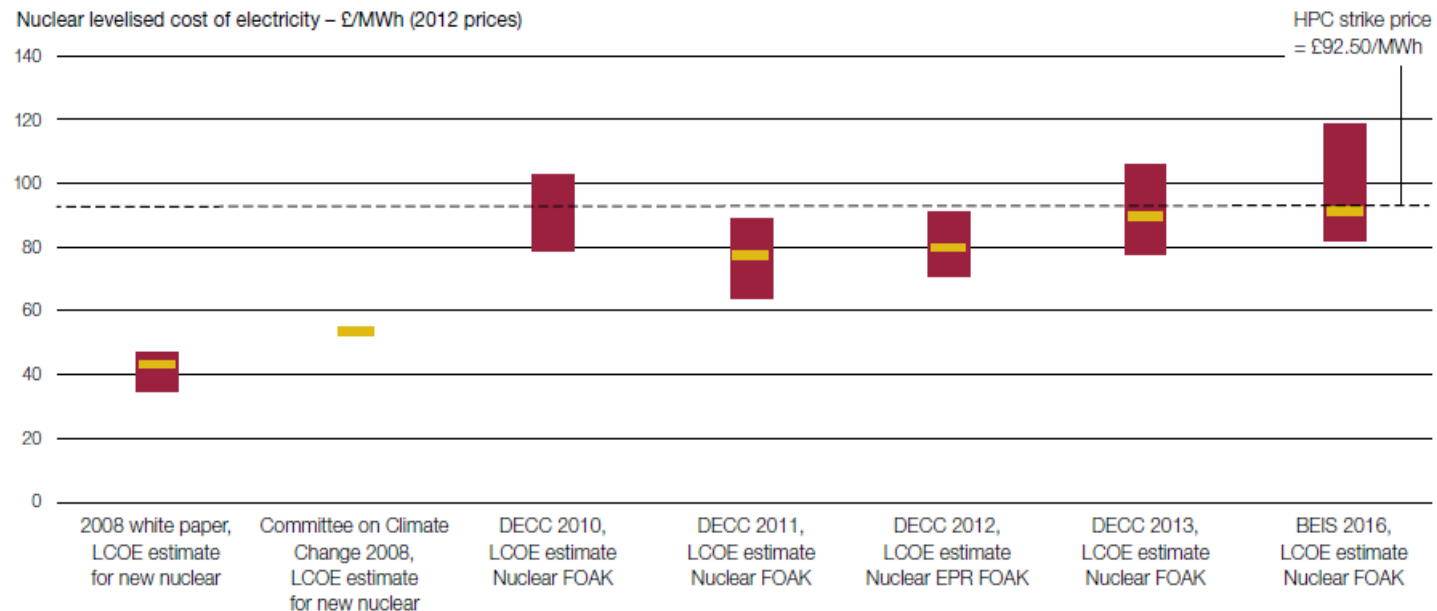
- 20% increase in demand
- 30GW of coal and nuclear plant closing
- More intermittent sources in the mix
- £140bn in generating capacity, plus £40bn transmission and distribution (to 2030)

# Since 2008 nuclear costs have doubled

**Figure 3**

Levelised cost of electricity (LCOE) estimates for nuclear new build since 2008

Estimates of the costs of electricity from nuclear power stations have doubled since the government's 2008 *Energy Challenge* white paper



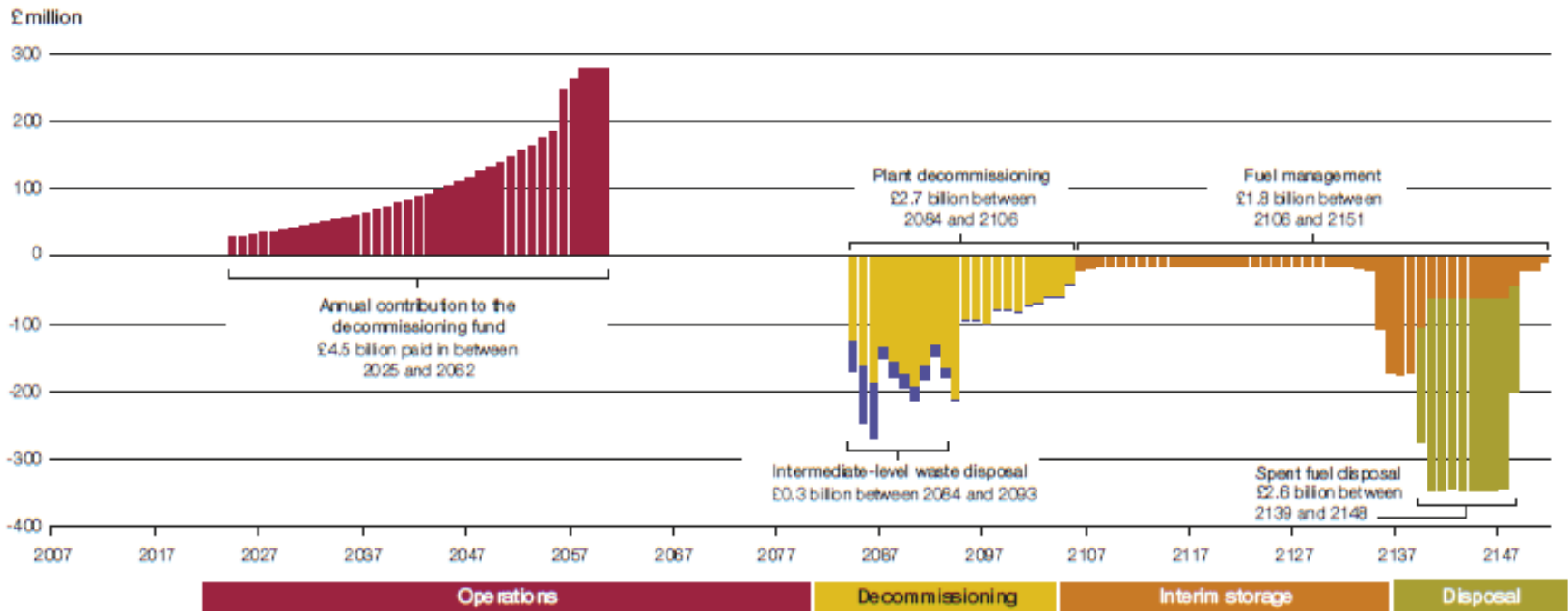
**...Though others agree new nuclear should be part of the least cost mix to meet the 2050 carbon target**

- Committee on Climate Change (2015 assessment)
- National Grid (2016 FES)
- Aurora Energy (2016 assessment)

# Waste & decommissioning – a long time horizon and uncertain costs

NNBG estimates of decommissioning and waste management costs and timeline (2016 prices)

The majority of decommissioning costs will be incurred decades after NNBG completes payments into the fund



- Annual contribution
- Decommissioning
- Intermediate-level waste disposal
- Fuel management
- Spent fuel disposal