

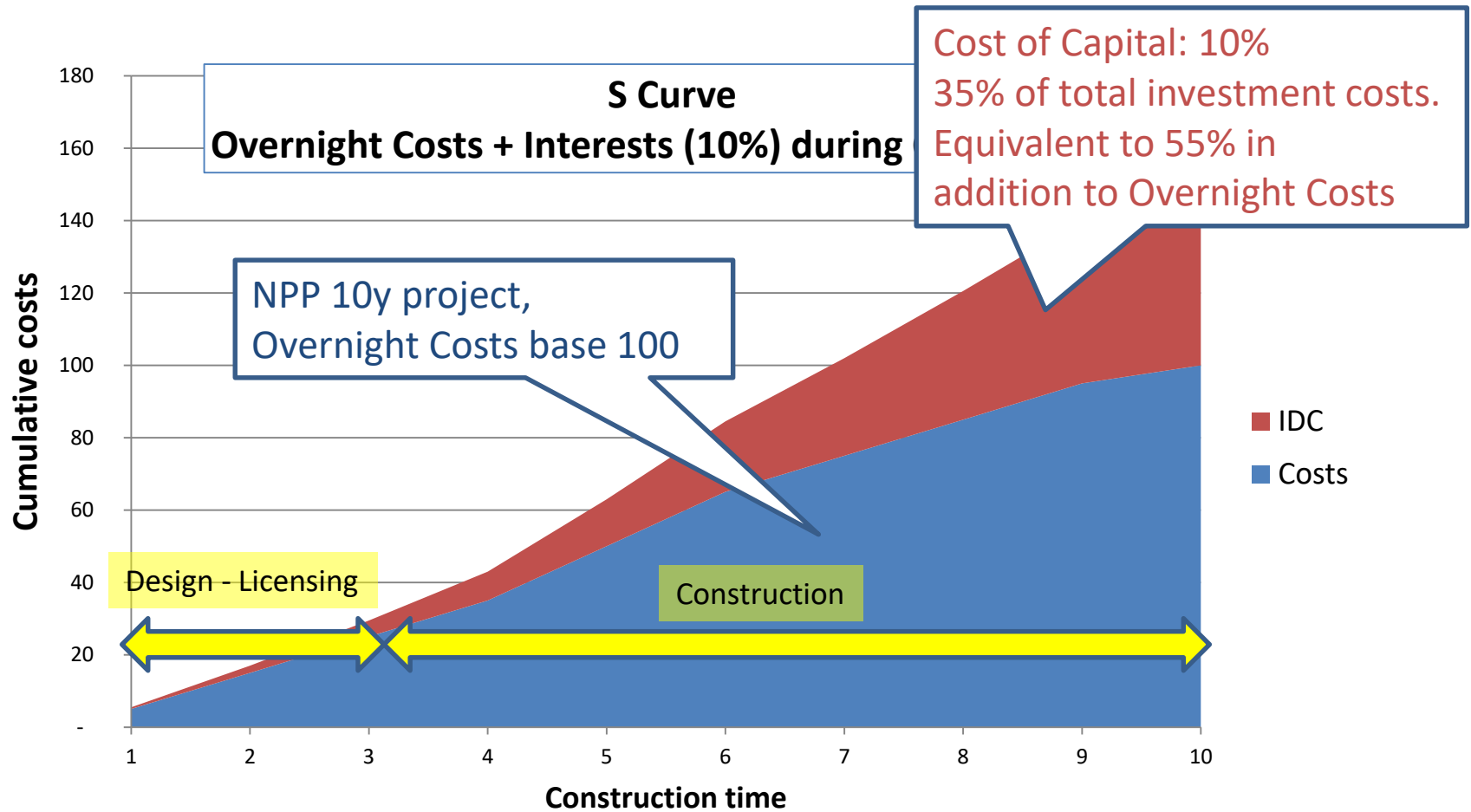
Improving nuclear economics by managing and allocating financial risks



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Some considerations on costs and risks



New nuclear build characterized by:

- Construction time (potential overrun risks)
- Highly capital intensive (interest during construction)
- Importance of Financing and Structuring

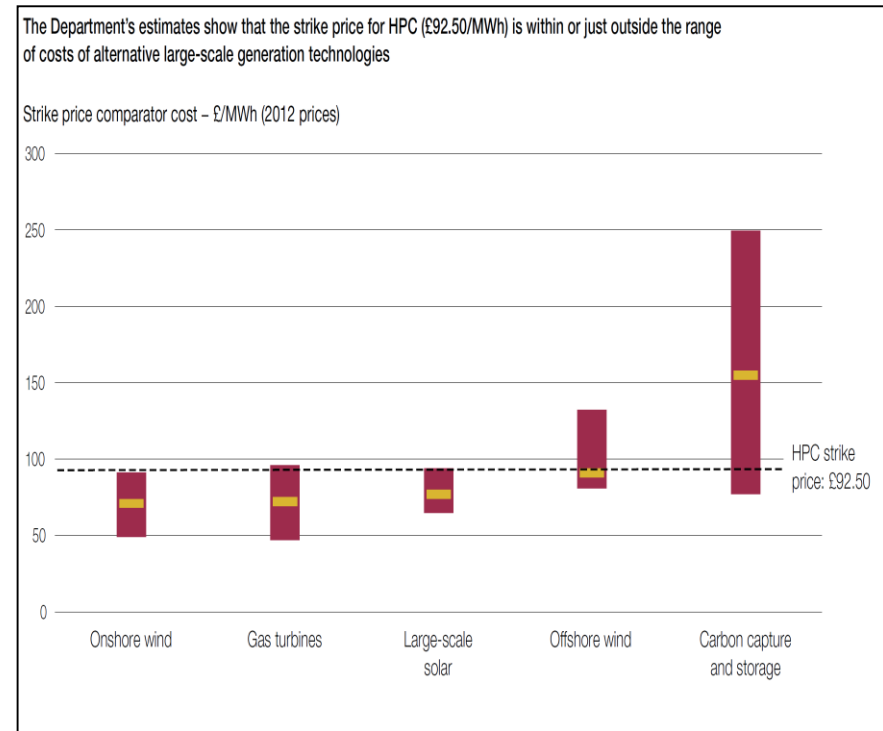
UK Nuclear projects

Review of Hinkley Point C deal

NAO – National Audit Office’s report June 2017 – reviewing the HPC deal

HPC CFD, similar to contracts for other low-carbon technologies

- No government subsidy as such (commitment at the time)
- All up front risks carried by private sector.
- In return : Guaranteed price for the electricity
- By 2016, UK had set 40 CFDs with low-carbon electricity generators: 6,7 GWe – 15 year, 80 to 150 £₂₀₁₂/MWh.
- HPC deal is competitive in price and comparable in IRR.

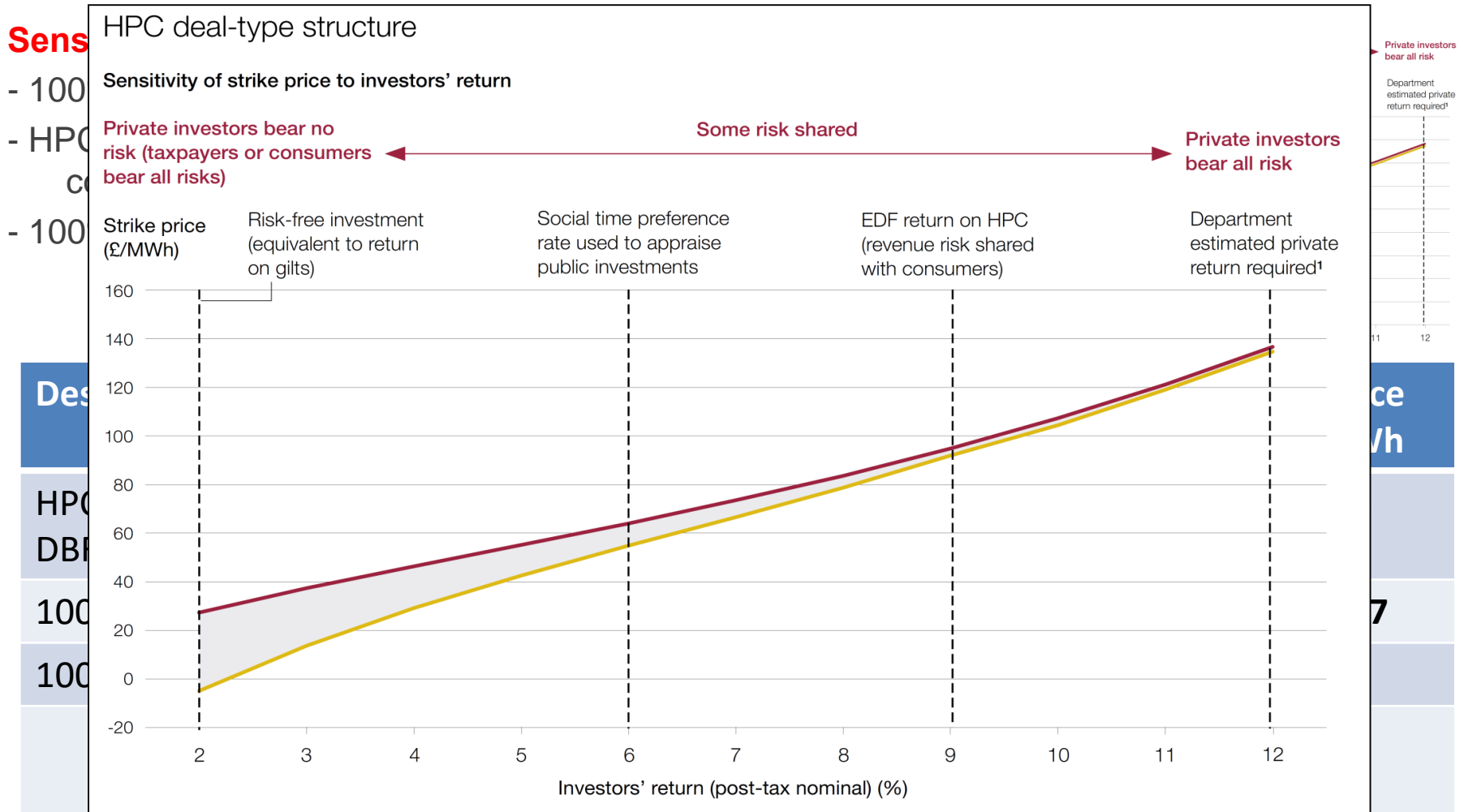


NAO report’s recommendations

- Explore alternative approaches to share the risk of construction overruns

UK Nuclear projects Alternative financing options

HPC deal-type structure



>> Huge sensitivity to structuring and Gov's share. The HPC 92.5 £/MWh may become below 60 £/MWh under scheme involving Government.

UK Nuclear projects

Alternative financing options

Hybrid

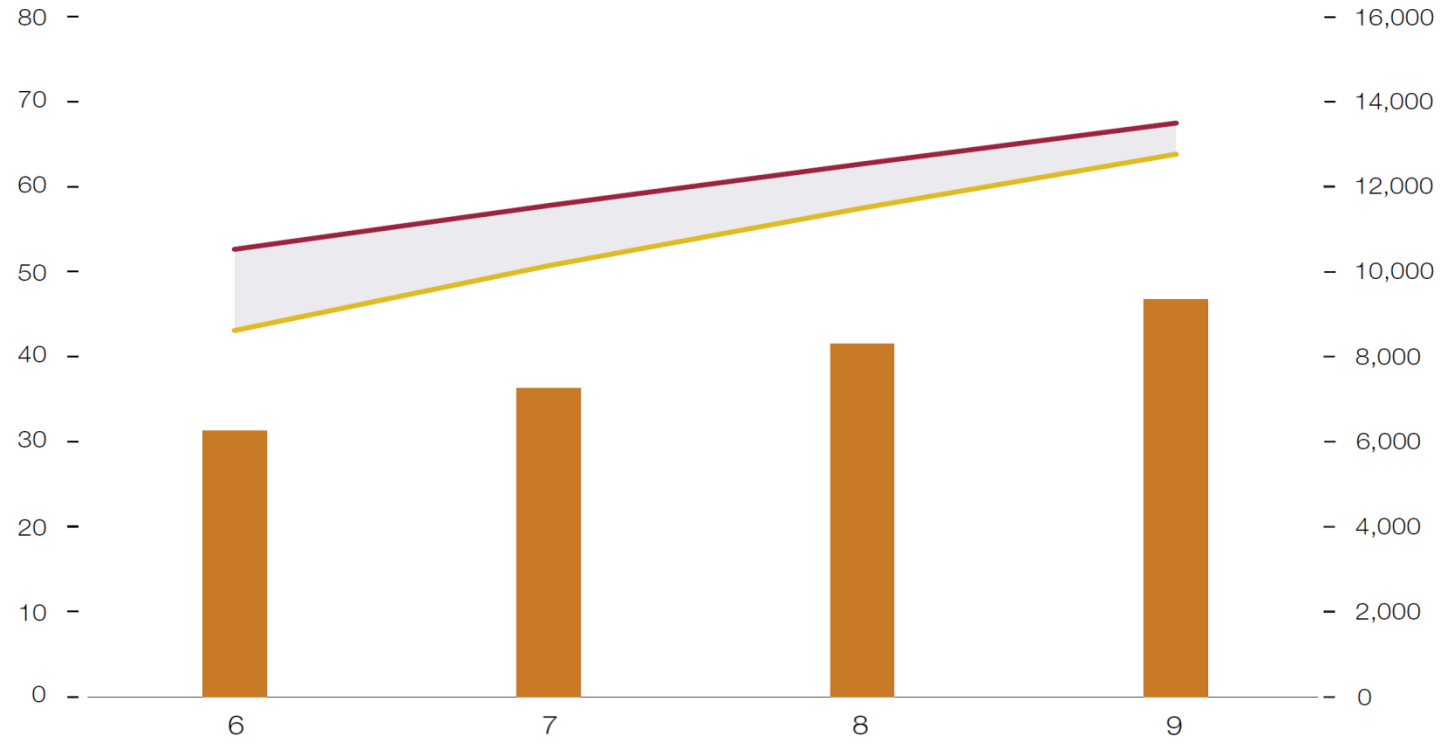
Hybrid regulated asset base model

Strike price sensitivity to investors' return and total consumers' contributions during construction

Providing investors with a return during the construction phase would decrease the strike price by at least £20/MWh

Strike price (£/MWh)

Consumers' contributions (£m)



Desc

HPC

DBFC

With

shari

With

ing construction

price by

's contributions (£m)

- 16,000

- 14,000

- 12,000

- 10,000

- 8,000

- 6,000

- 4,000

- 2,000

- 0

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Price
MWh

95

68

58

Sizewell C: Cost and risk reduction



Risks	FOAK new nuclear	NOAK (SZC)
Regulatory requirement changes	<ul style="list-style-type: none"> Design changes required after start of construction leading to re-work and delay Delays securing regulatory approvals 	<ul style="list-style-type: none"> Stable regulatory arrangements Reduces risk of regulator required change
Immature / changing design	<ul style="list-style-type: none"> Immature design leading to design changes after construction start Late design reduces on-site productivity 	<ul style="list-style-type: none"> SZC will be a copy of HPC. The HPC design will be mature and stable SZC will have a largely complete design before it starts construction
Quantities of materials and equipment	<ul style="list-style-type: none"> Underestimation of quantities Causes cost and schedule underestimates 	<ul style="list-style-type: none"> Mature design means quantities known with a high level of confidence
Quality issues / inexperienced supply chain	<ul style="list-style-type: none"> Unused to nuclear environment (quality and regulatory requirements) Quality issues leads to re-work and delay 	<ul style="list-style-type: none"> SZC to re-use HPC prime contractors HPC lessons learned and 'nuclear experience' transfer to SZC benefiting quality and

Fleet effect: SZC will be units 3 and 4 of a UK EPR fleet (7 and 8 of an international EPR fleet)

Cost saving: 'One off' HPC costs avoided saving c20% of SZC construction costs

Complete design: At the start of construction, SZC design will be largely complete; and quantities of materials and equipment known with a very high level of confidence

Lessons learned: From HPC and international EPRs. Supply chain can transfer learning from HPC

Harmony: a goal for the nuclear community

25% of electricity
supply in 2050

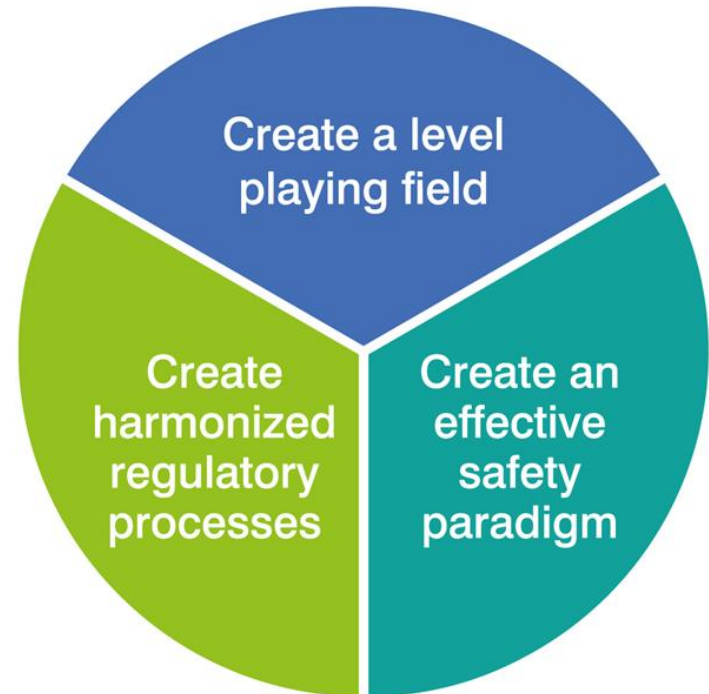
1000 gigawatt
new nuclear
capacity by 2050

To help meet the
growing demand for
a clean and reliable
low-carbon mix.



The Harmony programme provides a framework for action, helping industry reach out to key stakeholders so that barriers to growth can be removed.

Create a **level playing field** in energy markets which drives investment in future clean energy. Nuclear energy needs to be recognized for its reliability and should be treated on equal terms as other low-carbon technologies as part of a robust low-carbon mix.



Financing and appropriate risks allocation are key in the nuclear power development.

Fully deregulated market limit new NPP private development and investment.

UK CFD provide one approach for the current NPP project in UK, FOAK.

UK and NAO's report opened discussion for more efficient and cost effective structuring and financing arrangements for future NPPs in UK.

Harmony programme call for a level playing field in energy markets.

THANK YOU

www.world-nuclear.org