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UK Energy Research Centre
Researching pathways to a low carbon future

Technology and Policy Assessment (TPA)

Phil Heptonstall

Imperial College Centre for Energy Policy & Technology (ICEPT)

4th Meeting, LCS-Rnet

17th September 2012

Who we are

- The Team:
  - Robert Gross, Imperial College
  - Steve Sorrell, University of Sussex
  - Phil Heptonstall, Imperial College
  - Jamie Speirs, Imperial College
  - + others as required

- Advisory Group drawn from DECC, CCC, Industry, NGOs, Academia

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The UKERC TPA function

- Conduct independent, policy-relevant assessments to address key issues and controversies in energy policy
- Using a systematic review methodology, inspired by Evidence-Based Policy and Practice (EBPP) to draw on existing research, to develop accessible, credible and authoritative reports relevant to policymakers, other stakeholders and wider public debate
- Approach:
  - Identification of key experts/advisors and selection of an assessment team
  - Scoping of key issues and development of an assessment protocol
  - Expert review and/or stakeholder consultation
  - Publication of question and assessment protocol on TPA website
  - Assessment conducted, including systematic search of evidence base, data extraction, quality appraisal, synthesis
  - Production of preliminary report, including key findings
  - Expert review and/or stakeholder consultation
  - Peer review
  - Formal report launch

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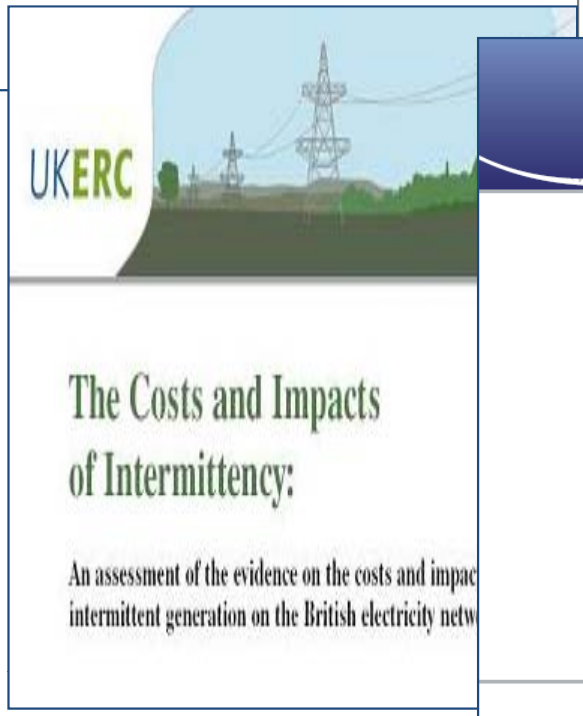
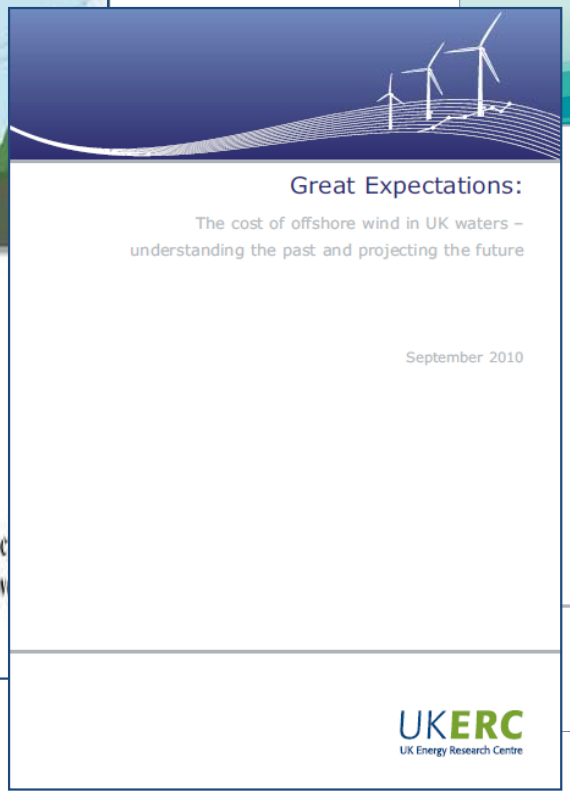
Previous TPA work





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Policy impact

- 2006 DTI 'Energy Review – The Energy Challenge' (**The costs and impacts of intermittency**)
- 2007 DTI 'Energy White Paper – Meeting the Energy Challenge' (**The costs and impacts of intermittency**)
- 2008 BERR 'White Paper on Nuclear Power' (**The costs and impacts of intermittency, The rebound effect**)
- 2008 House of Commons Select Committee on Innovation, Universities, Science and Skills Fifth Report of Session 2007–08 'Renewable Electricity – generation technologies' (**Investment in electricity generation**)
- 2008 House of Lords Select Committee on Economic Affairs Fourth Report of Session 2007–2008 'The Economics of Renewable Energy' (**The costs and impacts of intermittency**)
- 2008 Committee on Climate Change 'Building a low carbon economy' (**The rebound effect, The costs and impacts of intermittency, Investment in electricity generation**)
- 2009 Committee on Climate Change '1st Progress Report' (**What policies are effective at reducing carbon emissions from surface passenger transport?**)
- 2010 Industry Taskforce on Peak Oil & Energy Security report: 'The Oil Crunch: A wake-up call for the UK economy' (**Global Oil Depletion**)
- 2010 Committee on Climate Change '4th Carbon Budget' (**Great expectations: the cost of offshore wind in UK waters**)
- 2011 Mott MacDonald 'Costs of Low Carbon Generation Technologies' (supporting analysis for the 2011 Committee on Climate Change 'Renewable Energy Review' (**Great expectations: the cost of offshore wind in UK waters**)
- 2011 Committee on Climate Change 'Bioenergy Review' (**Energy from biomass: The size of the global resource**)

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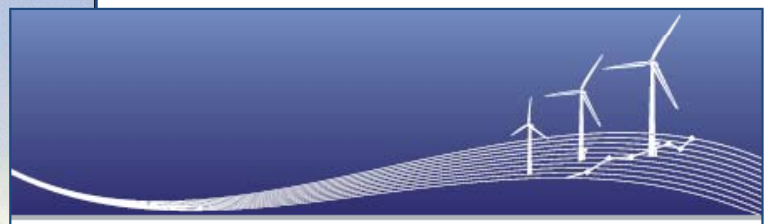
Case Study – The TPA Offshore Wind Costs Project



Great Expectations:

The cost of offshore wind in UK waters – understanding the past and projecting the future

September 2010

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Why offshore wind?

- EU 2020 and UK Government renewables targets
- Offshore wind expected to play a major role ~ c15 GW by 2020 with aspirations for much more
- Costs have been heading in the wrong direction
- Costs key to acceptability and achievability of targets
- Strong interest from the TPA Advisory Group
- Wider UKERC interest in investment, costs, learning curves – what can we learn for nuclear, CCS?

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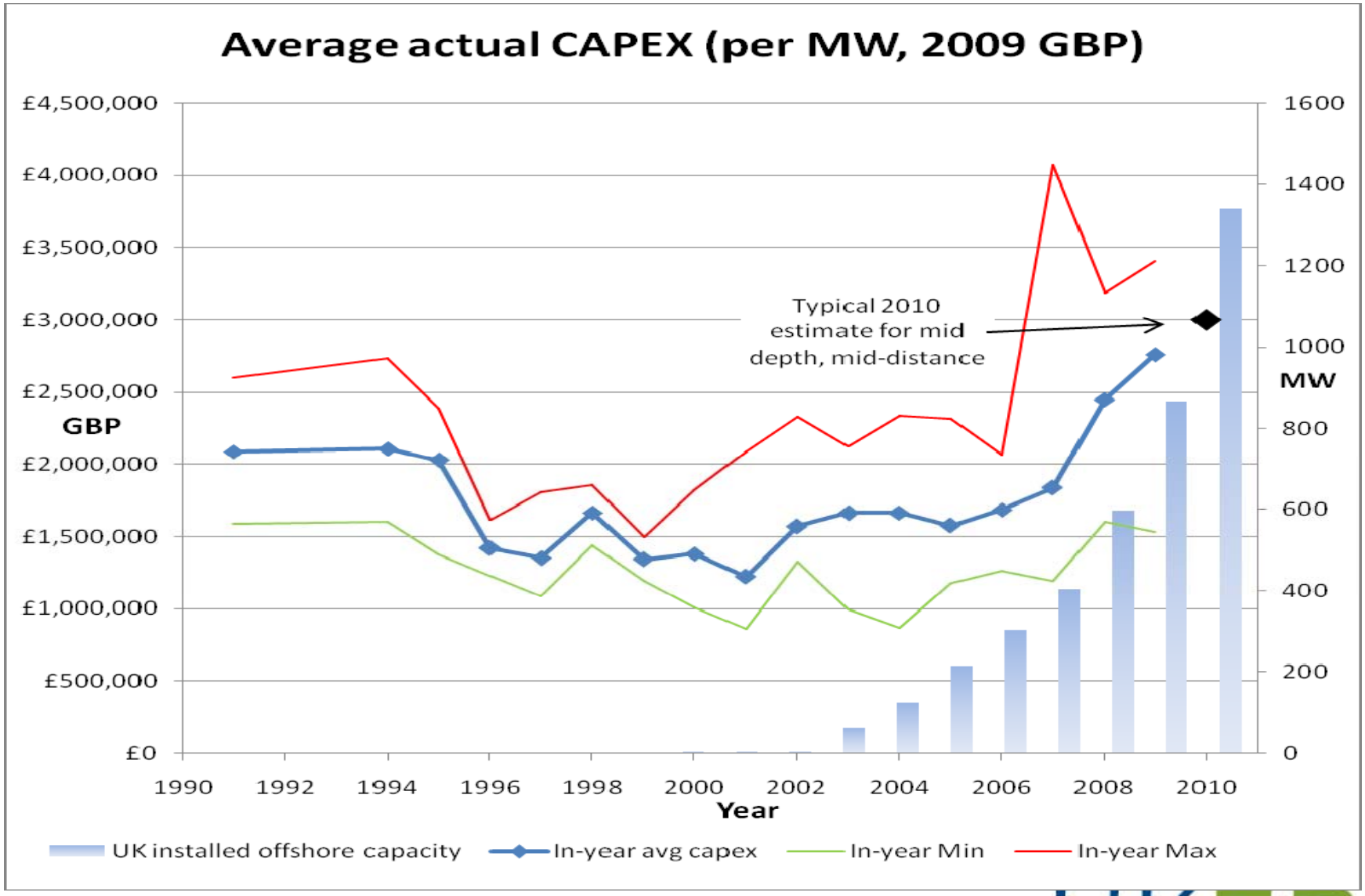
Offshore Wind – reported capex



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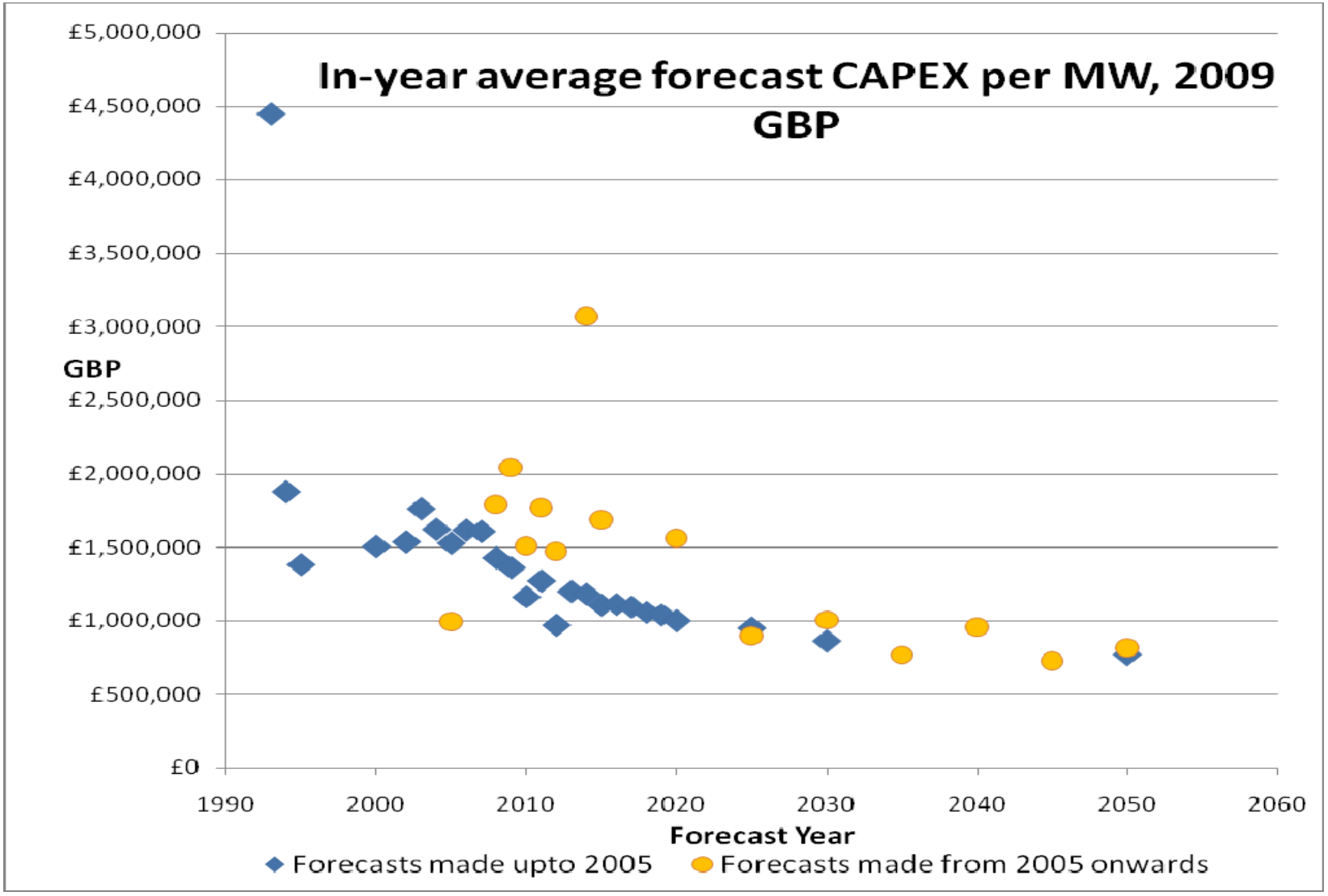
Offshore Wind – forecast capex



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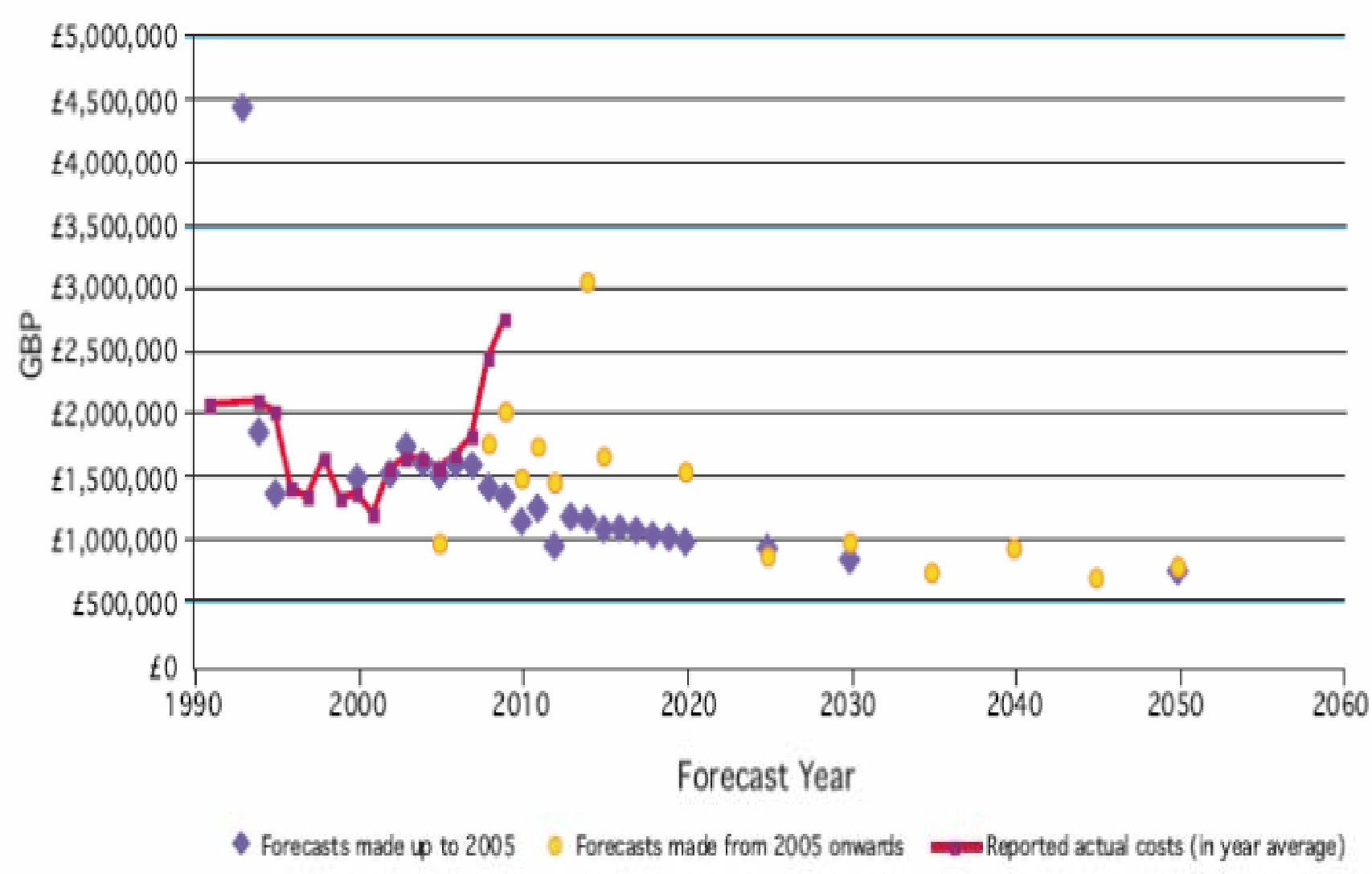
Reported and forecast capex



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What drove up costs?

- Materials, commodities and labour costs
- Currency movements
- Lack of competition in turbine supply (also including the ‘niche premium’)
- Depth and distance (also including the ‘true’ costs being revealed and the cost of increasing reliability)
- Supply chain constraints (vessels and ports)
- Planning and consenting delays

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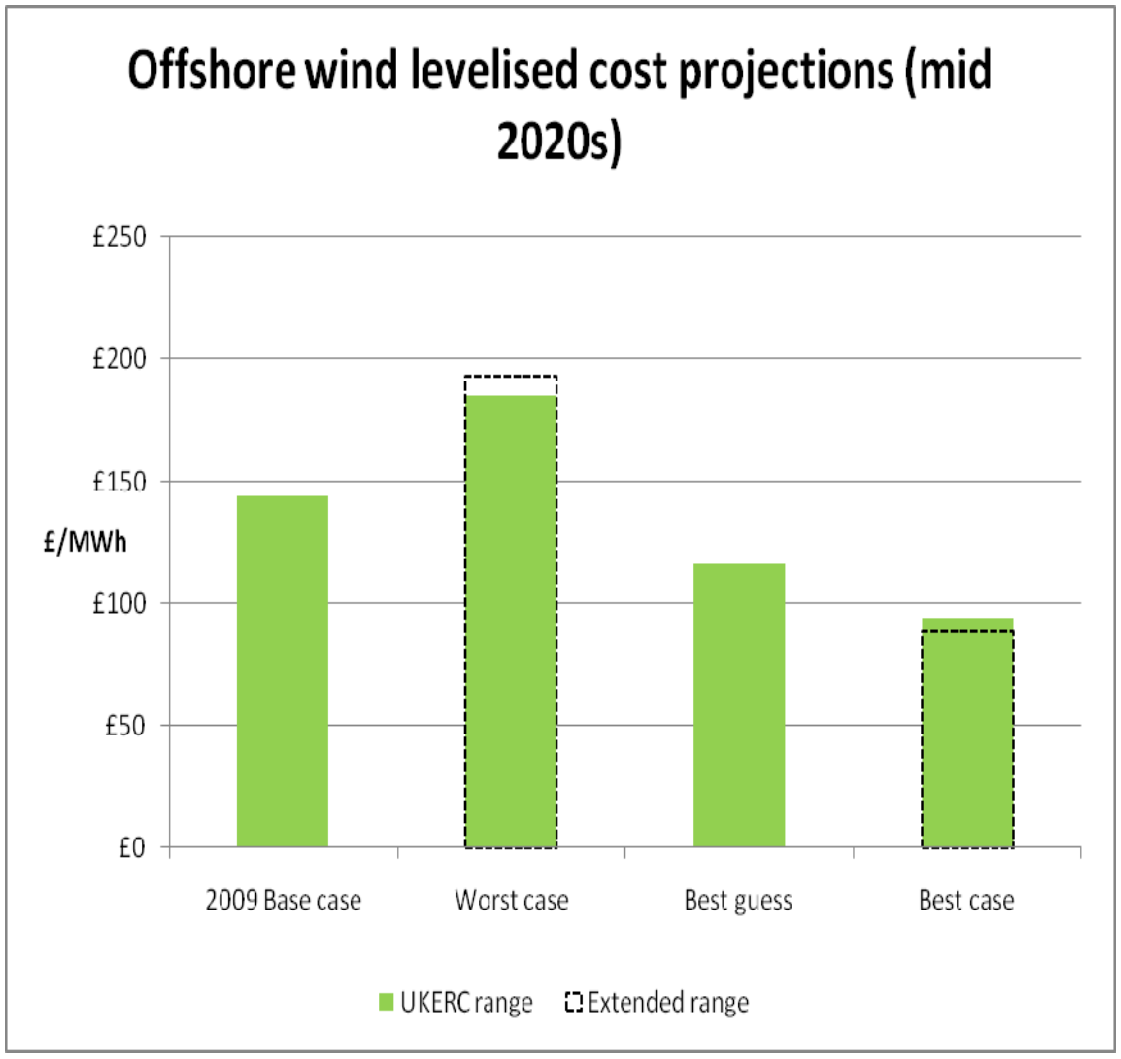
UKERC TPA cost projections



- Greater supply chain confidence – the 'Round 3 effect'
- Competition emerging in turbine making
- Innovation and efficiency gains, especially in turbine size and technology and in foundation design (but not radical changes)
- Scale effects and standardisation
- Improved O&M, reliability and better load factors

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Conclusions for offshore wind

- Early developments did not give a good guide to future costs (Premature application of learning curves to an industry still in its infancy)
- Cost plateau and turning point may now have been reached at c.£3.0m/MW capex and £140-150/MWh
- Substantial reduction between now and mid-2010s unlikely
- There are grounds for optimism, but this should be tempered with realism about the challenges
- Downward trajectory is likely to be gradual with end point higher than once thought – beware 'dogged optimism'
- Reasonable to expect a fall in cost over the period between now and mid 2020s – potential 20% decline? (Greater reductions require most, if not all, of the major cost drivers to move decisively in the right direction)
- Recognize that the UK Government and Crown Estate have more aggressive cost reduction aspirations (£100/MWh by 2020)
- Pace versus efficiency – open question as to whether the rush to 2020 is the best approach
- Don't panic – offshore wind is still nascent (still building the equivalent of one or two conventional power stations)
- Many technologies experience early cost increases and technical problems – and then go on to offer cost effective performance
- The context is important – all low carbon options look more costly at present, and there is significant uncertainty over costs….

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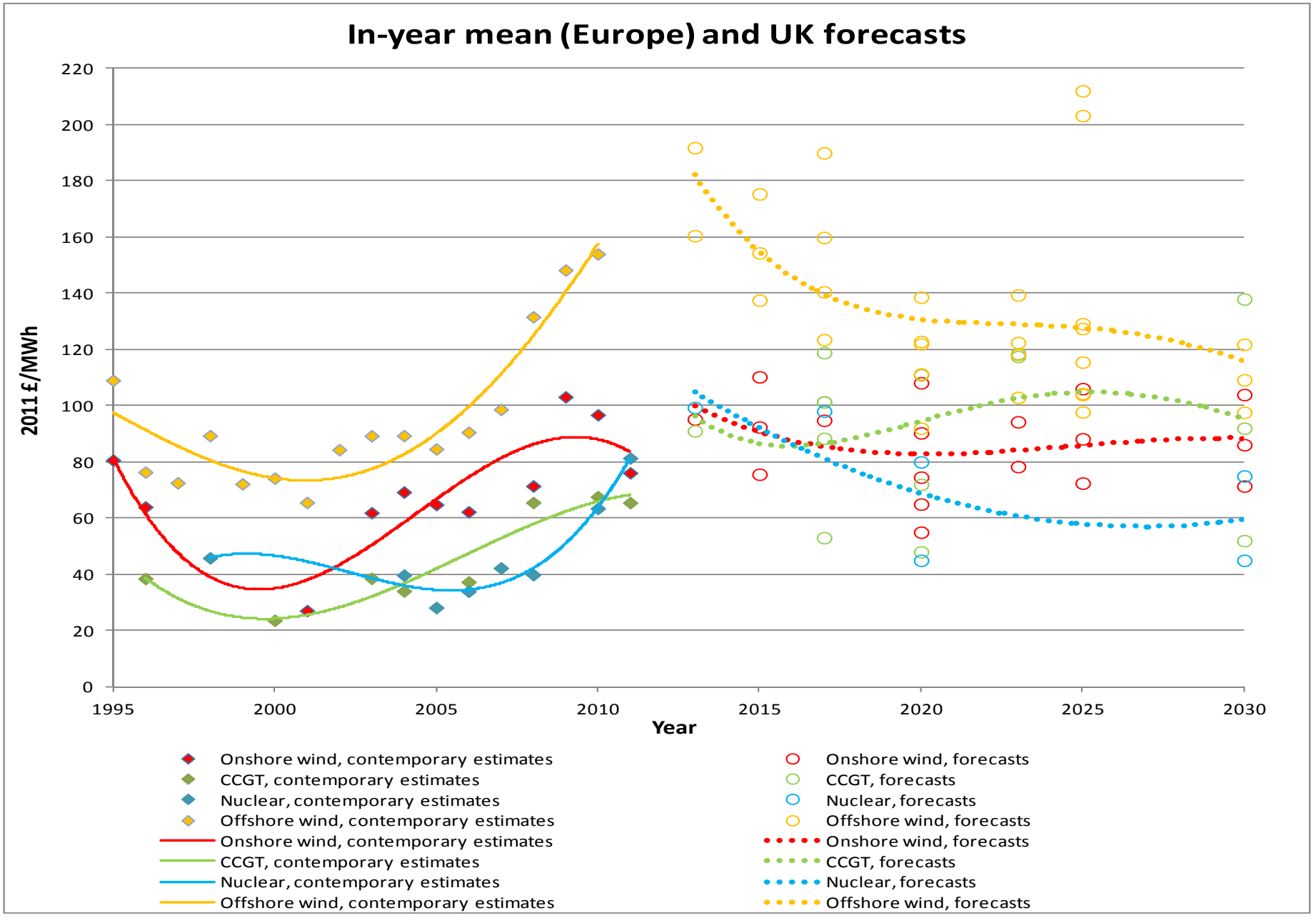
Current TPA work on costs



Final thoughts on the TPA experience

The UKERC TPA has been able to:

- Address controversies and resolve misunderstandings (e.g. Intermittency report)
- Draw attention to important, but sometimes overlooked, issues (e.g. Rebound report)
- Inform the debate around continuing uncertainties and disagreements (e.g. Global Oil Depletion and Biomass reports)

Need to bear in mind that:

- Topics must be amenable to the systematic review approach
- There must be a suitable evidence base, and a carefully framed research question

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