



2050 Energy Pathways – ETI Perspective

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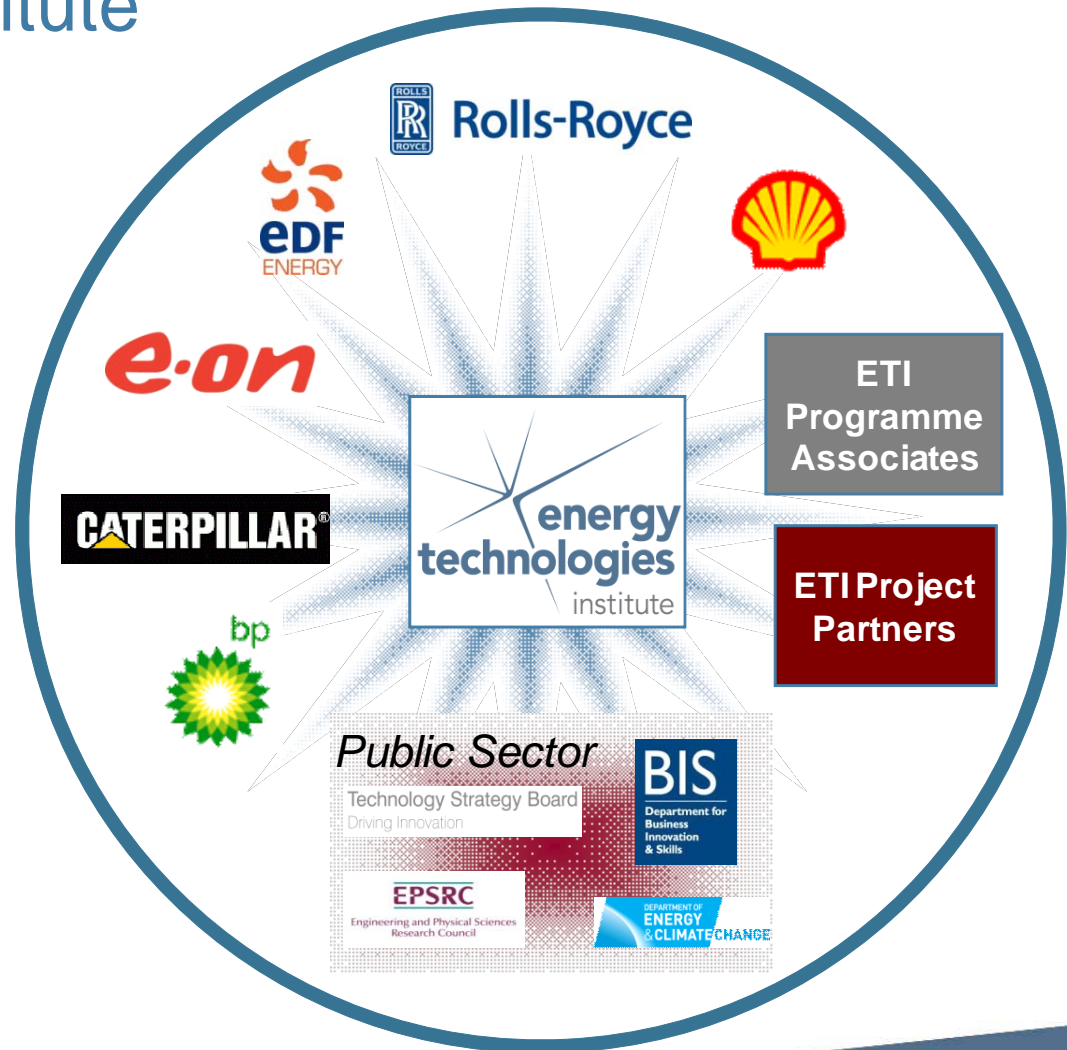
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Energy Technologies Institute

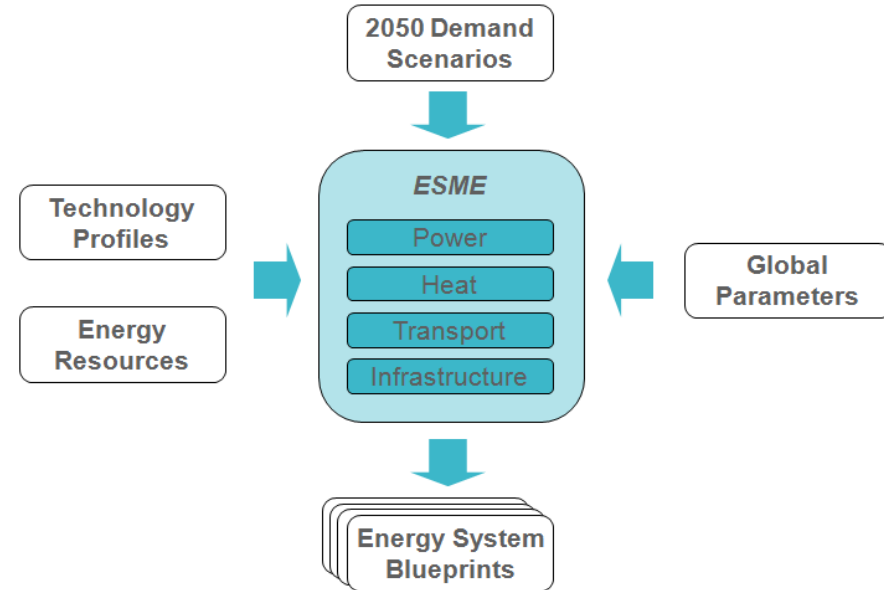
Addressing the challenges of climate change and low carbon energy

- Improving energy usage, efficiency, supply and generation
- Demonstrating systems and technologies
- Developing knowledge, skills and supply-chains
- Informing development of policy, regulation and standards
- Enabling deployment of affordable, secure, low carbon energy systems



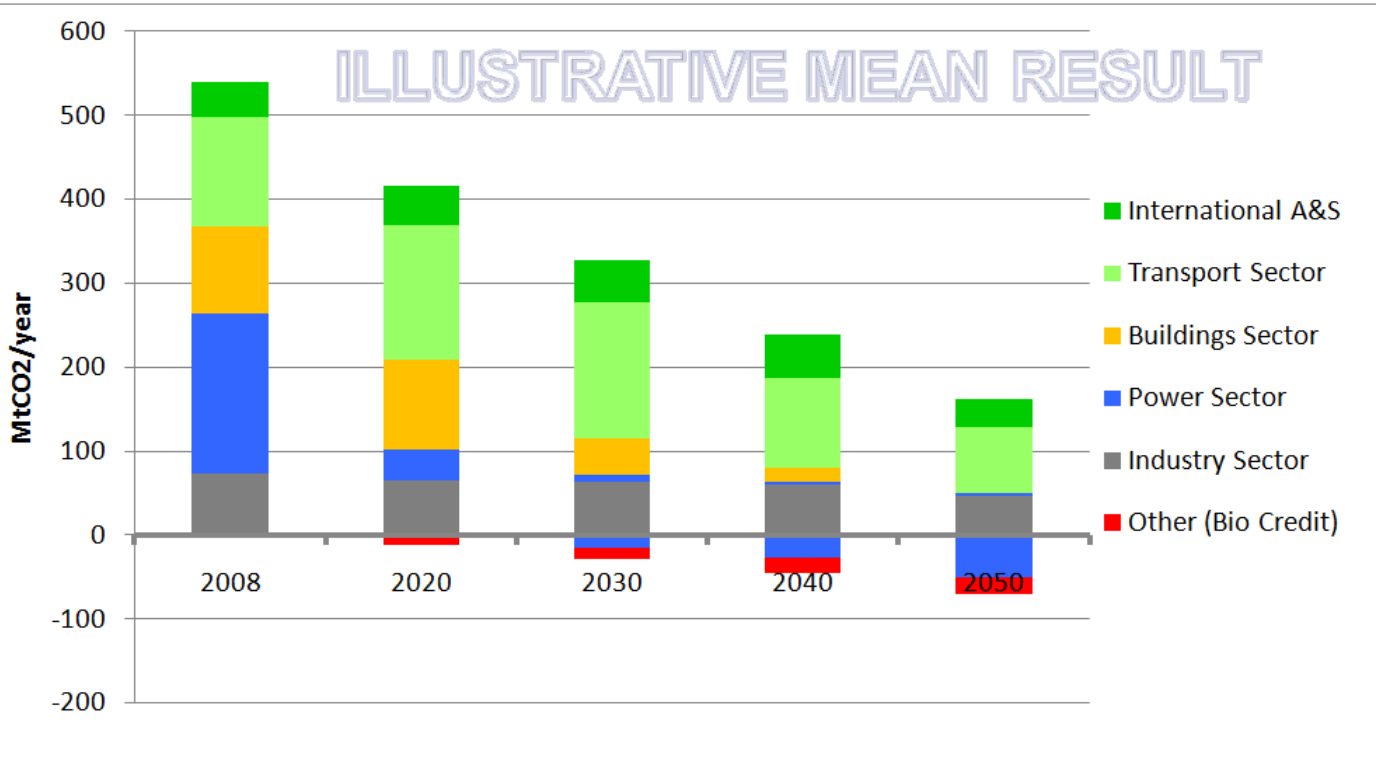
ESME offers a new perspective

- An energy system design tool
 - Focus on 2050 and practical engineering system designs
- Pathway cost optimisation
 - Back casting from 2050 vision
 - Probabilistic treatment of uncertainty
 - Spatial & temporal factors
- Circa 125 technologies modelled
- Informed by ETI members & advisors; independently peer reviewed



The power and buildings sectors are likely to drive emissions reduction....

Scenario example:

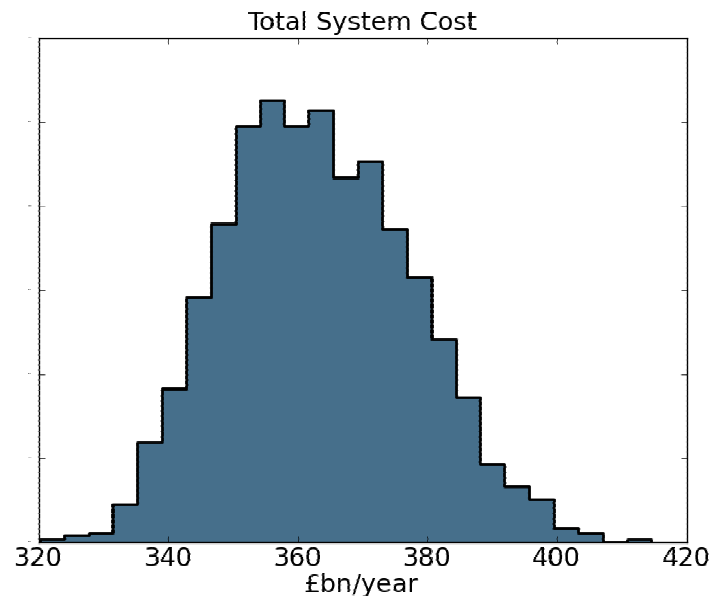


- 2050 = 85% energy system emissions reduction
- No electricity import / export
- Unconstrained fossil fuel availability
- “Reference case” fuel prices
- UK biomass 100-300 TWh
- Biofuel imports 70 TWh
- 2050 reference case
 - Population = 77 million
 - Dwellings = 38 million
 - Cars = 40 million

UK biomass could be a key determinant of system costs

- Total system costs (fuel, investment, operating) is circa 2% of GDP in 2050 versus lowest cost, unconstrained emissions case – may double without UK biomass

ILLUSTRATIVE MEAN RESULT

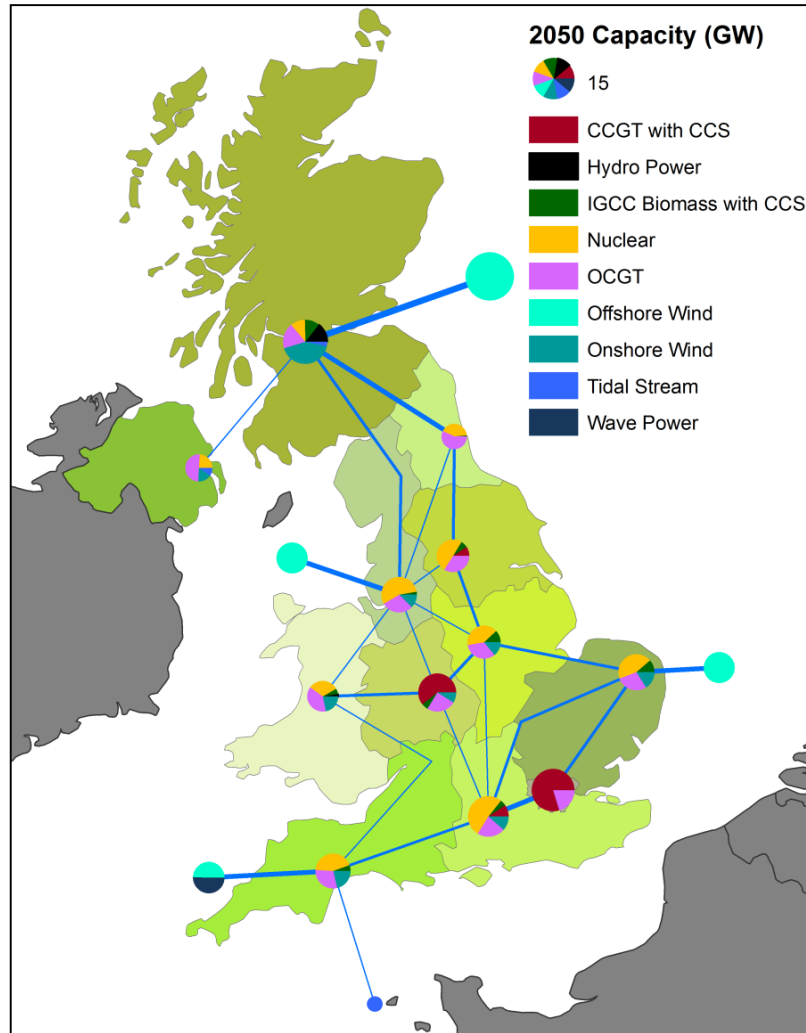


2050 Energy System Costs (Mean)

£bn per annum (2010)*	2050
Reference case	£70 Bn
No building retrofit	+10
No nuclear	+15
No CCS	+60
No biomass	+90

*versus lowest cost, unconstrained emissions case

High regional deployment diversity....



2050 Power Infrastructure

ILLUSTRATIVE MEAN RESULT

- Biomass and wind resources are drivers of local energy mix
- Low grade heat recovery informs power station locations
- Biomass and CO₂ transportation may impose further constraints
- The impact of public acceptability factors are unclear



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