



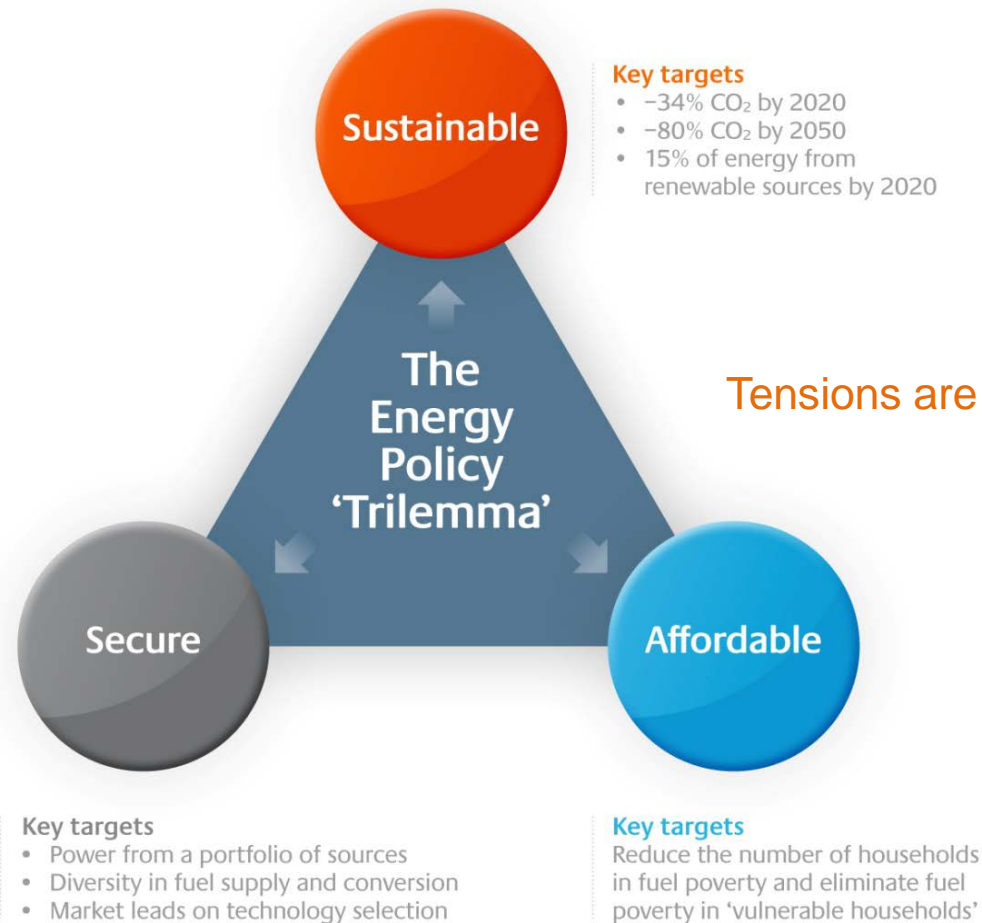
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Options/Choices/Actions on Low Carbon Energy

Mike Colechin



The UK energy challenge...





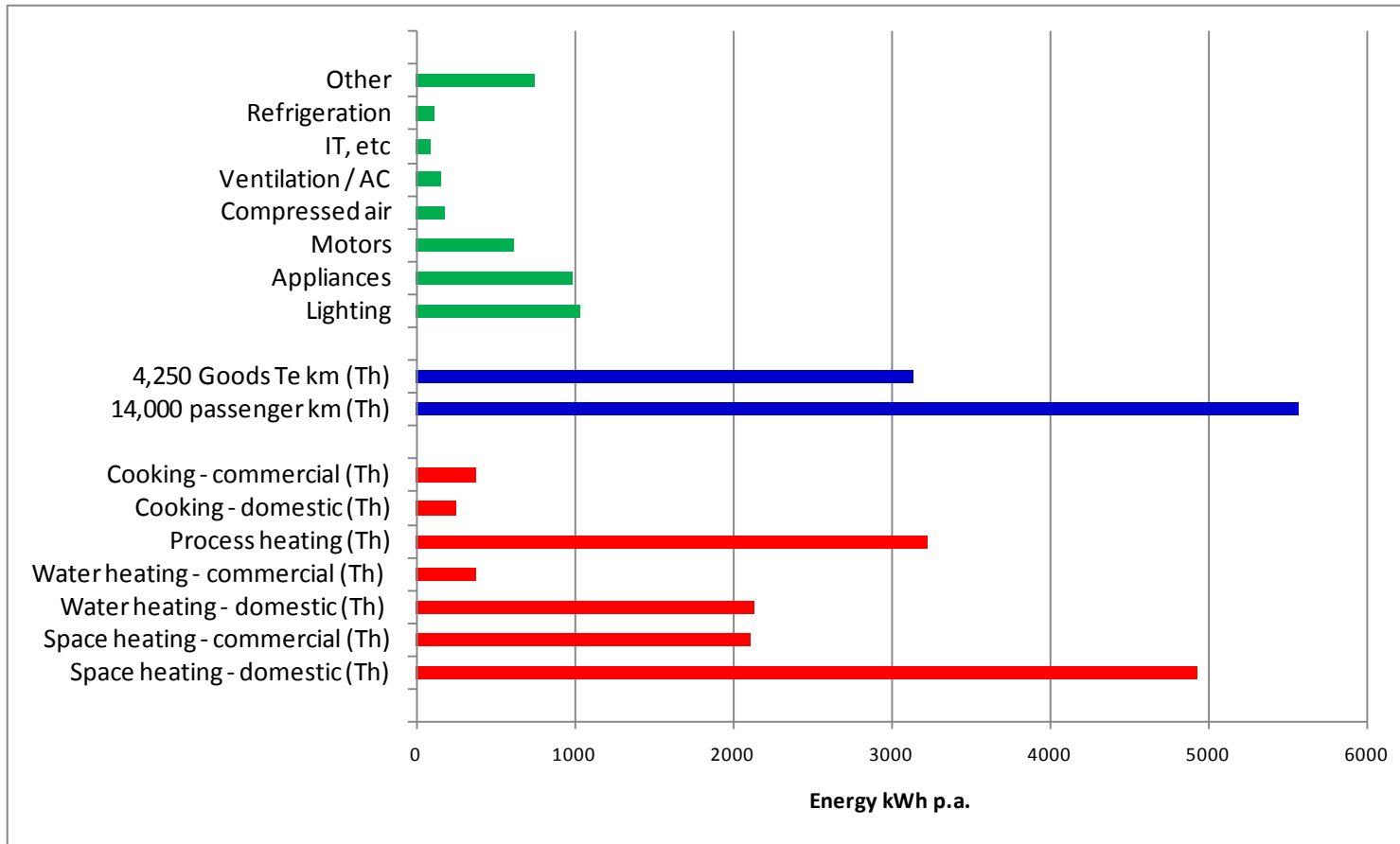
The UK energy challenge...

Demand is growing, assets are aging, prices are rising... irrespective of a CO₂ reduction target

- 62m people growing to 77m by 2050
- 24m cars growing to 40m by 2050
- 24m domestic dwellings 80% will still be in use in 2050
total dwellings 38m by 2050
- Final users spent £124bn on energy in 2010 9% of GDP
- 2.4m English households in fuel poverty average 'fuel poverty gap' £438
and increasing
- Over 90GW generation capacity from 1MW to 3.9GW
- Over 200 'significant' power stations average age >20 years
- 50% of power generation capacity in 30 power plants
average age 30 years



Individual energy consumption in the UK* ...

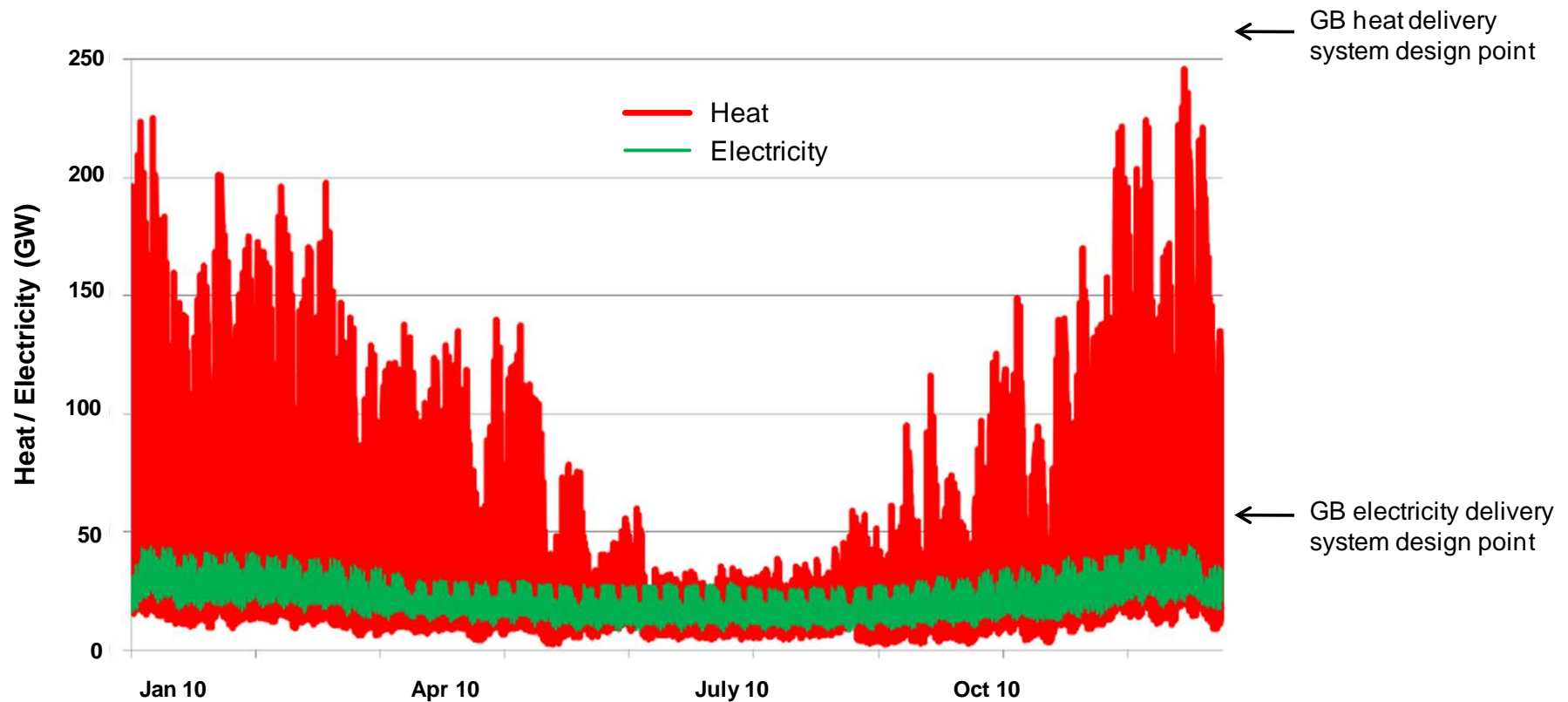


* 2010 UK consumption divided by 60M
(people in the UK)

Notes: 1. Passenger transport figure excludes international air travel
2. Data excludes heavy industry



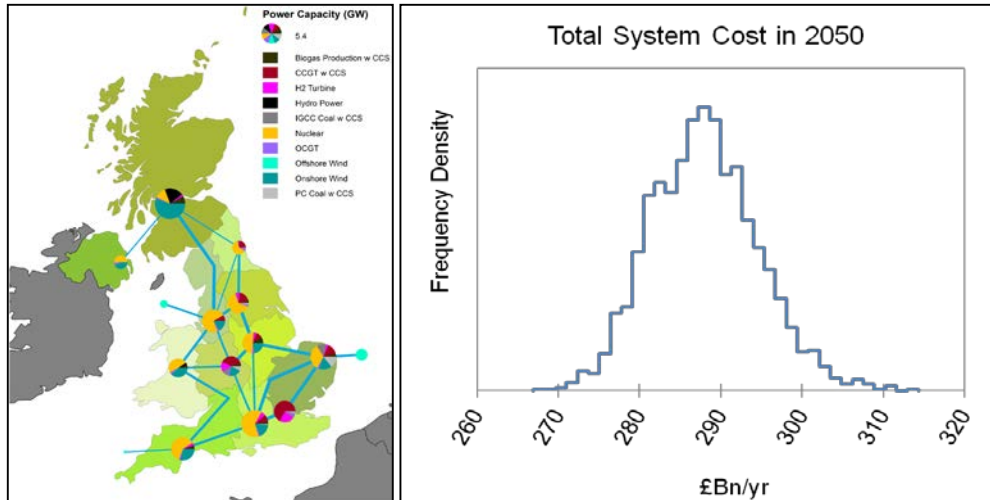
GB heat and electricity demand variability (commercial & domestic - 2010)



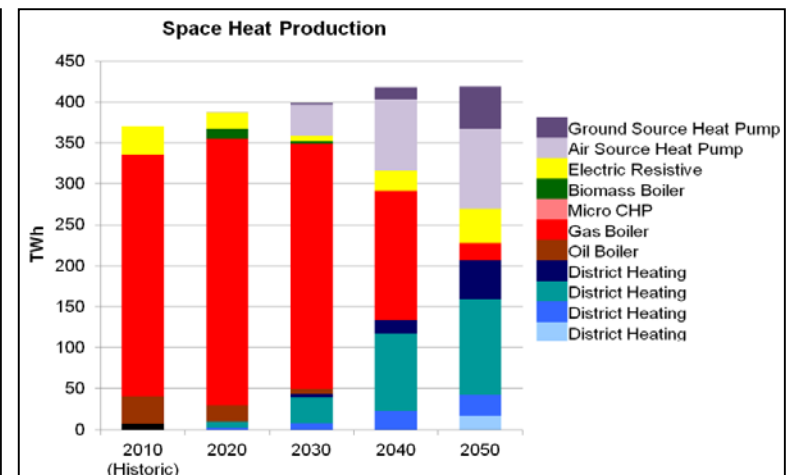
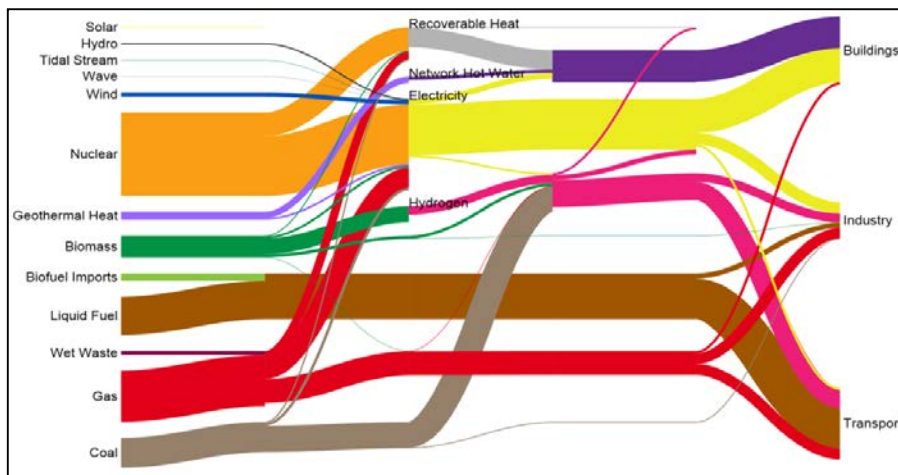
Source: UKERC (2011)



ESME – ETI's system design tool...

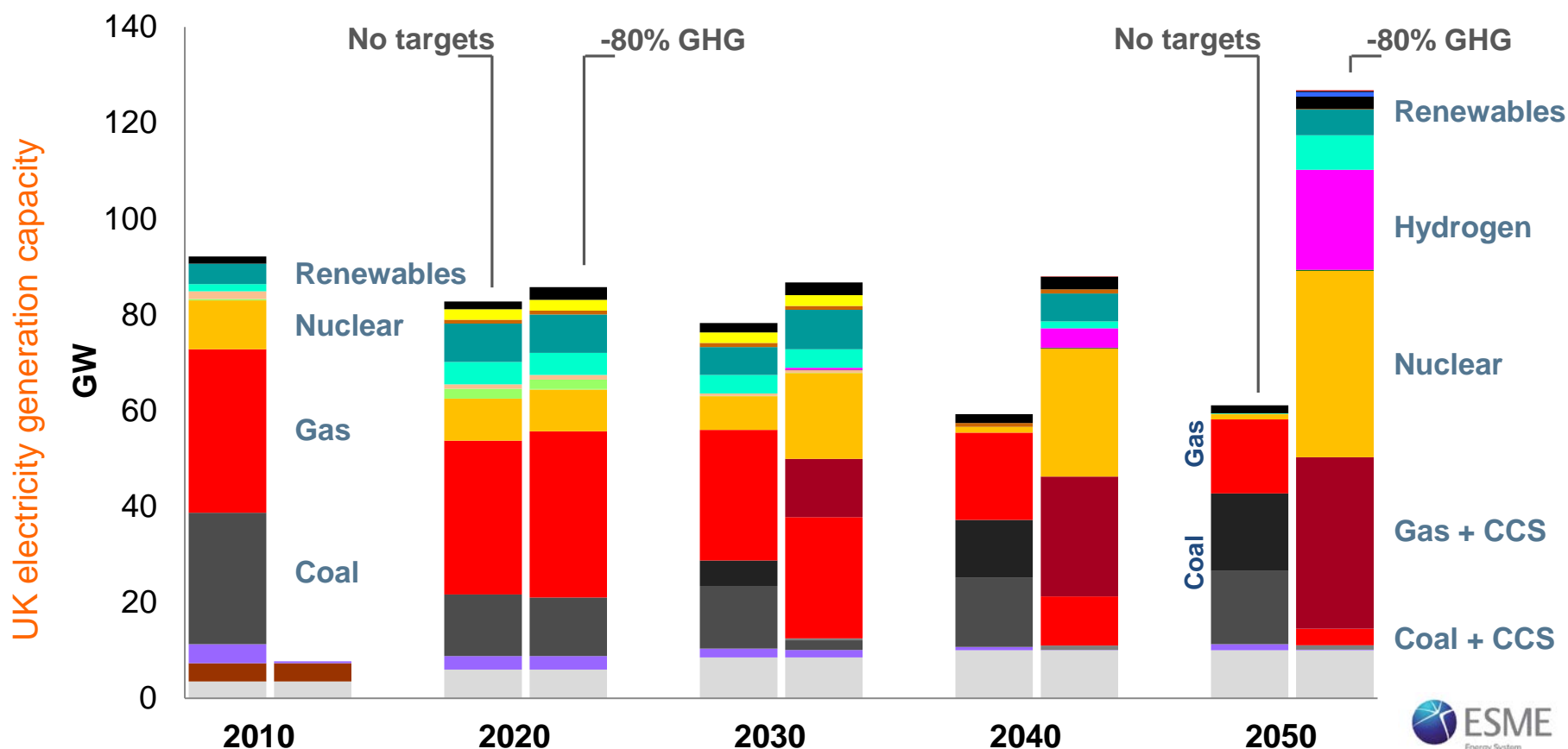


Energy
System
Modelling
Environment



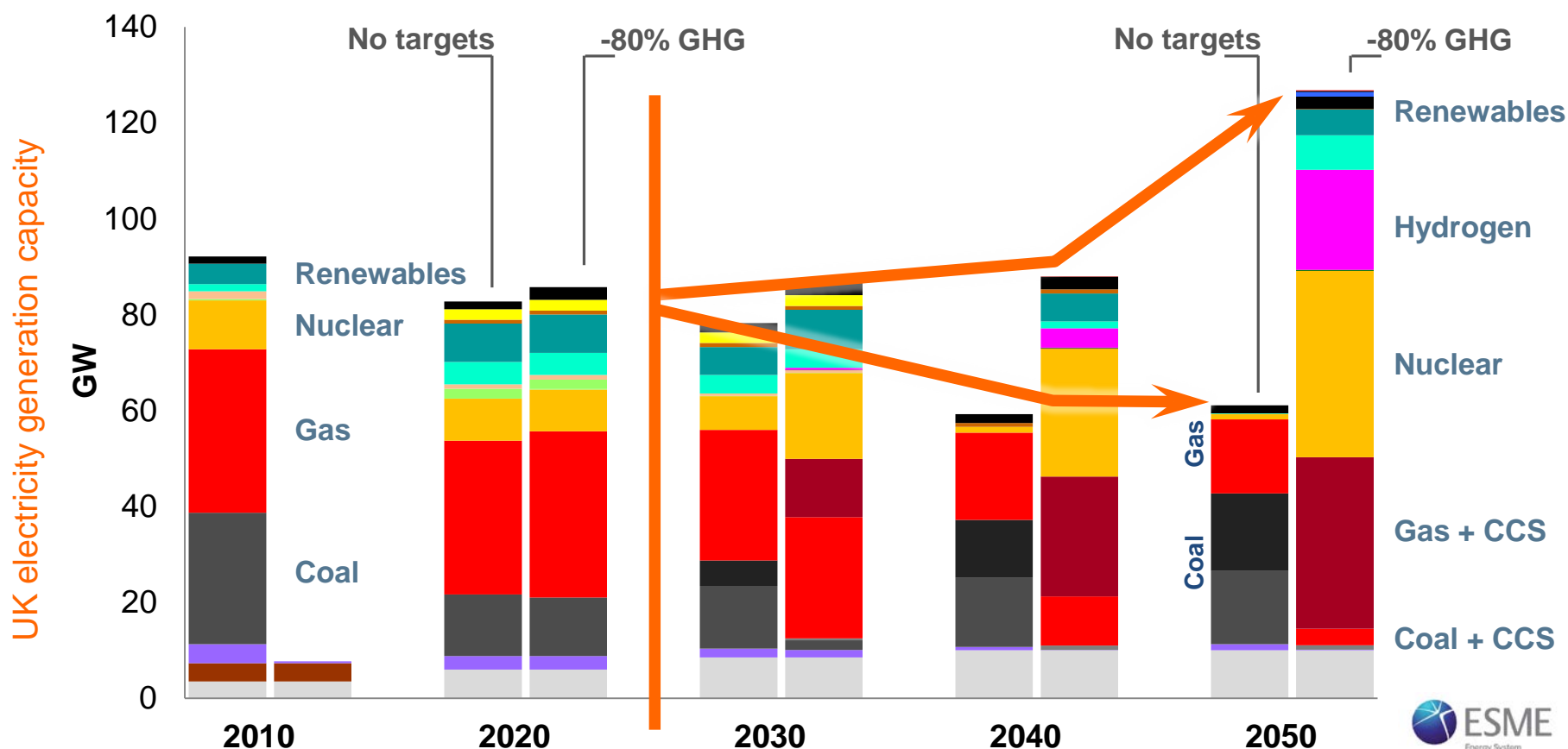


“No emissions targets” and “-80% GHG in 2050” are very different worlds...





As long as we prepare NOW, decisions on 2050 can wait...
but not for long

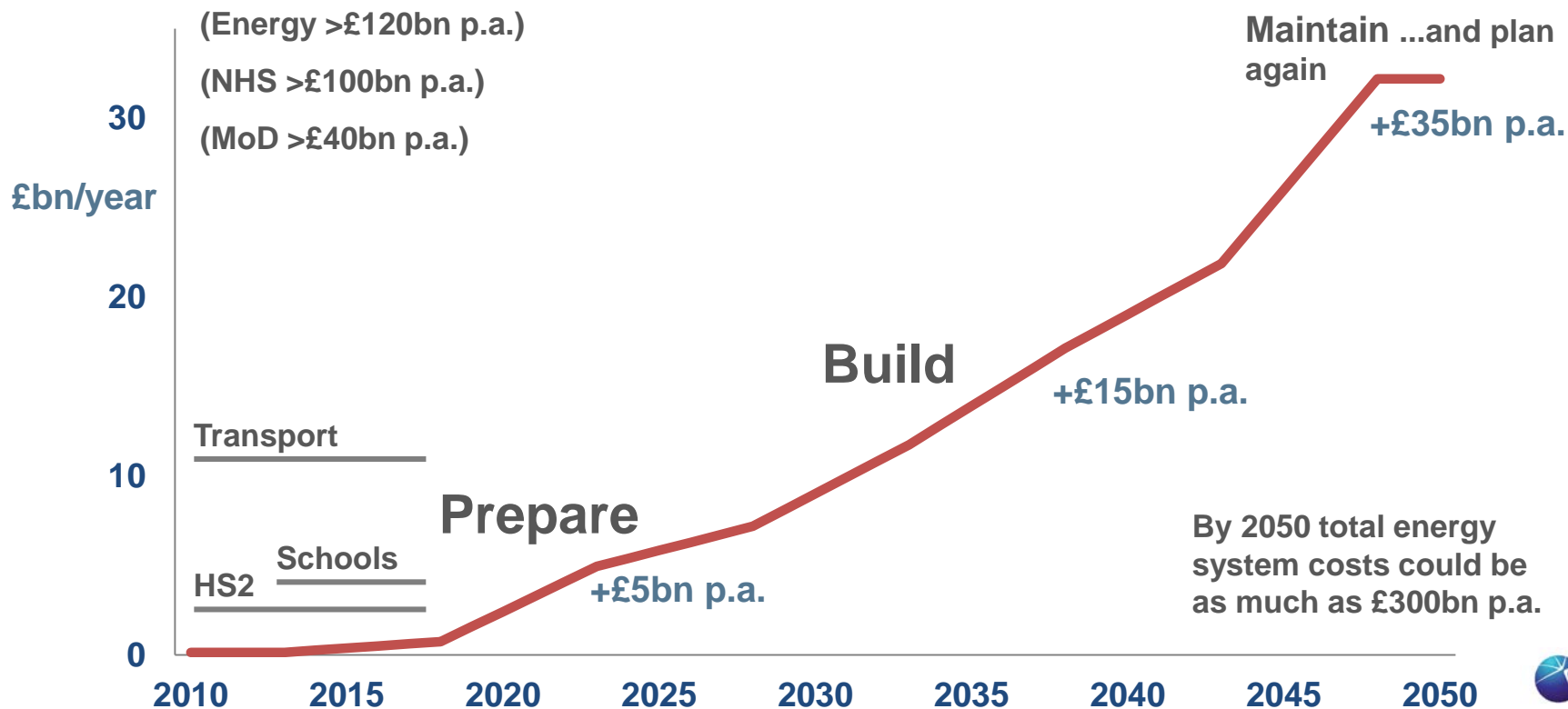




Prepare over next 10 years

creating platform for infrastructure roll-out and growth

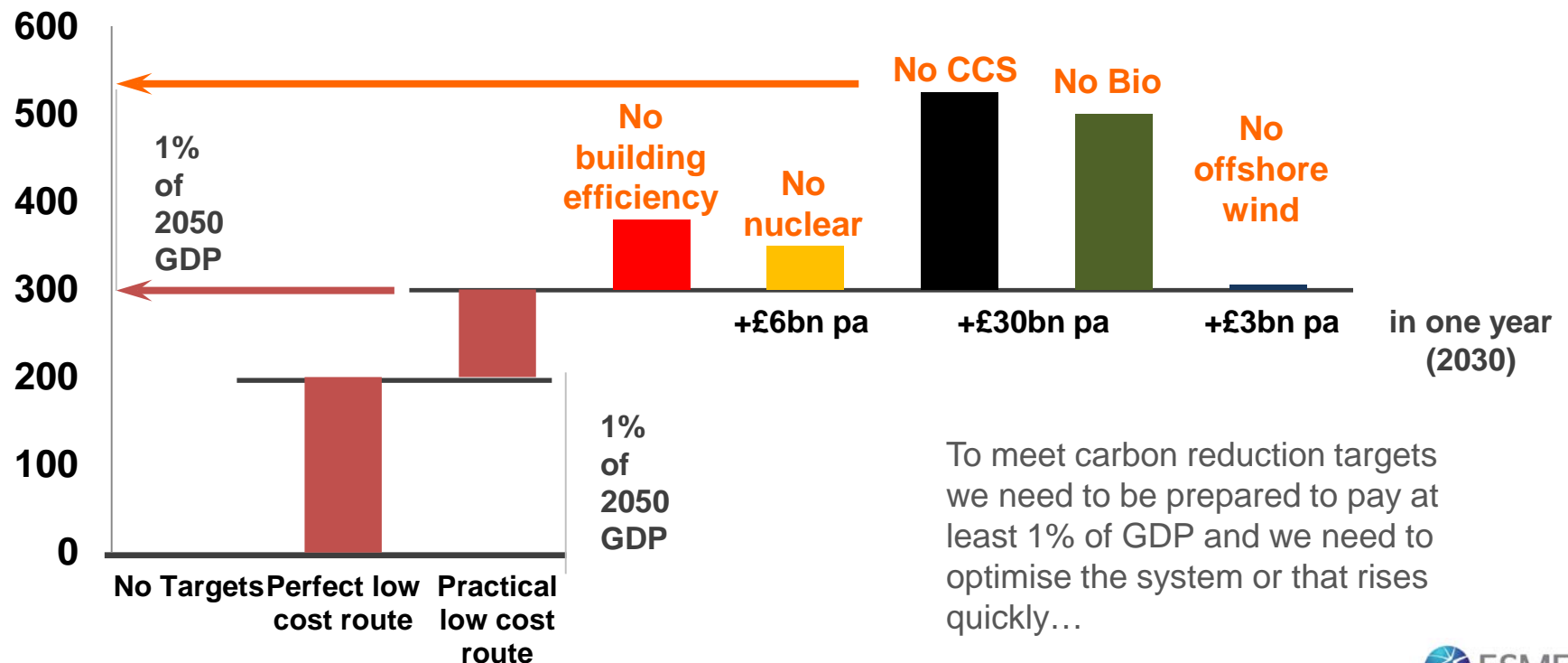
Incremental capital investment in a 'low-carbon' energy infrastructure





Poor system optimisation doubles the cost of a 2050 UK low carbon energy system

Additional cost of delivering -80% GHG energy system
NPV £ bn 2010-2050





Key decisions and cost implications

- Direction change between “no targets” and “-80% CO₂” polarises in mid 2020s
- Key electricity decisions are national policy led programmes
 - **Nuclear new build**
 - **CCS**
- plus... local and individual consumer decisions on other critical areas - with major implications for distribution level infrastructure
 - **Heat delivery**
(gas, electricity, biomass, district heating)
 - **Transport**
(liquid fuels, electricity, hydrogen)

Delay in launch of major build programmes beyond mid 2020s **leads to cost increases of ~£5bn p.a.** as more costly alternatives are built

There are logical asset replacements (technically and financially) that ensure security, sustainability and lowest system cost

Efficiency improvement
(transport and buildings)

Gas

Offshore renewables

Bioenergy feedstock's
(for heat and power)

Nuclear

CCS
(fossil and biomass fuels)

all “no regrets” choices for the next 10 years



What we need...

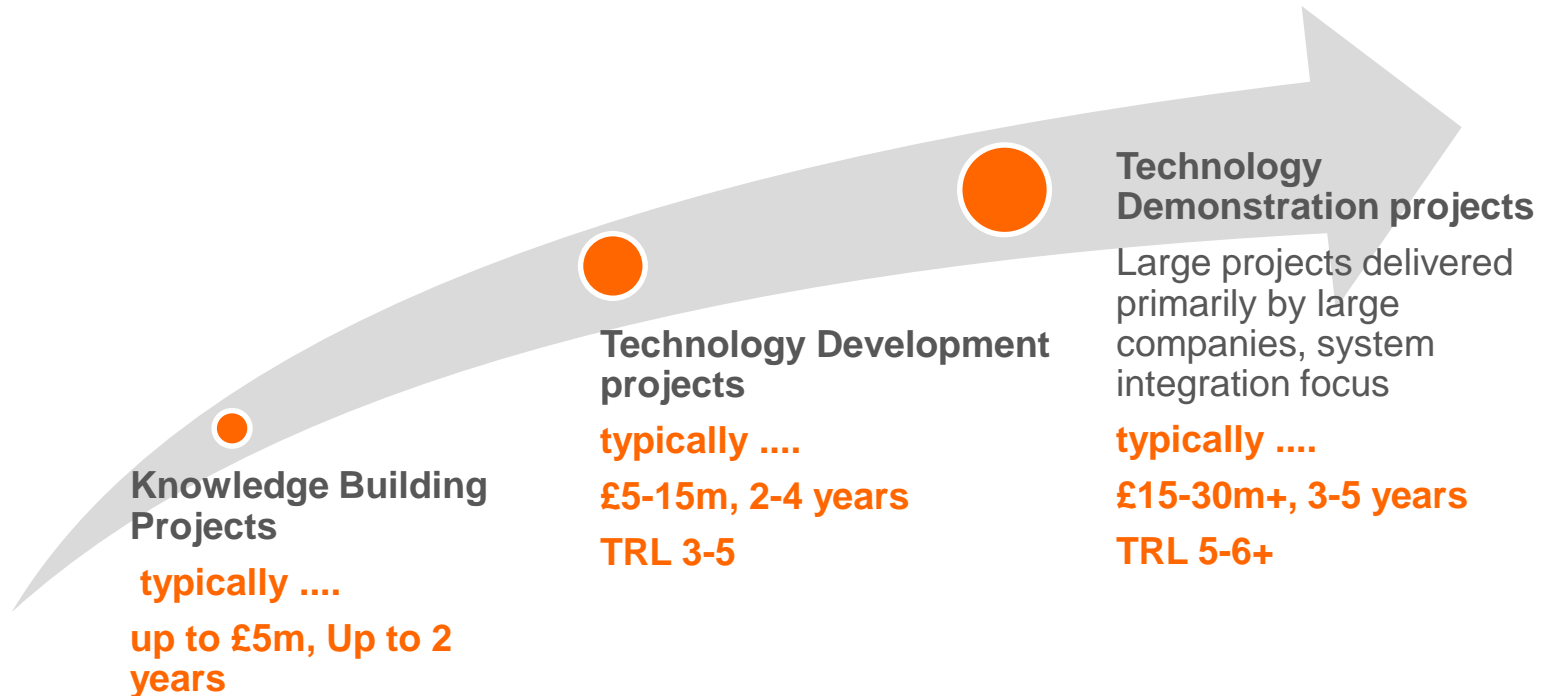
- Understanding of the drivers on future development
 - Costs
 - Supply capability and capacity (in a global market)
 - Infrastructure decisions
 - Investor requirements
 - Consumer needs/desires
- Clear market and value opportunities for investors and consumers
- Supportive and stable policy
- Consumer support

But... the future remains uncertain and we need an energy system design that allows for this

- Ready to make informed choices
- A system that creates and retains optionality
- Prepared for investment in a wide scale infrastructure roll-out
- Innovate to drive down cost (technology and business models)
- We need innovative incentives for industry to invest in the UK

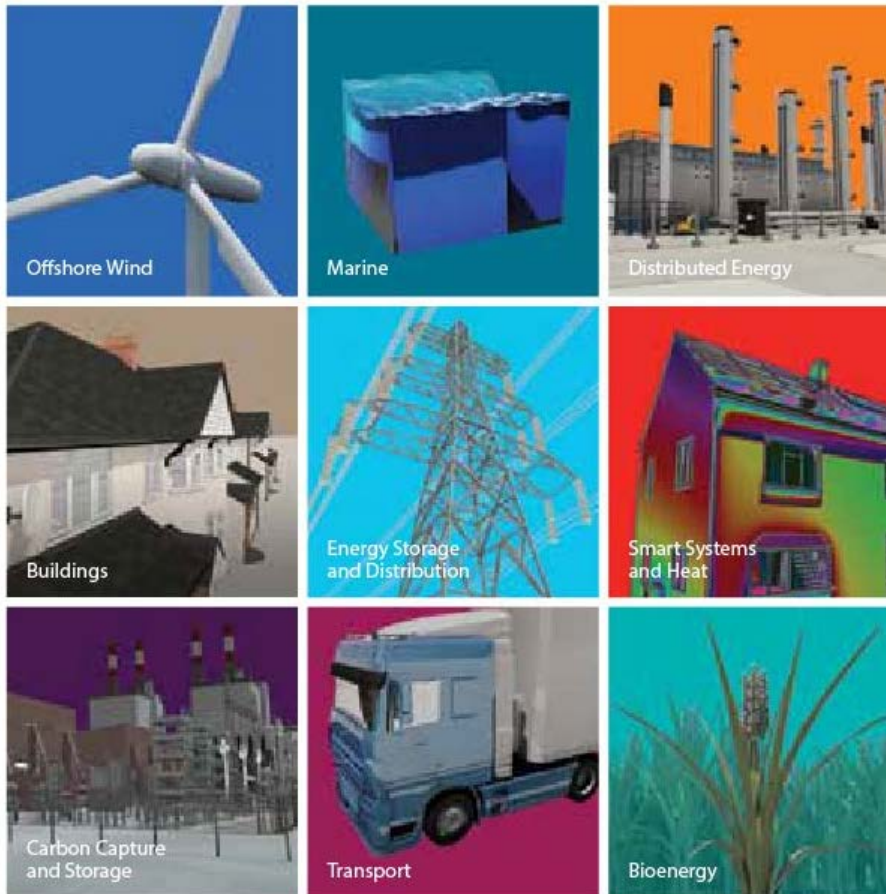


ETI Invests in projects at 3 levels





ETI technology programme areas



Key outcomes:

Major Impact on Policy Development

Project outputs which inform future policy / regulation / legislation, particularly around climate change and economic development.

Supporting Development of Critical Supply Chain

Investment in the capability that leads to commercial development of key services, systems and component technologies for use in the UK and globally.

Investor & Industry Confidence

System and sub-system demonstrations that deliver market confidence and encourage future investment.

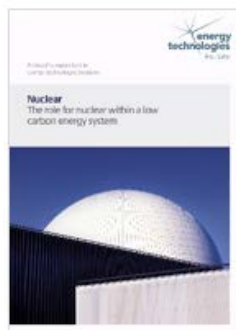
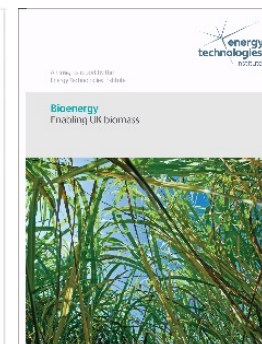
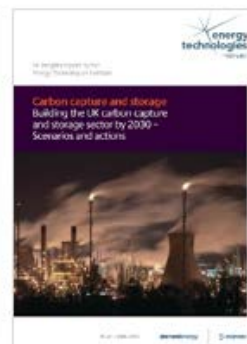


The ETI works with:





ETI Insights





Accelerating Low Carbon Energy Innovation In The UK

The UK needs innovation to help it meet its carbon targets



Successful innovation has several critical components: market confidence, finance, public policy and the capability to innovate

Collaboration and shared understanding is required to help the innovation process



Involving interactions across science, business and government to facilitate knowledge transfer and learning

it is easier to achieve a transition with a shared understanding of the drivers of new low carbon energy technologies



Most low carbon markets are almost entirely driven by public policy but delivered by private sector firms.

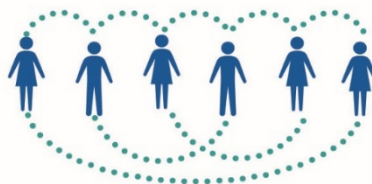


Policy interventions are required to drive innovation in energy and low carbon



business needs certainty so policy stability matters

Successful innovation systems often involve open and iterative processes, which are complex



They depend on multiple interactions between different actors

Successful innovation in low carbon energy requires new technology capabilities, new markets, new business models together with appropriate changes to the regulatory framework



The slower the pace of energy innovation



the less time the UK will have to transition to a low carbon economy and the more expensive it will be to do so





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