www.eti.co.uk

Modelling the UK energy system: practical insights and use

George Day

Energy Technologies Institute

British Institute of Energy Economics conference

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Overview

Overview of ETI's energy system modelling environment (ESME)

Does energy systems modelling tell us anything useful?

What does ETI's modelling tell us about how to get to 2050?

Practical policy implications

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Energy System Modelling Environment - overview

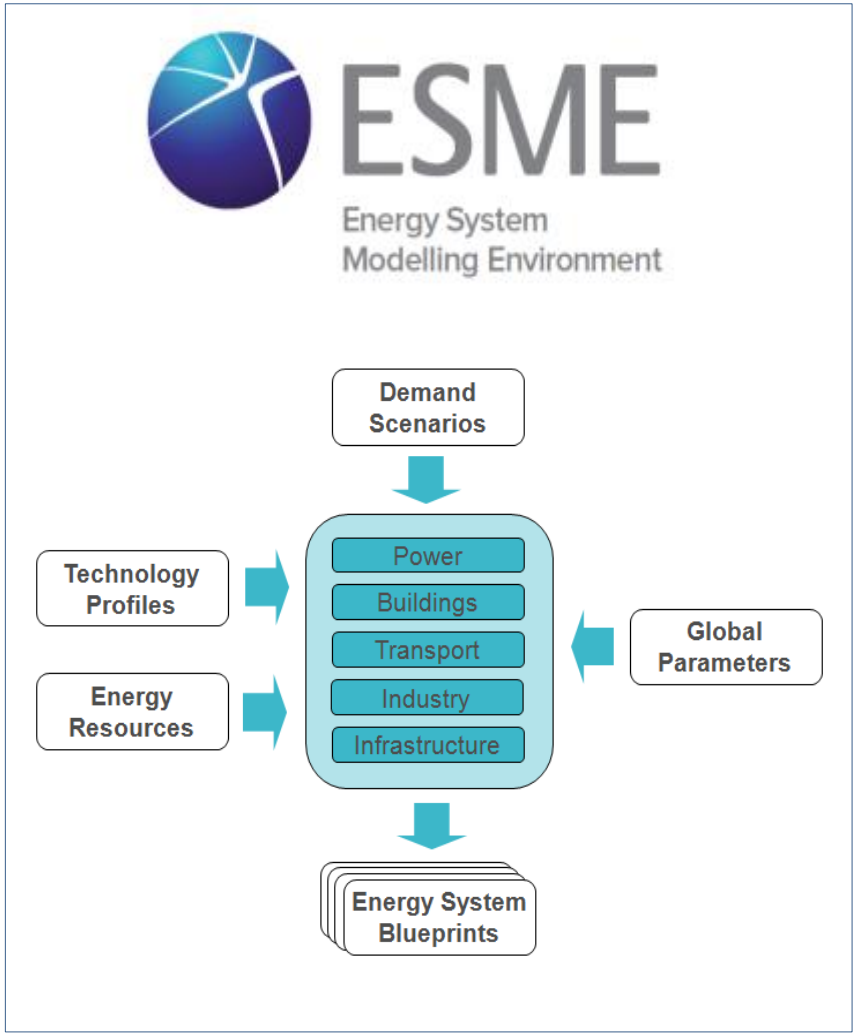
A national energy system design tool, integrating power, heat, transport and infrastructure

Modelling approach

- Cost optimisation (policy neutral)
- Probabilistic runs
- Spatial & temporal factors

Informed by ETI members/advisors

Internationally peer reviewed



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Department for Transport
DEPARTMENT OF ENERGY & CLIMATE CHANGE
defra
UK Bioenergy Strategy
The Carbon Plan:
Delivering our low carbon future
HM Government
December 2011
DEPARTMENT OF ENERGY & CLIMATE CHANGE
The Future of Heating:
A strategic framework for low carbon heat in the UK
March 2012

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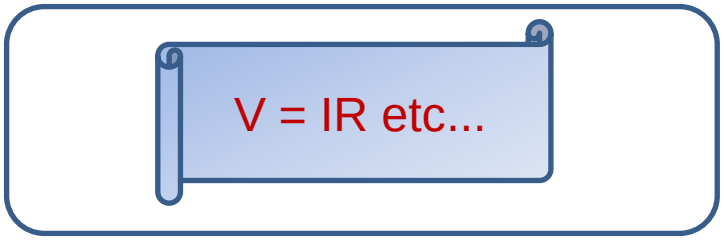
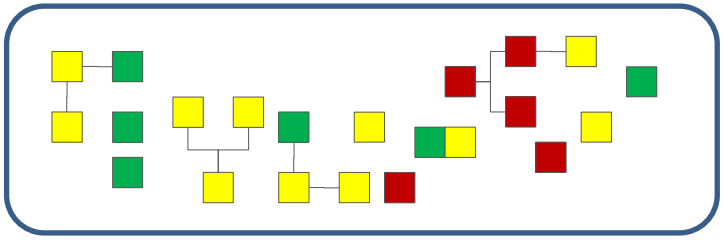
Does energy systems modelling tell us anything useful?

Why might systems modelling be useful for energy policy?

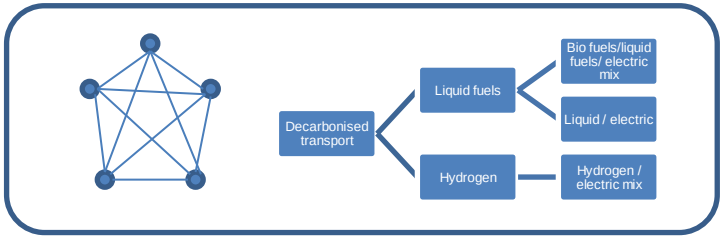
Well understood physical laws



Competing and interacting energy sources and vectors



Network effects and path dependency



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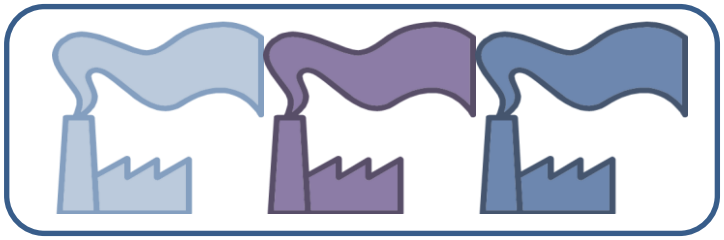
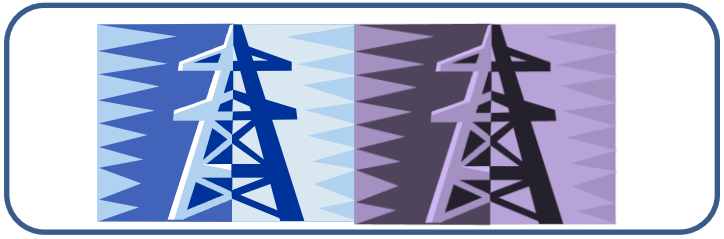
Why might systems modelling be useful for energy policy? (cont'd)

Importance of externalities & policy intervention



Scale of investment & change



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Some limitations

- Perfect foresight
- Simplified cost functions
- Consumer surplus
- Investability
- Discounting issues

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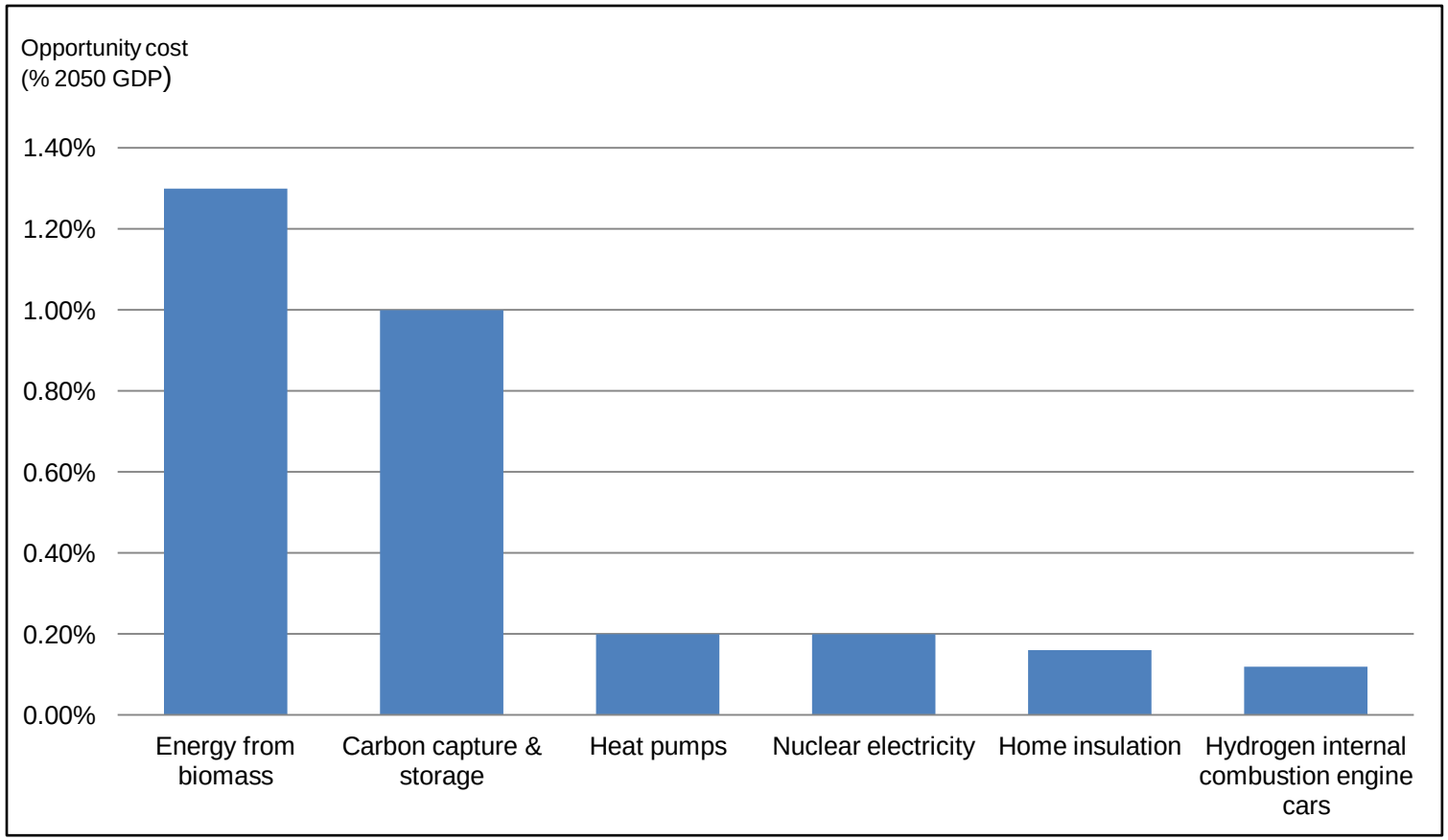
Key technology choices



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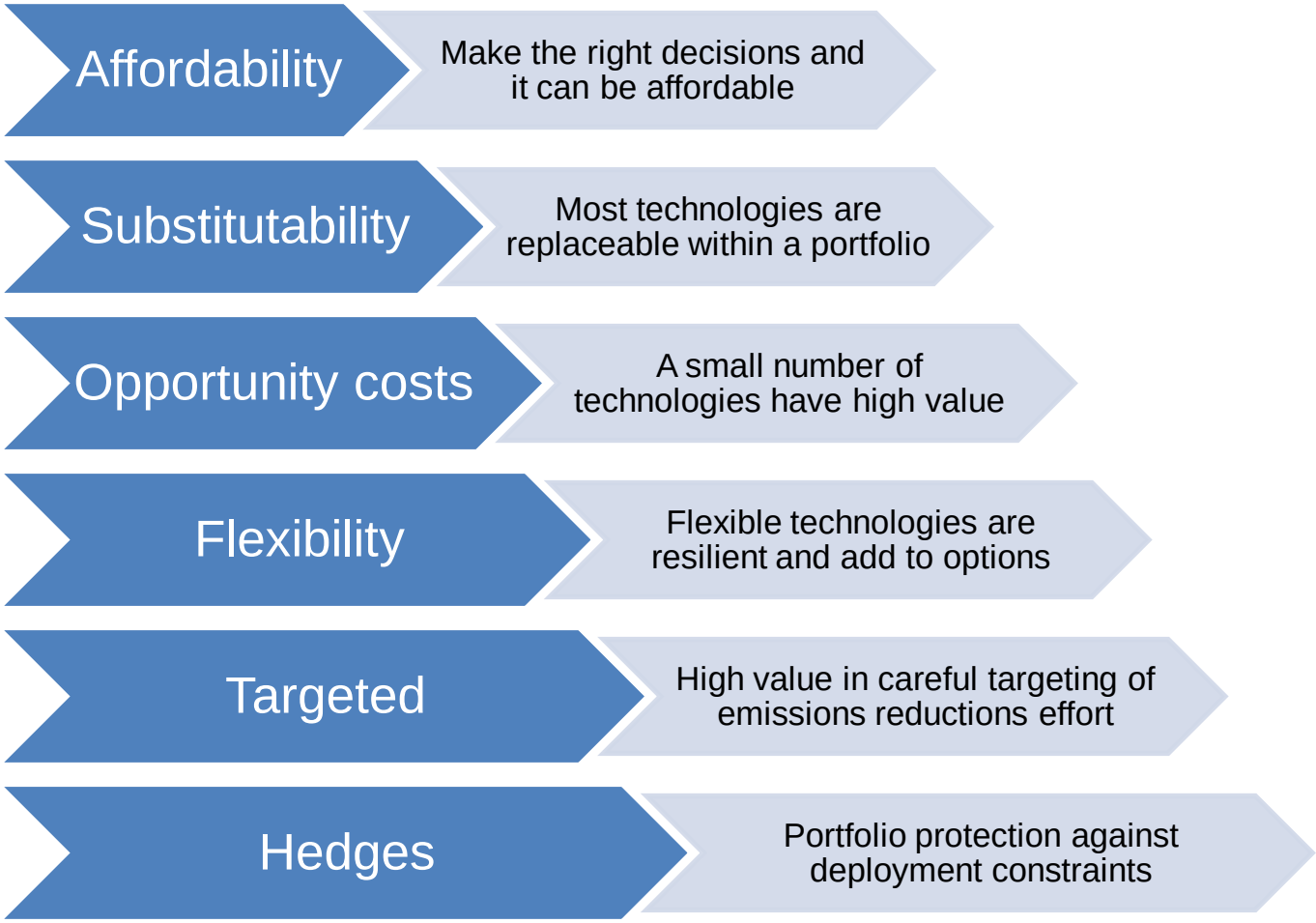
Low carbon 2050 ..

…what is modelling telling us?..



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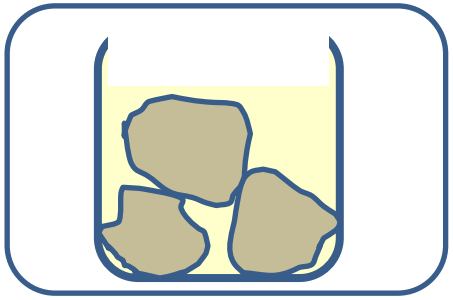
Practical use in policy making

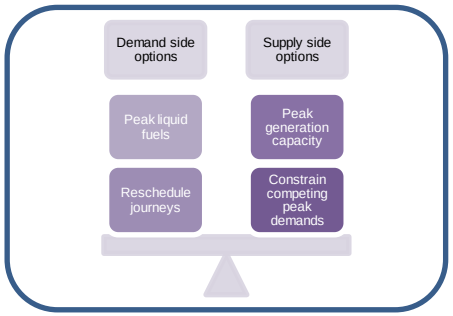
Picking contenders

- Focus on the ‘big rocks’



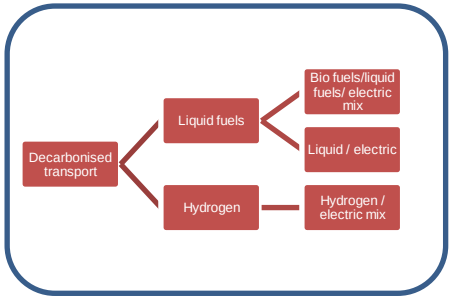
System insights for market & policy design

- Technologies compete and complement in non-obvious ways



Pathways insights

- Cautionary tales – how much will inertia cost?
- What do we need to do now?



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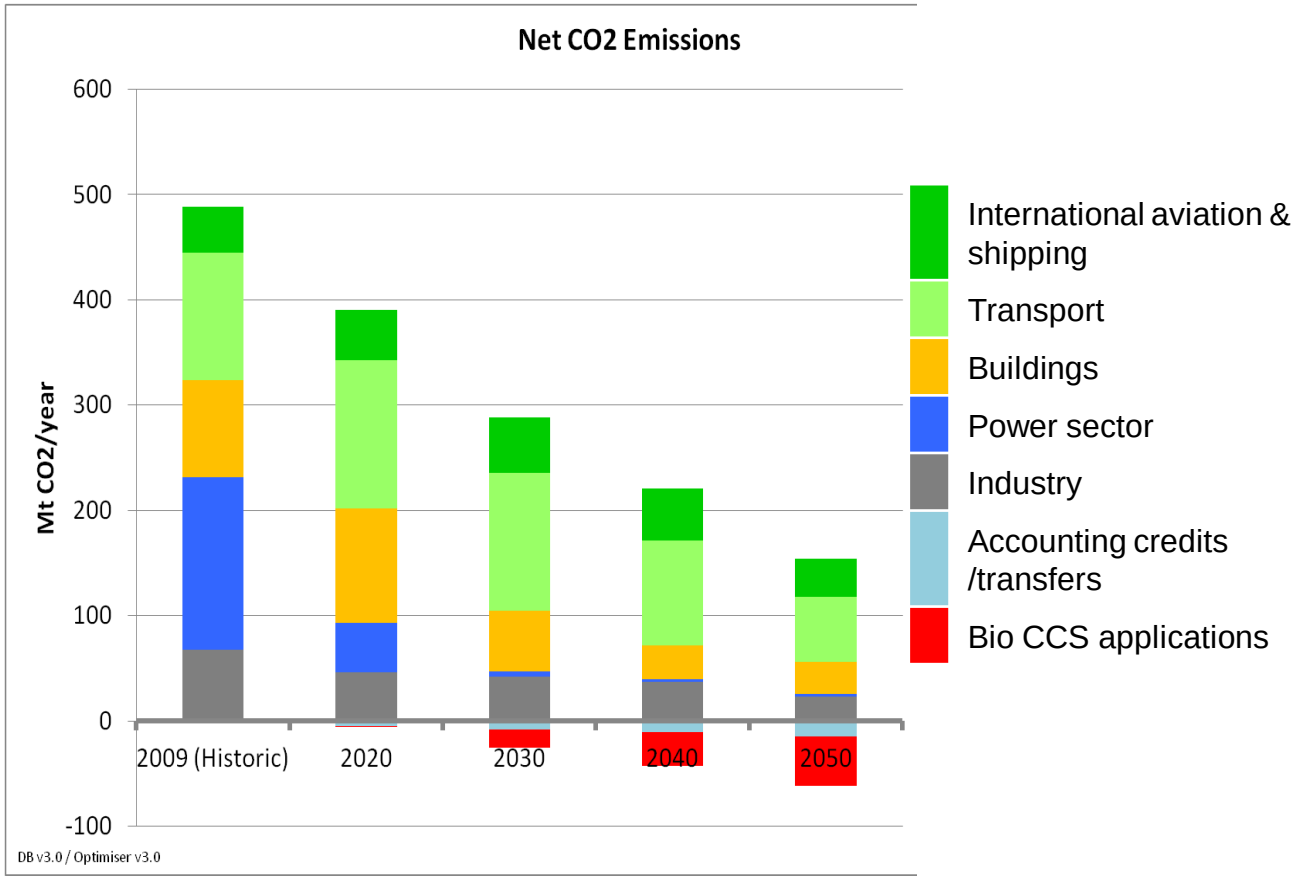
Emissions pathway

…or why CCS looks like a 'big rock'...

Power sector abates first

Bio CCS 'negative emissions' – crucial to overall architecture of system



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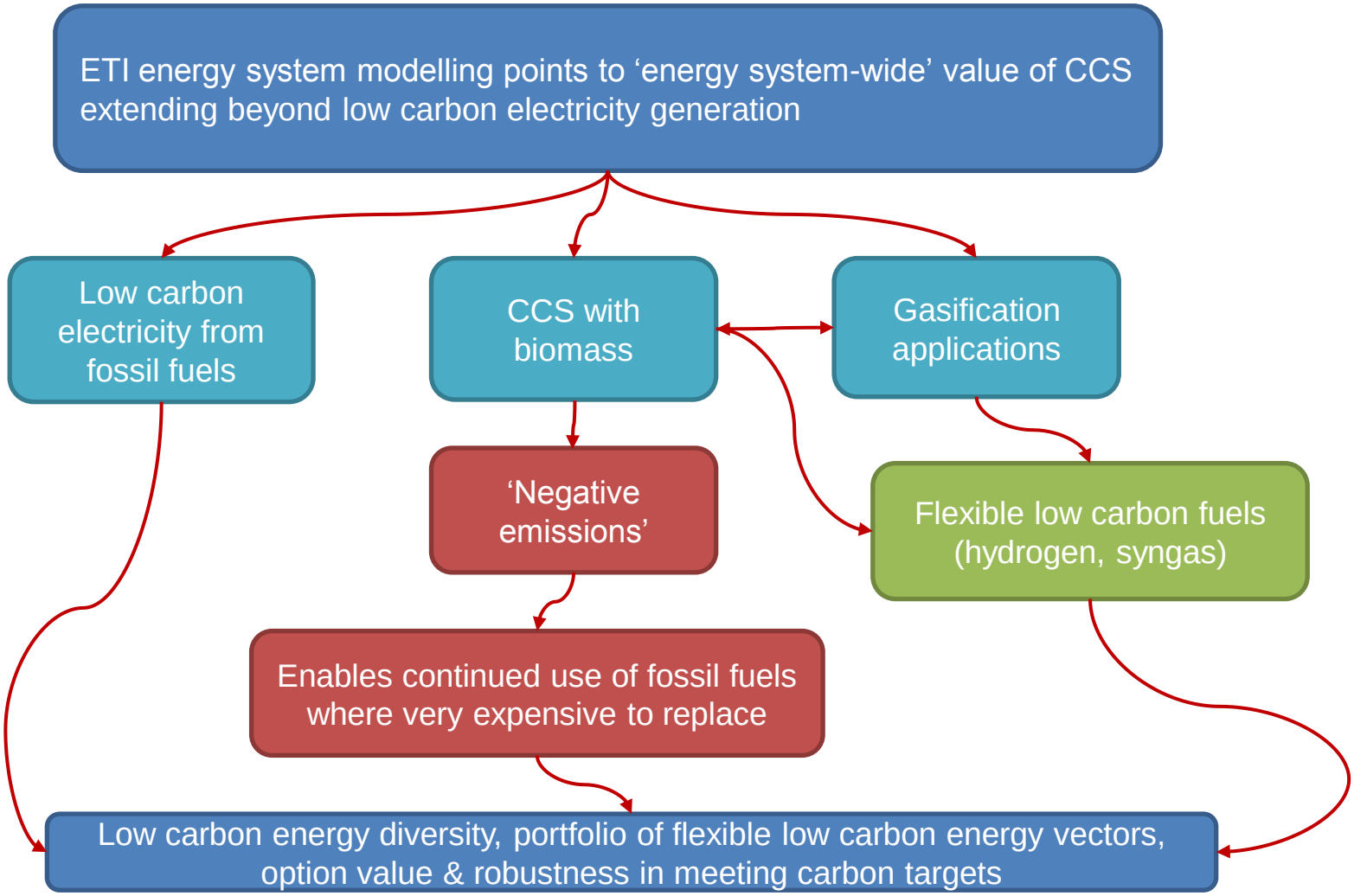
Picking contenders...

… 'system value' of CCS...



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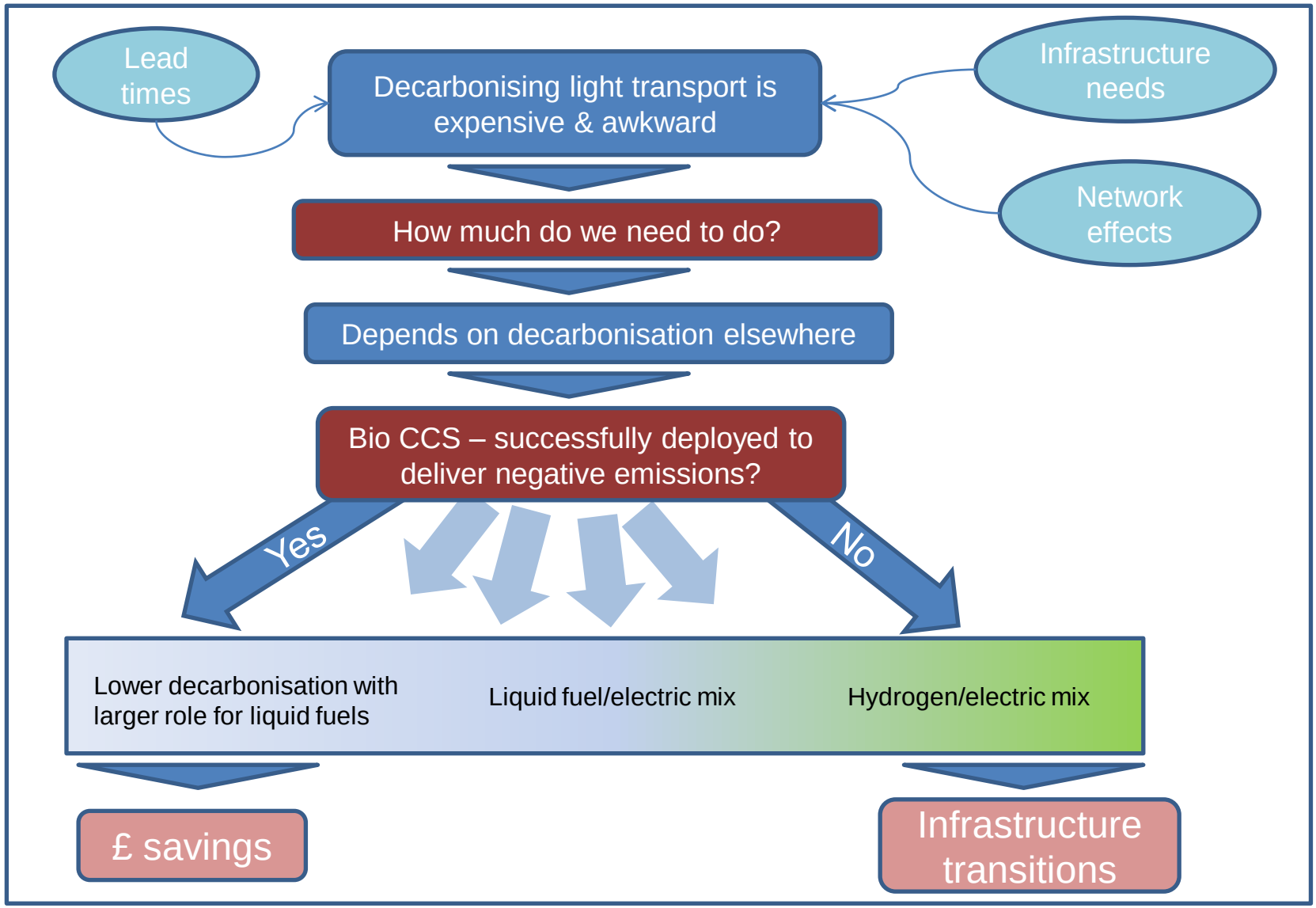
System insights...

.. decarbonising transport..



Pathways insights – using scenario comparisons

ESME v3 Standard Version	**Basic Director's Cut** -Programme/project targets -Momentum effects: slower uptake of CCS and new build nuclear
Short term economic constraints BDC plus: •UK meets 15% RED target in 2020 •Low GDP UK growth •Momentum: slower uptake of CCS and new build nuclear	**Emphasis on renewables, with imports of biomass** BDC plus: •UK meets 15% RED target in 2020 •UK slow to develop indigenous biomass •Imports of woody biomass available, but at lower end of HMG scenarios, more expensive and higher C than home grown

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Summary

ESME
Energy System Modelling Environment

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Energy systems modelling capable of generating novel insights with practical application

System wide perspective is key

- identify best parts of system to decarbonise
- level playing fields for emissions reductions across the energy system

Informing policy in terms of ‘contenders’, market design and the costs of inertia

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