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The UK's low carbon pathway to 2030: uncertainties and mitigation strategies

Jim Watson

(with Rob Gross, Ioanna Ketsopoulou & Mark Winskel)

I-SEE Seminar, 28th Oct 2014

Overview

1. Context: the UK's low carbon transition
2. Uncertainties project aims
3. Key uncertainties in electricity, heat and transport
4. What could be done to stay on course?
5. Conclusions

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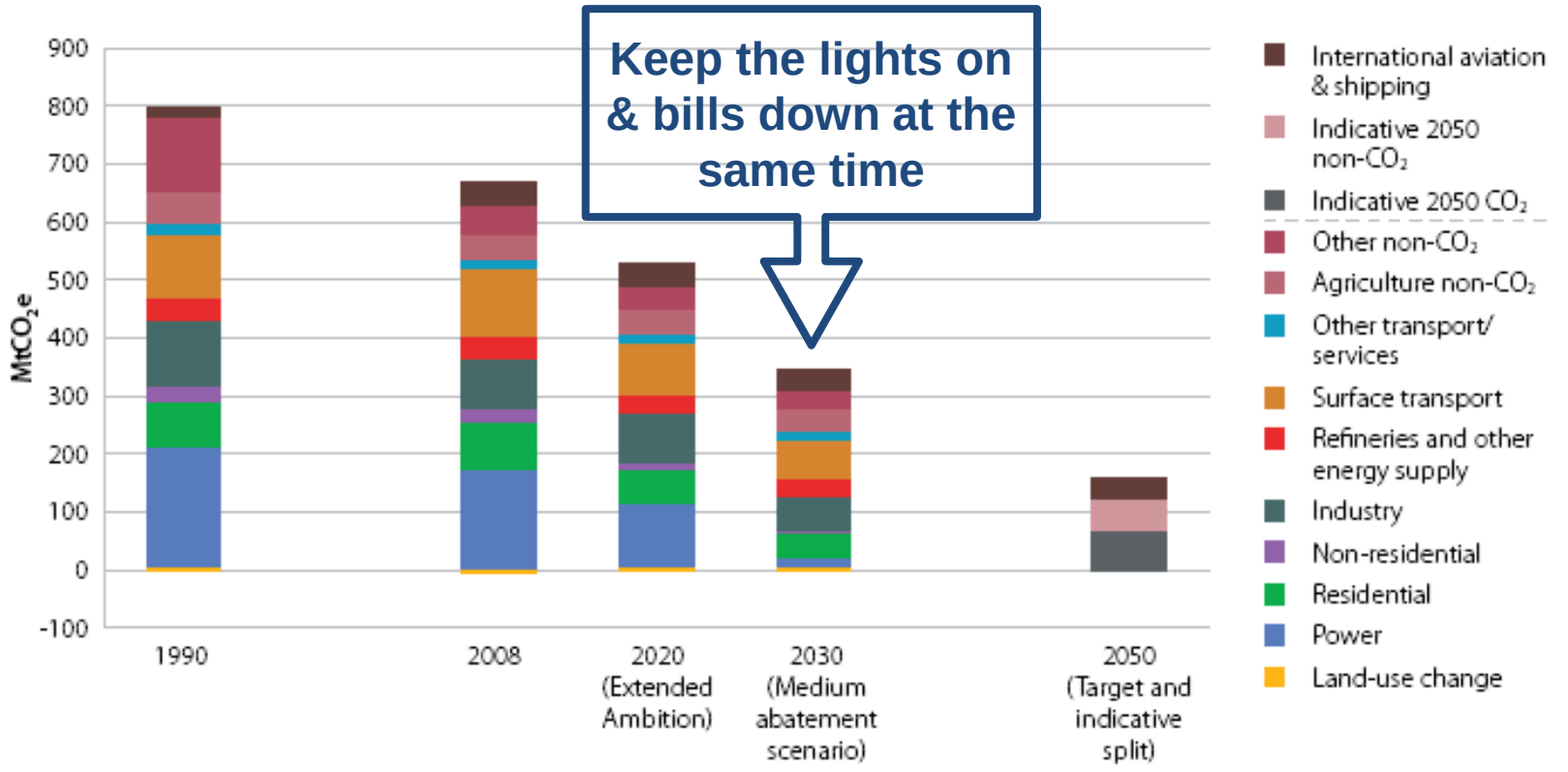
The UK's low carbon transition

Figure 3.13: UK greenhouse gas emissions (1990-2050)



Source: NAEI 2010, CCC calculations.
Note(s): Other transport/services includes CO_2 emissions from domestic aviation and shipping and agricultural energy use. Other non-CO_2 includes non-CO_2 emissions from waste, buildings, industry, energy supply and transport.

Source: Committee on Climate

Uncertain political context

Security of supply, affordability, and playing our part in combating climate change. And that for me is the order

Michael Fallon, former energy minister, 2nd Dec 2013

Our energy security is best served by minimising our exposure to the volatile global fossil fuel markets, enhancing our energy efficiency and maximising home-grown low carbon energy, as well as cleaner indigenous reserves, such as natural gas, to help ease the low carbon transition.

Ed Davey MP, Secretary of State for Energy & Climate Change, Mar 2014

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Uncertain political context

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Energy boss warns of blackouts as competition probe 'stops investment in power plants'

Centrica chief executive says energy giant is unlikely to invest in power plants needed to keep the lights on while under investigation by the top competition watchdog

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24 September 2013 Last updated at 17:37

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Ed Miliband: Labour would freeze energy prices

COMMENTS (2104)

Labour would freeze gas and electricity bills for every home and business in the UK for 20 months if it wins the 2015 election, Ed Miliband has said.

Ed Miliband: "Britain can do better than this"

The big energy firms would be split up and governed by a new tougher regulator to give people "a fairer deal".

Labour says the move will save average households £120 and businesses £1,800 - but cost the energy giants £4.5bn.

But energy companies said the policy could lead to power shortages, and jeopardise investment and jobs.

Labour conference 2013

Landale: Austerity socialism?

Wednesday at the Labour conference

Election Labour's to lose - Ashcroft

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Conservatives plan new attack on windfarms

Cameron considering manifesto commitment to curb onshore turbines, senior party source says

284 comments

Get the data: where are the UK's windfarms?

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Why legal aid cuts are a dis

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Energy strategies under uncertainty

A two year research project carried out by a team of over 30 UKERC researchers across the UK

Ten commissioned papers plus a synthesis report and special issue of academic journal *Energy Policy*

Two main aims:

- To generate, synthesise and communicate evidence about the range and nature of the risks and uncertainties facing UK energy policy and the achievement policy goals
- To identify strategies for mitigating risks and managing uncertainties for public policy and the private sector

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Energy strategies under uncertainty

Focus on the CCC's revised 4th carbon budget pathway to 2030:

- Methods for appraising uncertainty
- Instrumental uncertainties for CCC pathway in power, heat and transport
- Systemic uncertainties: natural resources, public attitudes and ecosystem services
- Analysis includes engagement with 'alternative' higher carbon pathway

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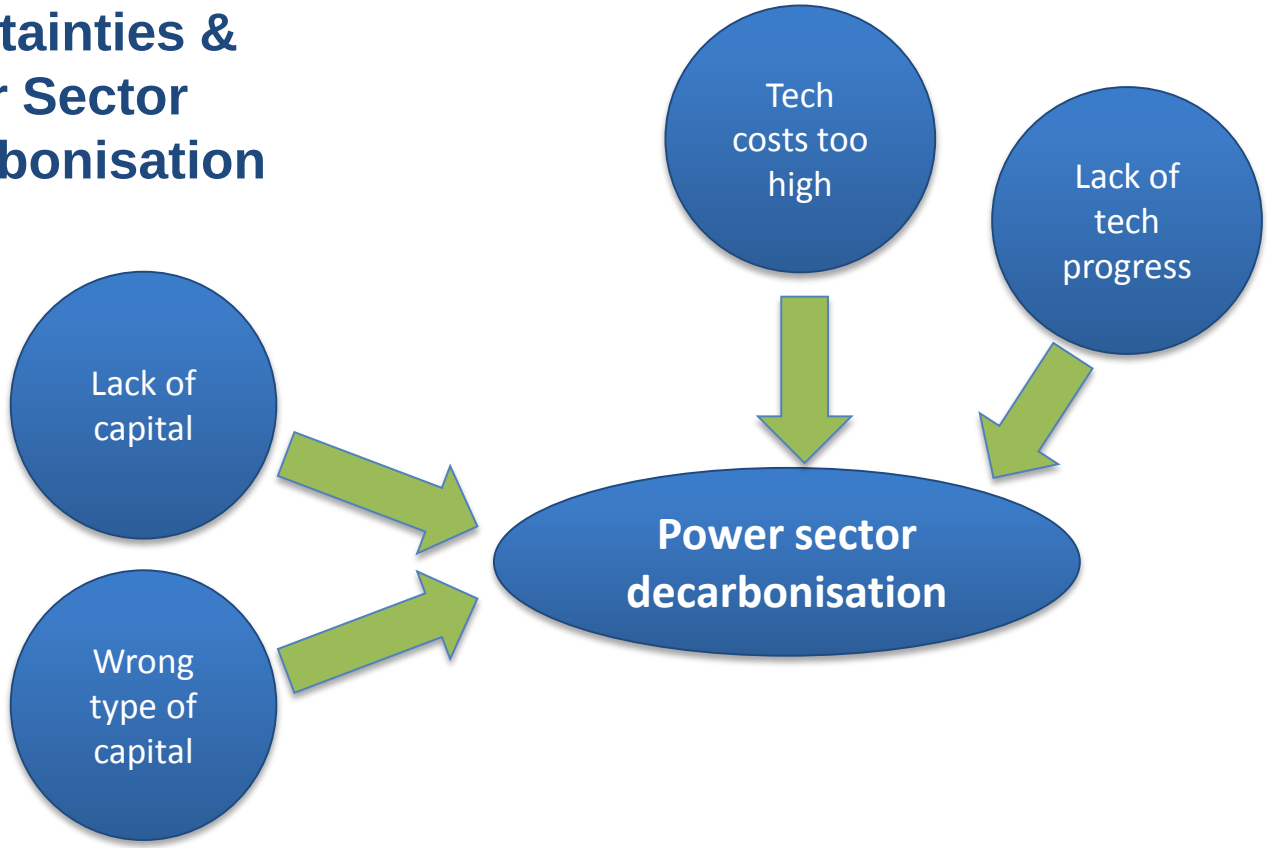
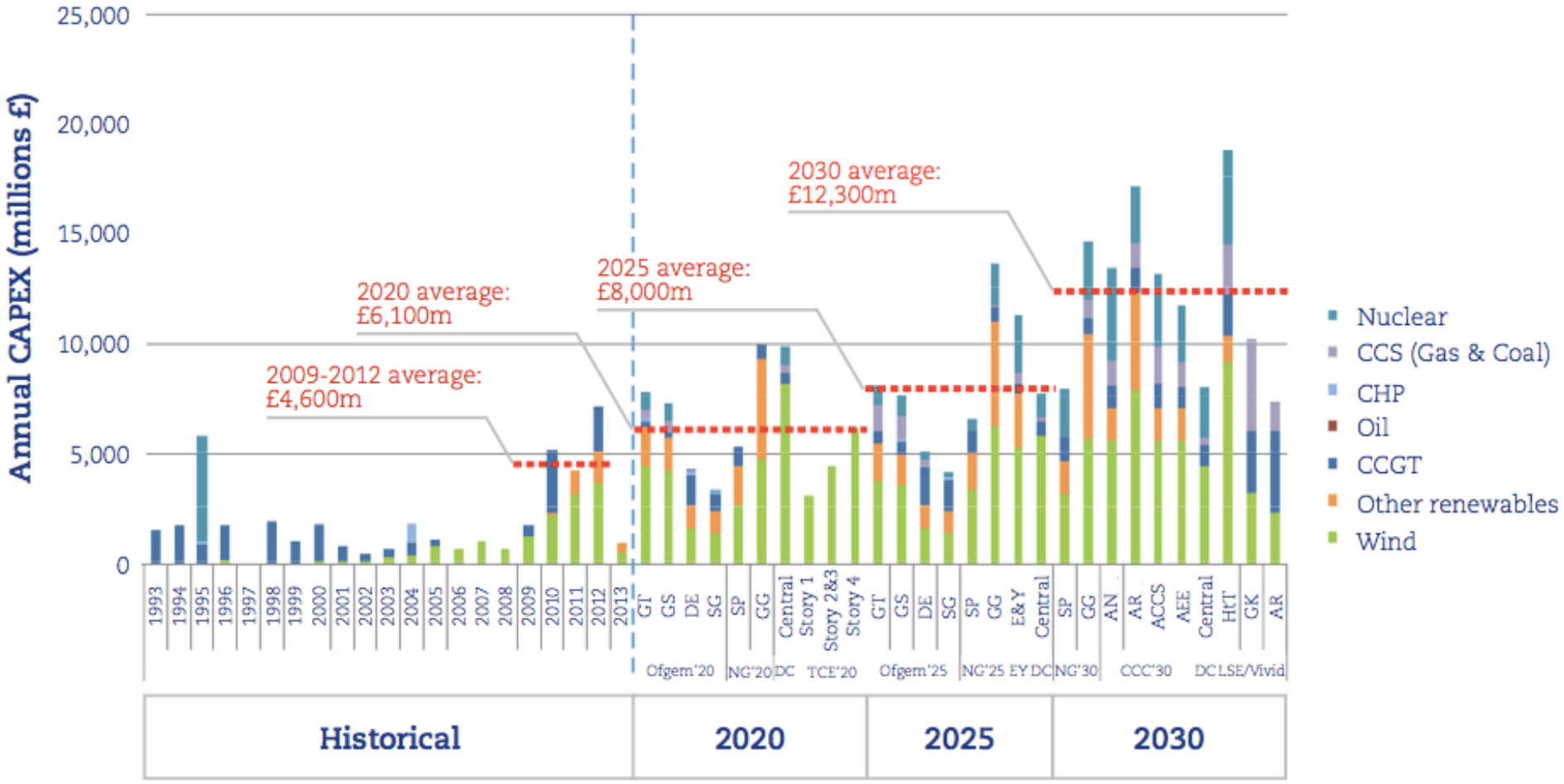
Uncertainties & Power Sector Decarbonisation



Investment uncertainties



Source: UKERC

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Technological uncertainties

- *Techno-economic uncertainties* associated with the economic, environmental and technical performance of individual low carbon technologies
- *Programmatic uncertainties* associated with the wider policy, regulatory and institutional arrangements that could affect the development pathways for these technologies
- *System integration uncertainties* arising from the integration of multiple power generation technologies within a low carbon electricity system

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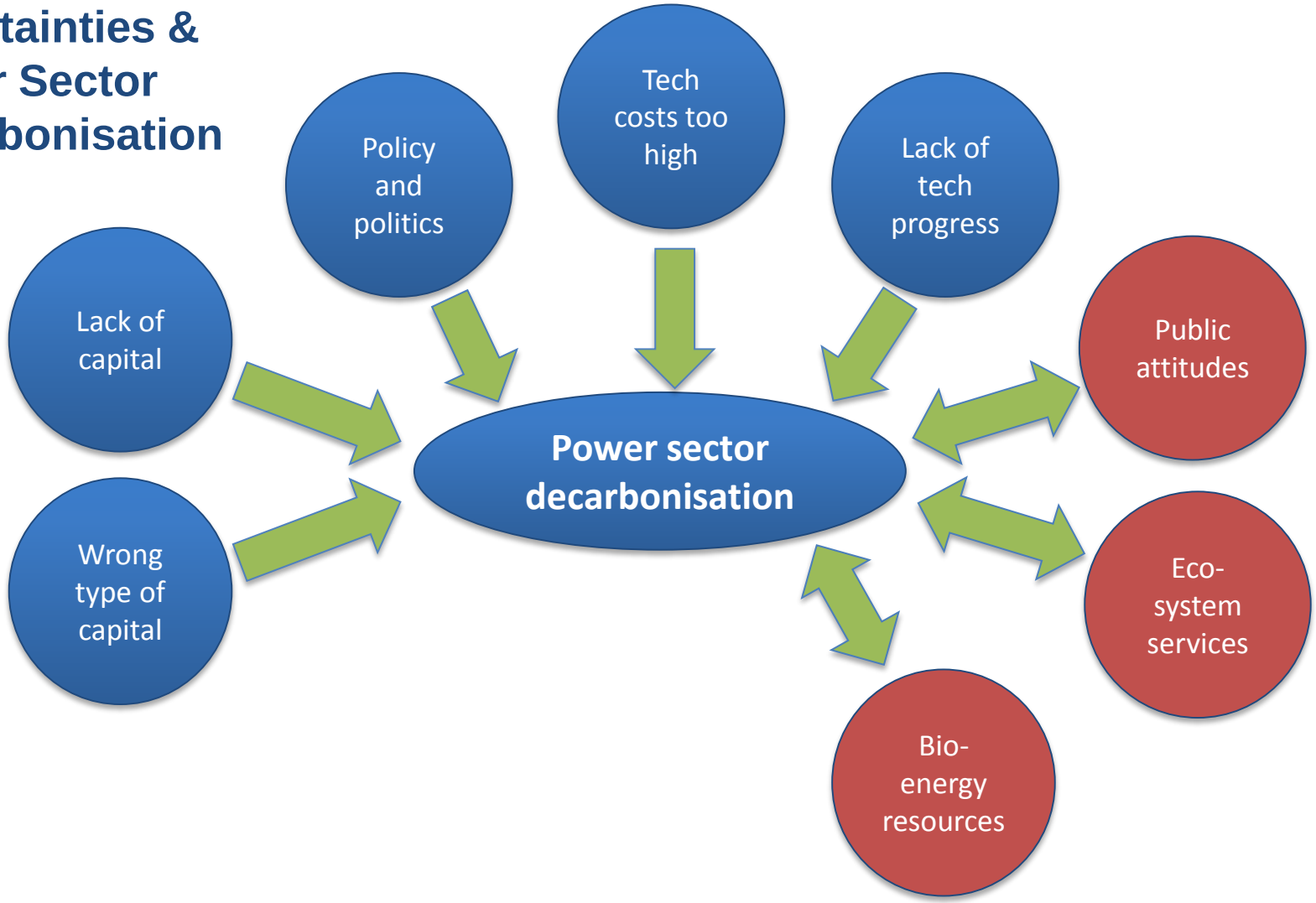
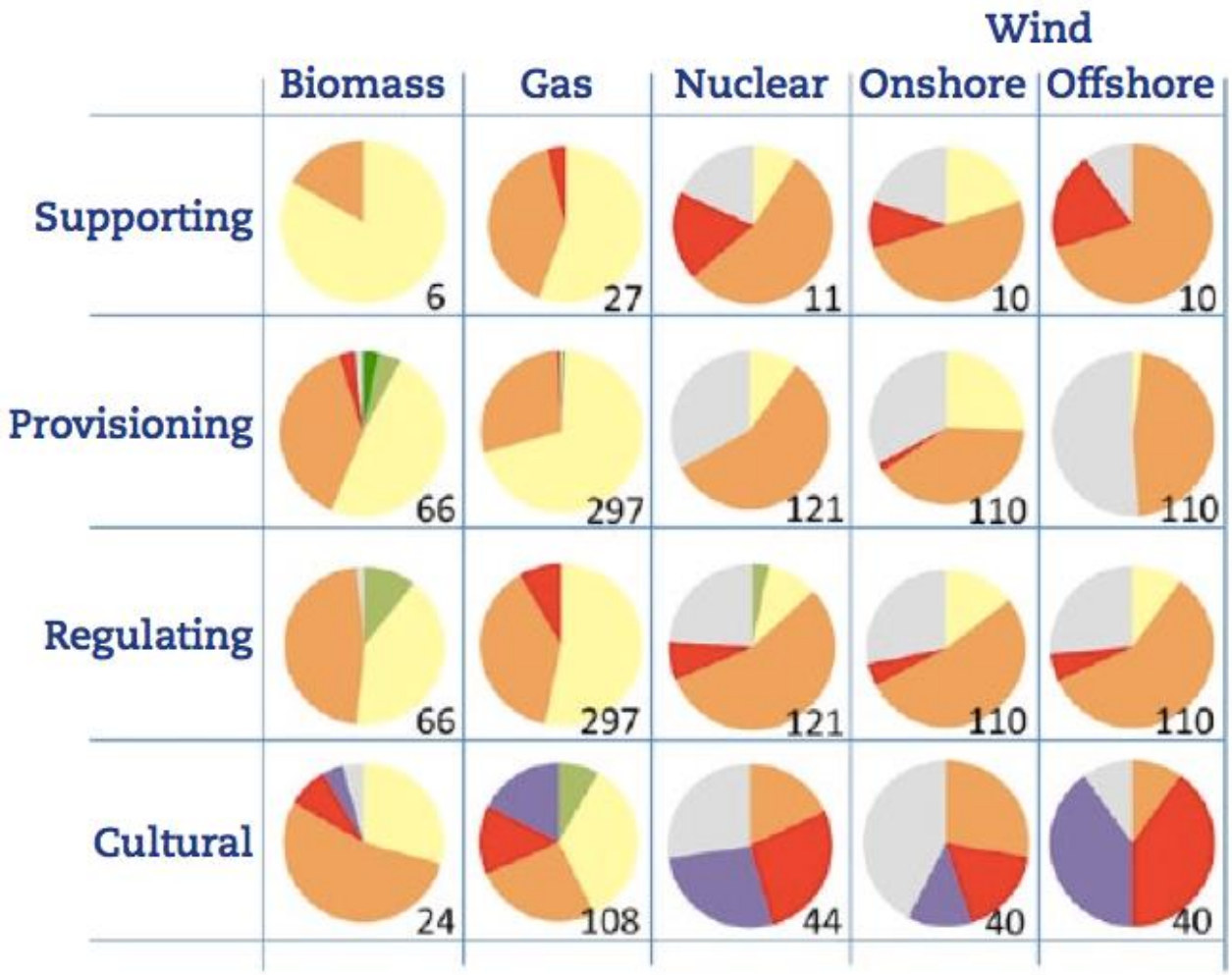
Uncertainties & Power Sector Decarbonisation



Ecosystem impacts (global)



- Significant positive (beneficial)
- Moderate positive impact
- No (or negligible) impact
- Moderate negative impact
- Significant negative (detrimental) impact
- Conflicting impacts
- Inconclusive (uncertain, not known, no data)

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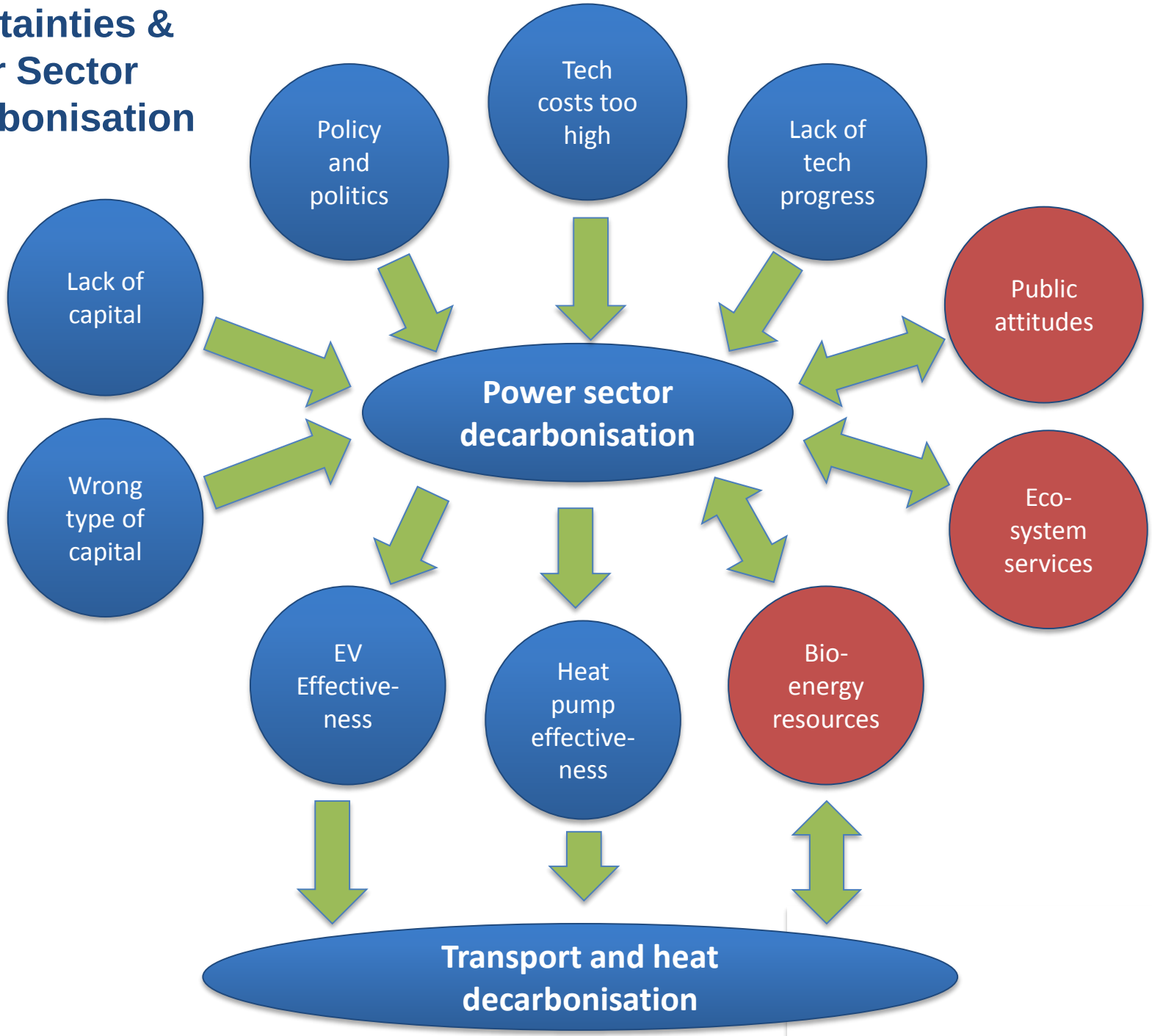
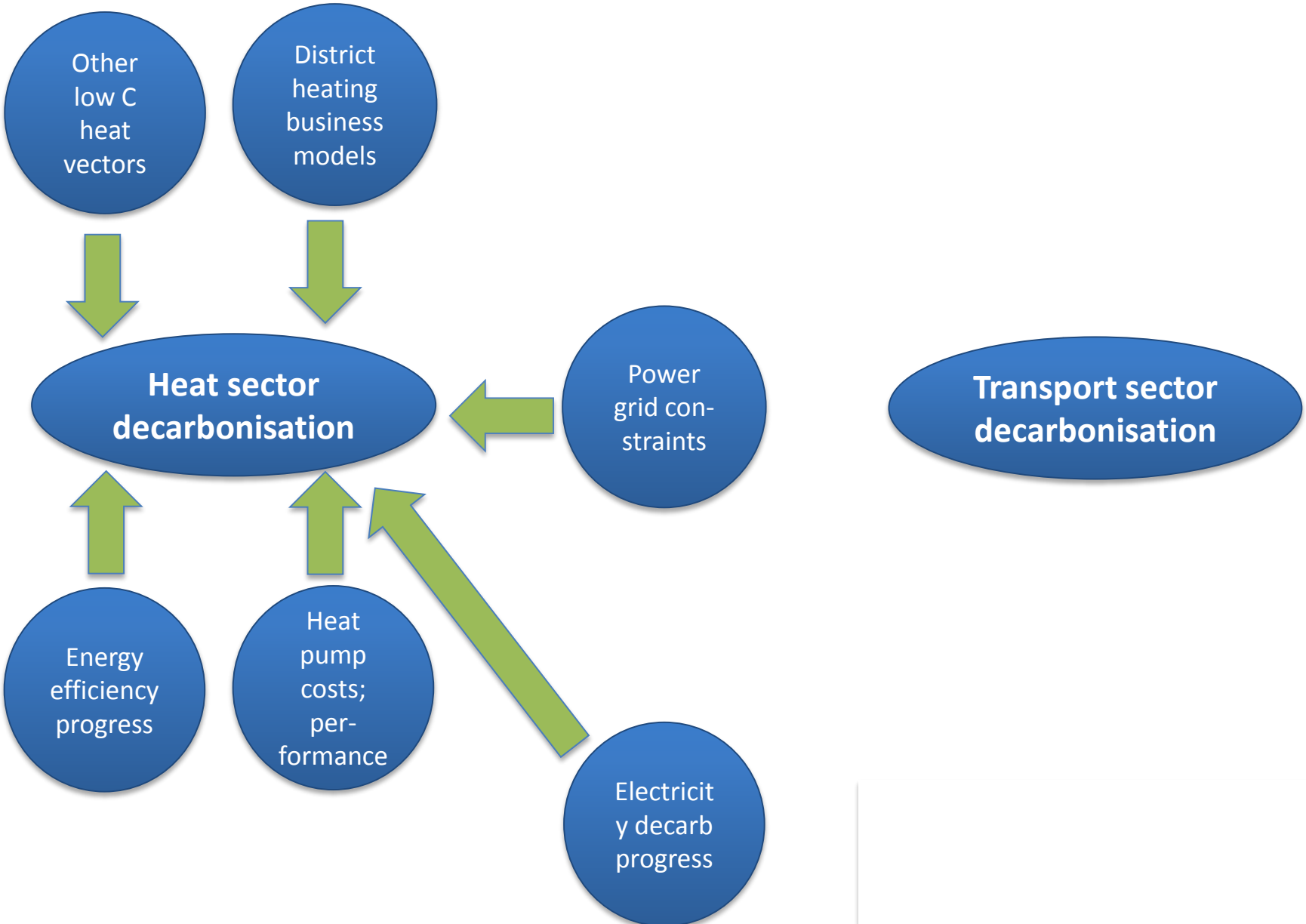
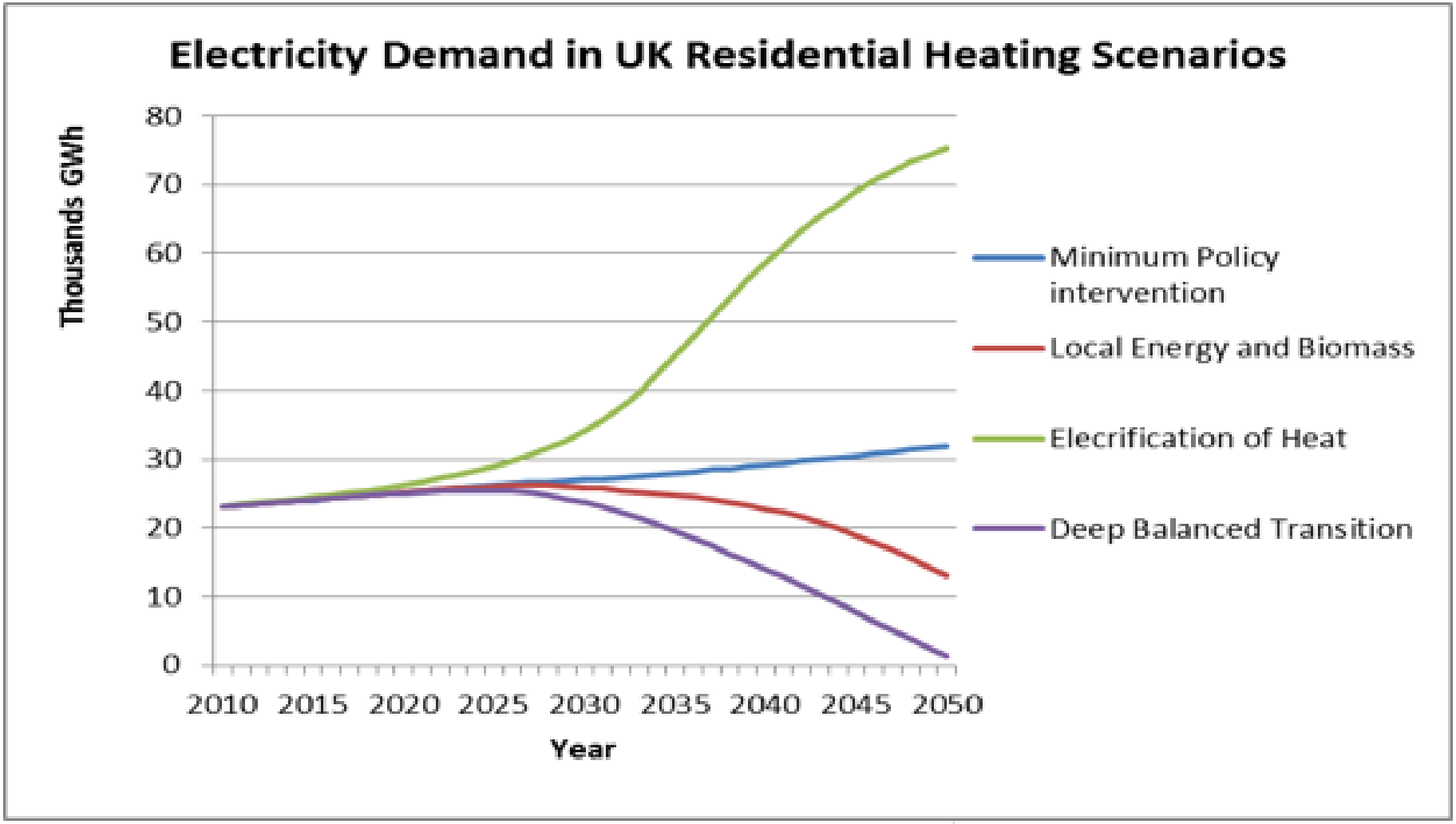
Uncertainties & Power Sector Decarbonisation



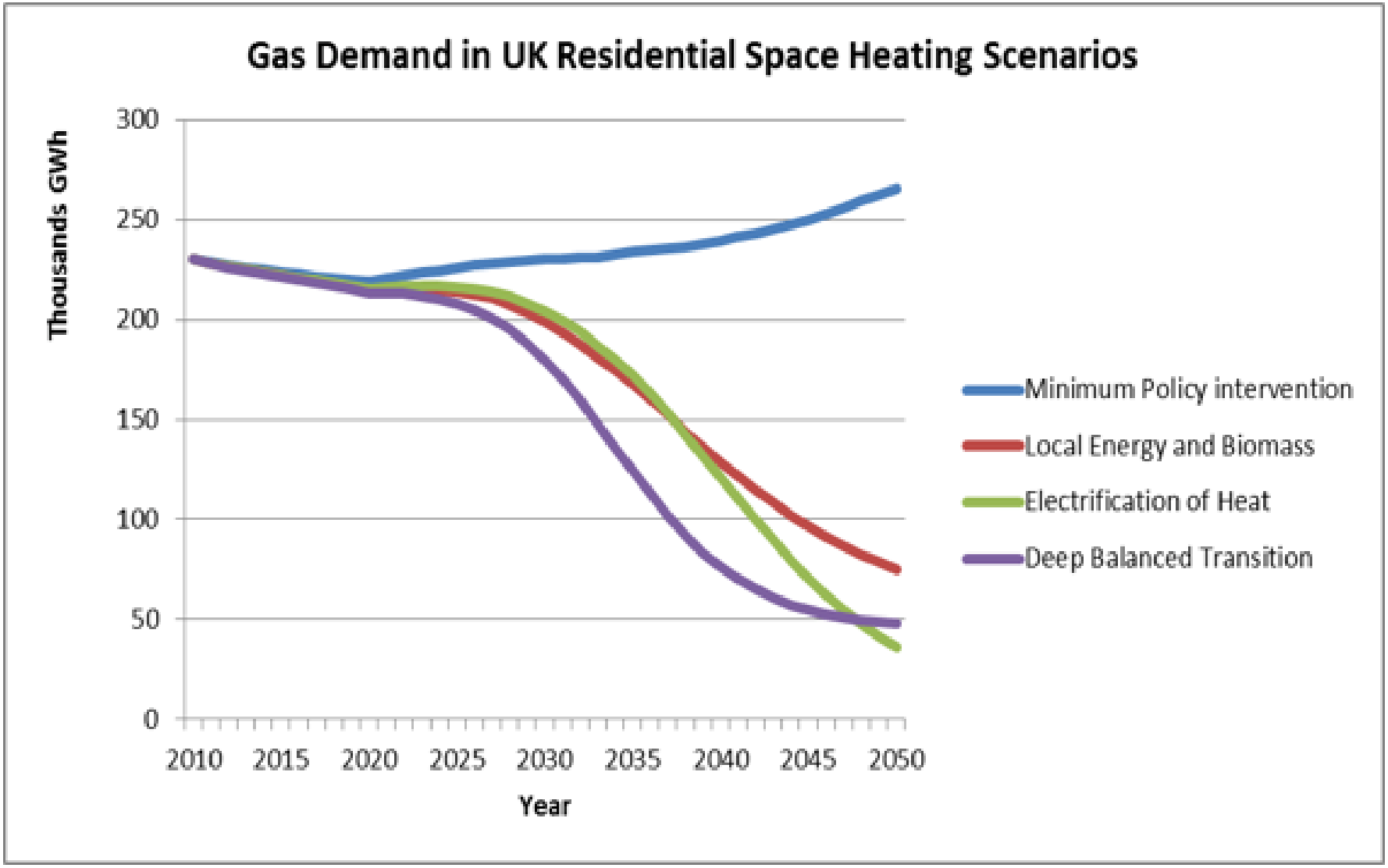
Transport and heat decarbonisation: More flexibility?



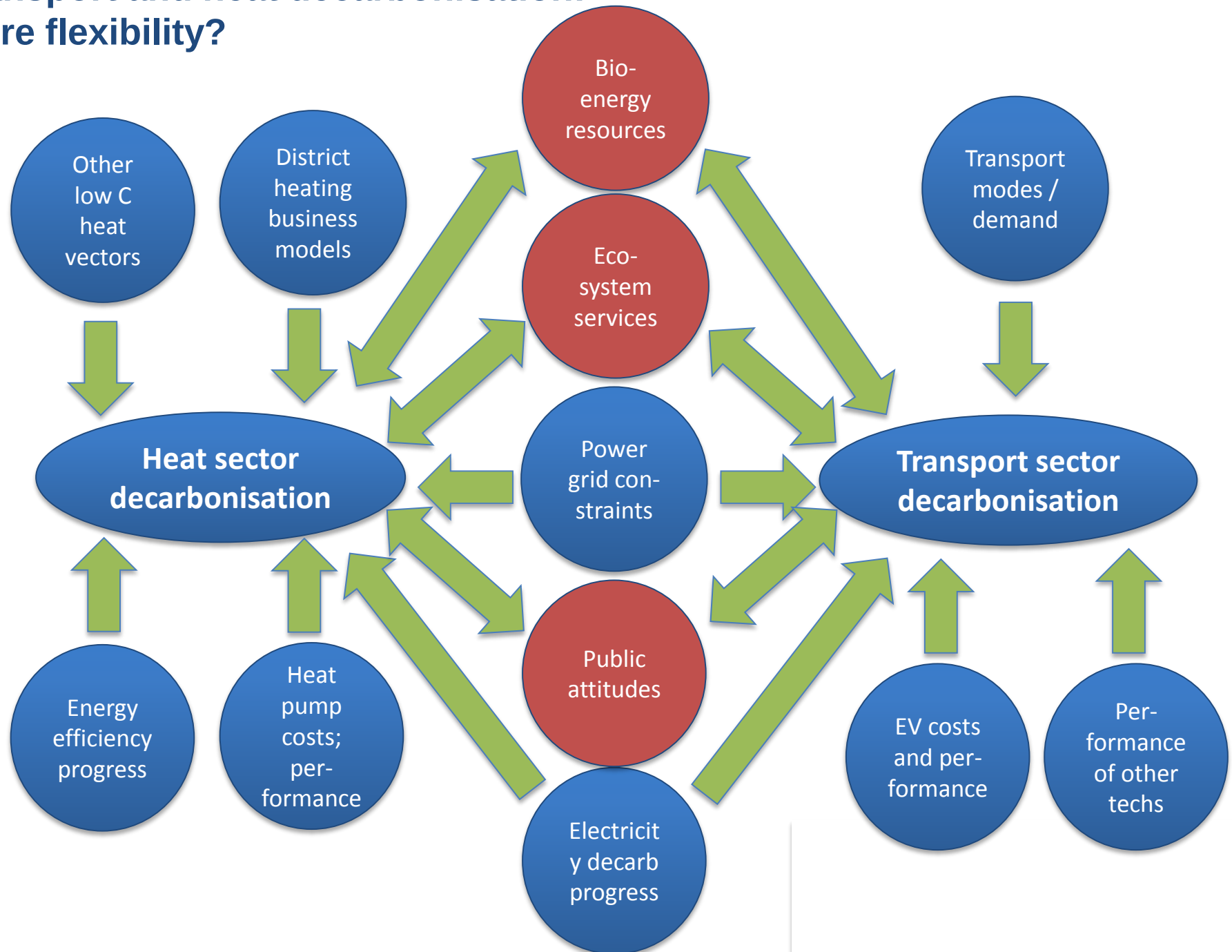
Exploring uncertainties: a shift to electric heating?



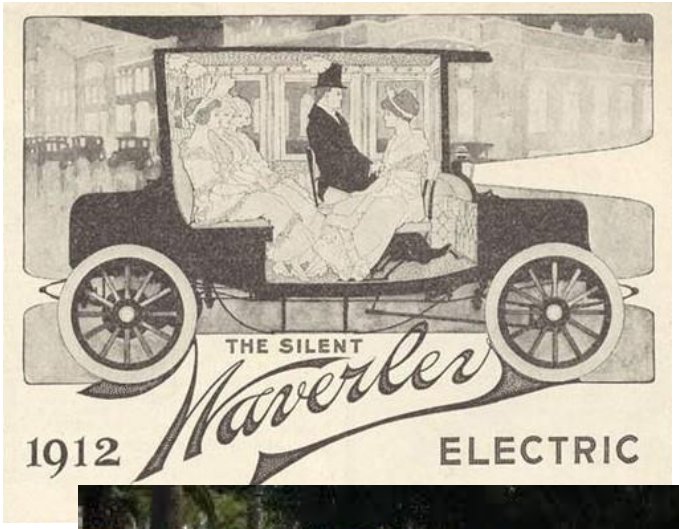
Exploring uncertainties: a shift away from gas is critical



Transport and heat decarbonisation: More flexibility?



Transport uncertainties: electric vehicles



Policies already in place to mitigate uncertainties, but more action required including:

- More certainty about financial incentives for EV ownership likely to improve adoption rates
- Standardisation of payment mechanisms for EV charging
- More robust methods for assessing EV environmental performance and costs

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Public attitudes and values

- Public attitudes often framed very narrowly by expert debates: on 'acceptance' of specific technical options
- Publics are often pragmatic about change, but unlikely to settle for change out of line with longer-term trajectories that reflect underlying values
- Engagement should focus on how the energy system is organised and paid for, not just technologies that could be deployed
- Beware of potential 'non transitions': e.g. significant fossil fuel use; carbon capture & storage; bio-energy

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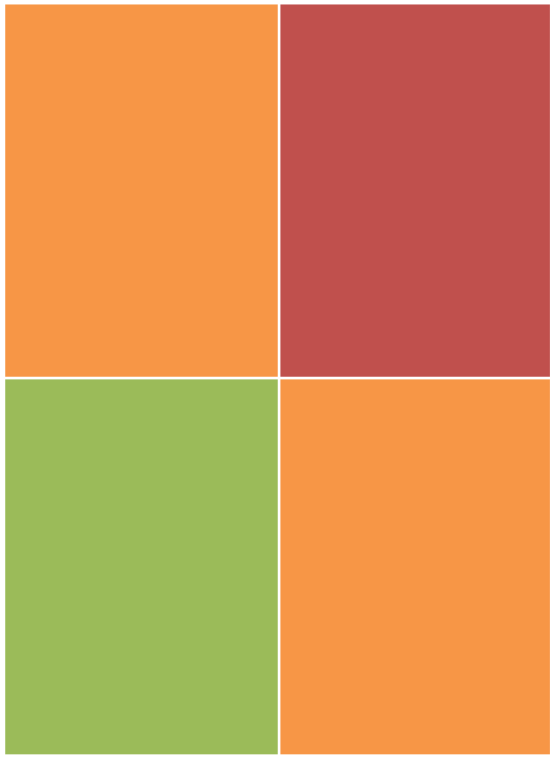
Staying on course?

Instrumental uncertainties, e.g.

	Complexity	Impact	Actions	By who?
Commercialise low carbon electricity technologies			• Long term policy support • Demonstration funding for CCS • Evaluations and learning	• Govt and innovation funders • Businesses • Research community
Heat pump performance			• Demo & deployment incentives • Learning & engagement with consumers	• Government • Innovation funders • Citizens / businesses • Research community



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Staying on course?

Systemic uncertainties, e.g.

	Complexity	Impact	Actions	By who?
Fossil fuel availability and price			• Energy efficiency • Diversity • Carbon pricing	• Governments and regulator • Businesses • Citizens / businesses
Ecosystem service impacts			• Stronger evidence base • Decision making tools	• Government • Businesses • Research community
Public attitudes to energy system change			• Genuine engagement with public on energy system change	• Government • Citizens

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Conclusions

- Power sector decarbonisation by 2030 is critically important:
  - No shortage of capital, but policy frameworks, market structures & business models may need to change to attract that capital
  - Limited options to 2030, but will be tough to keep them all 'in the low carbon race'. Need for evidence based decisions on priorities
- More flexibility with heat and transport decarbonisation:
  - Delayed electricity decarbonisation not a show stopper for heat
  - More action needed on energy efficiency to provide more flexibility
  - Support for demonstration & early deployment of heat & transport options (e.g. district heating; EVs) to 'open up' & test options
- Need to move beyond narrow framing of public attitudes: transitions that align with values more likely to be successful
- Natural resources and ecosystem service impacts may limit options and flexibility; driven partly by global trends

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