

Comparative assessment of low carbon gases and electrification for decarbonising heating in buildings

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Why the focus on heat is important?

$\rm CO_2$ emissions in the UK

Primary energy demand in the UK



Can we walk away from the gas grid?



Ref: Path dependency in provision of domestic heating, Robert Gross, Richard Hannah, nature energy4, pages 358–364 (2019)

Key Questions

- How different possible scenarios for the future of the gas grid will affect the cost, infrastructure requirement and system-wide implications of decarbonising heating in buildings?
- How does meeting emission mitigation targets for heating interact with energy security policy goals?



Taftan framework



Taftan framework: Model outputs



Taftan framework: Model outputs



Gas grid dispatch profile (GW)

Taftan framework: Model output



Results: Power and gas grid transformation



Results: Total system cost and cost of CO₂ avoided



Results: Demand for resources



Results: Demand for biomass



Results: Sensitivity analysis



Results: CCS network



Results: Sensitivity analysis







- Overcommitting to one energy vector will introduce reliability and availability risks to security of supply.
- Proper combination of different strategies could provide the opportunity for diversification of heating portfolio as resources.
- The level of investment required in all the scenarios are relatively close and determining the role of low carbon gases and electrification for decarbonising heating is better guided by the trade off between short-term reliability risks and long-term availability risks
- System-wide factors such as availability of biomass resources and natural gas, as well as availability and rate of deployment of CCS are key determinant in the transition pathway and the technology mix adopted.



Smart electrification

