Electrifying residential heat in the UK: The importance of heat pump cost reduction and domestic supply chain development in the presence of persisting energy price shocks

UNIVERSITY of STRATHCLYDE CENTRE FOR ENERGY POLICY

UKERC UK Energy Research Centre

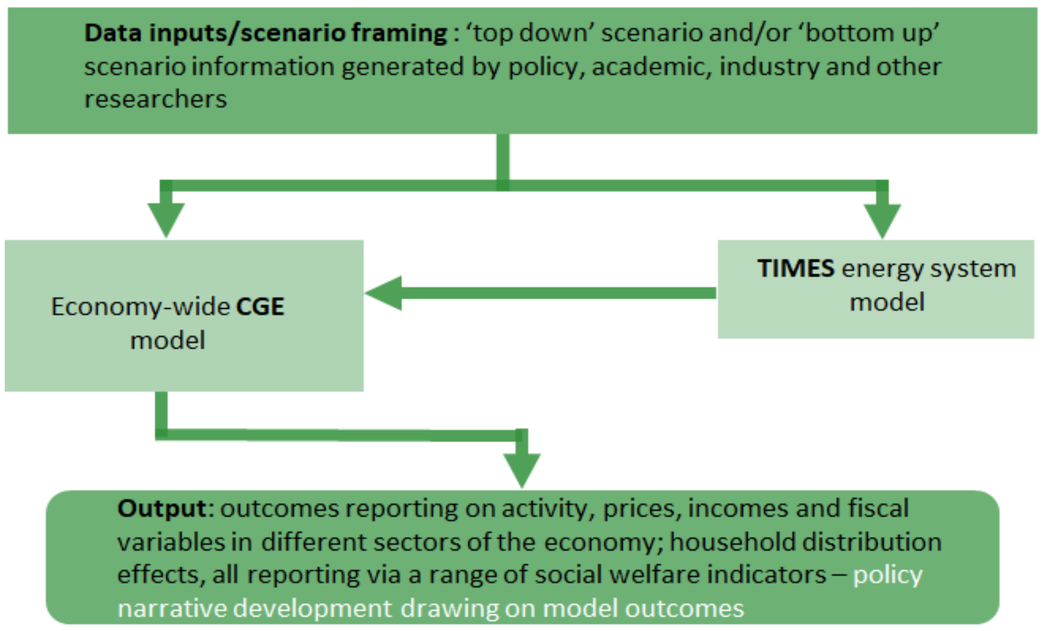
1.Introduction

To tackle climate change to meet net zero, the electrification of residential heat is proposed to be a key action. Significant changes to the energy system - including the upgrade of the energy networks and increasing renewable energy generation capacity - will be needed alongside the installation of new heating systems in people's homes. This project aims to:

- Analyze key impacts on the energy system and the associated costs of incorporating varying levels of electrification and energy efficiency.
- Investigate the economy-wide impacts across regions/sectors/household income groups, with a particular focus on low-income households and fuel poverty.
- Assess how different heat pump purchase options, production costs and supply chain shares affect the economy in the presence of persisting energy price shocks.
- Liaise with key policy stakeholders on how emerging understanding of key societal and political economy consequences may impact public and private sector decisions.

2. Soft-linked modelling approach

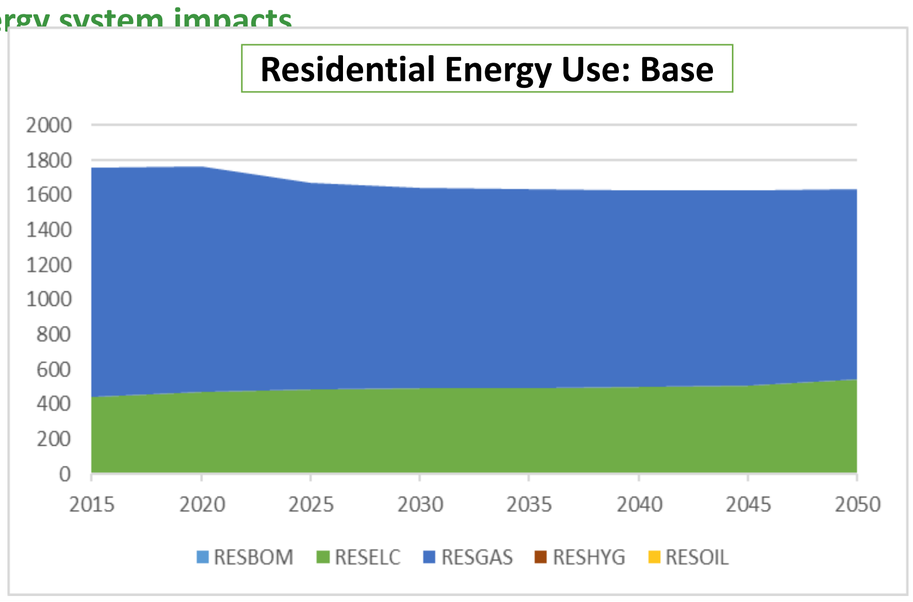
The methodology applies an innovative blend of energy system (TIMES) and economic (CGE) modelling to the heat decarbonization challenge.



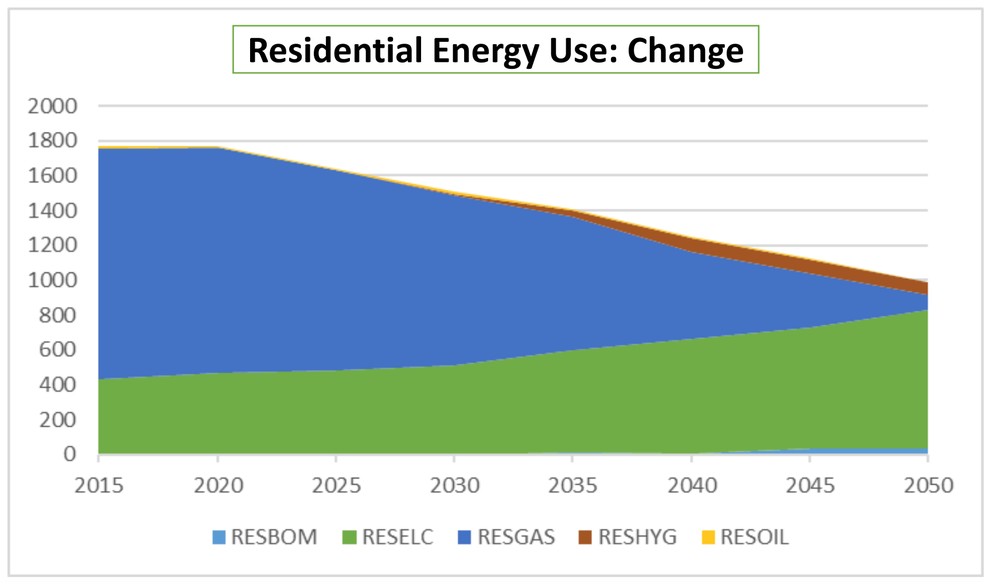
3. Scenario layering

- Price Shock Case: Only energy (electricity & gas) price shock until 2030
- Central Case: Energy price shock + Grid network upgrade + Electricity efficiency gain + Heat pump purchase/installation by outright payment/government grants, with share of 25% equipment, 50% fittings, 100% labour being UK sourced
- Cost Reduction Case: Central Case with heat pump ***cost reduced*** by 30% in equipment, fittings, and 50% in labour effective from 2028
- UK Source Case: Central Case with ***higher share*** of 75% equipment, 75% fittings, 100% labour being UK sourced

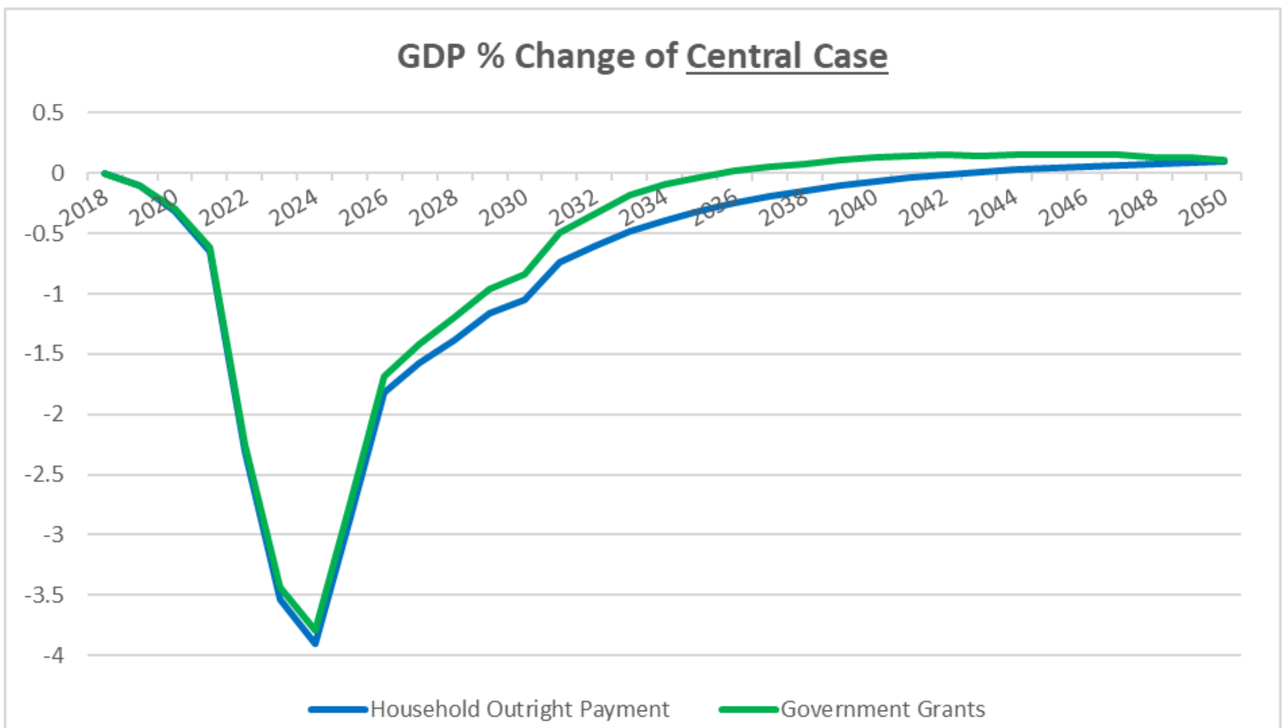
4. Energy system impacts

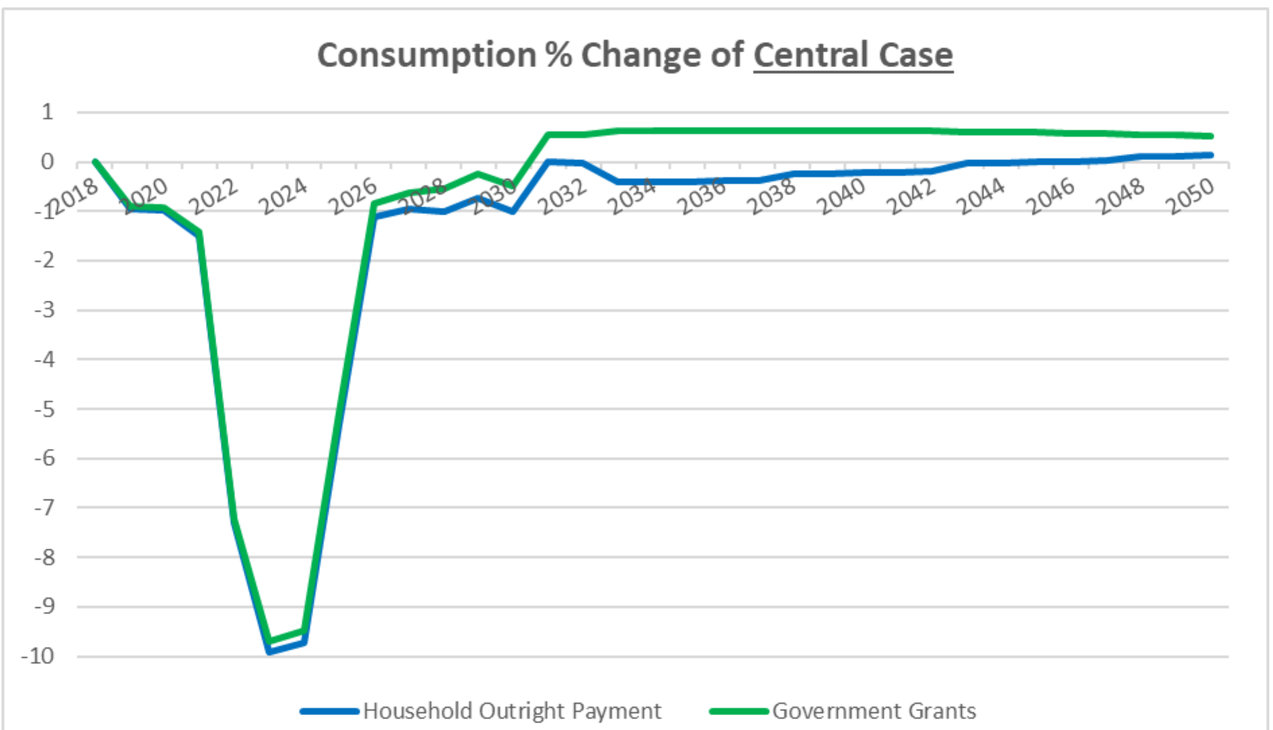


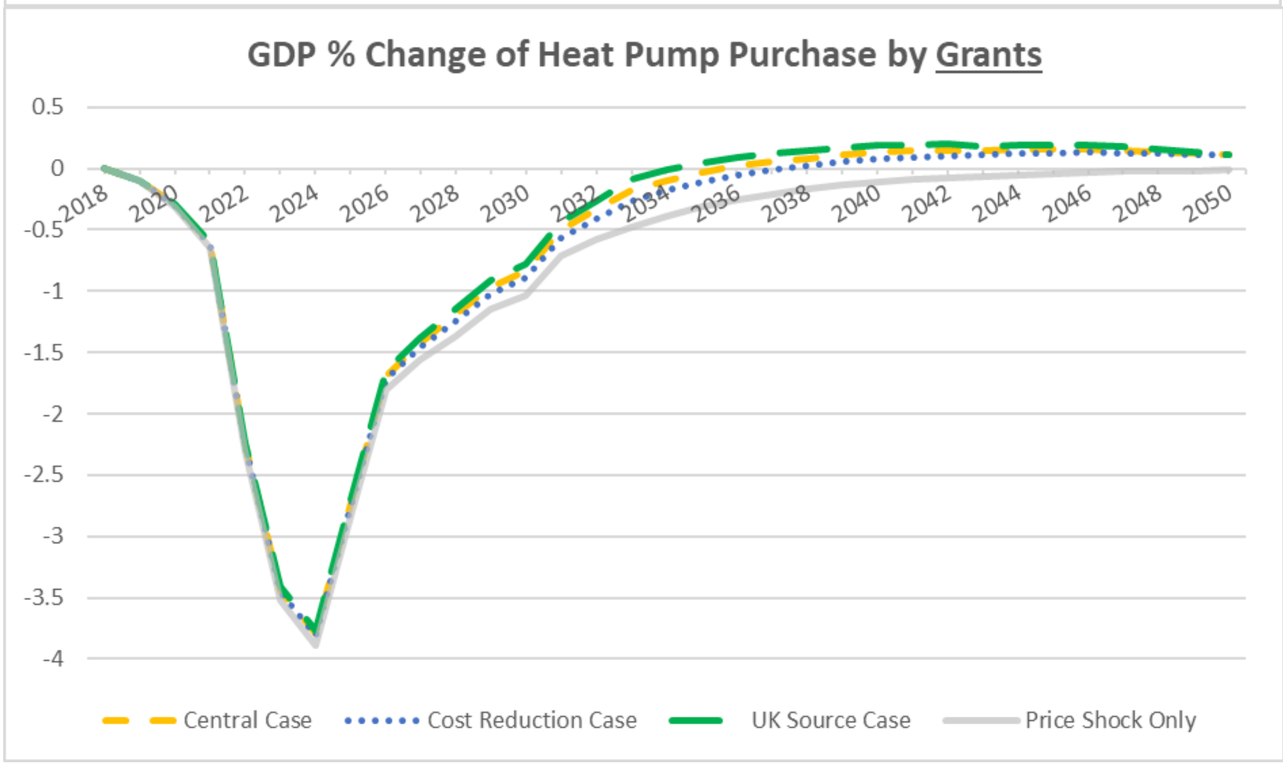
Almost 50% of residential heat using low carbon systems by 2035 and almost all by 2050



5. Wider economy impacts







- With dominating energy price shock, all scenarios show approx. 10% inflation
- Heat pump purchase by grants deliver the best economy-wide outcomes
- Unlike outright payment/loans for heat pump purchase, using grants does not negatively affect non-heat pump household consumption which is the main factor determining the economy-wide impacts here
- All cases mitigate the adverse wide-economy effects of energy price shock
- More UK manufacture leads to higher demand and spending to UK sector's output
- Covered by grants, heat pump cost reduction does not affect consumption but leads to less spending to UK sector's output
- Lowest income households mostly affected in proportionate terms

This poster is presented as an output of the project 'Delivering a sustainable and equitable heat transition in the UK' which is funded by the UKERC under the Flex Fund Call. The project is led by Professor Karen Turner, Director of the Centre for Energy Policy at the University of Strathclyde.
Project website: https://ukerc.ac.uk/project/delivering-heat-transition/

Prof. Karen Turner, Principal Investigator
E: Karen.turner@strath.ac.uk

Long Zhou, Research Associate
E: long.zhou@strath.ac.uk