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Briefing Note

Unlocking the benefits of the low-carbon heat transition

Summary

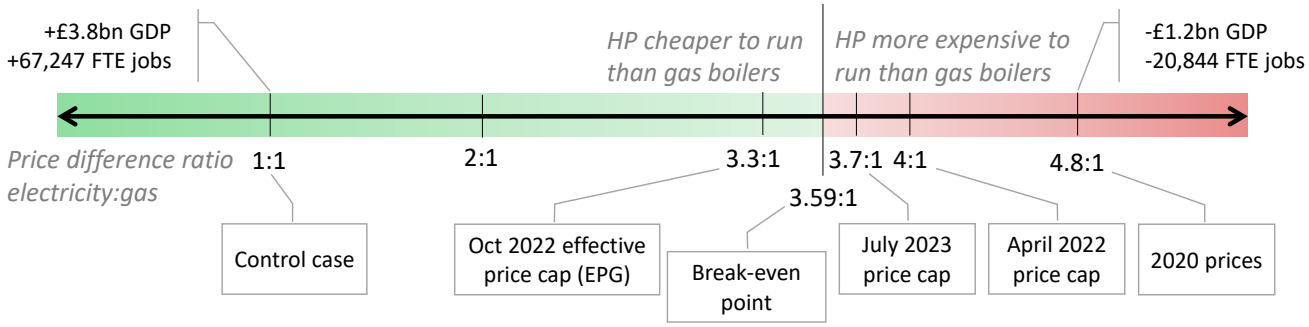
Decarbonising residential heating will be critical to meeting the UK's Net Zero ambitions. The UK Government has highlighted that the transition to low-carbon buildings could bring economic benefits including £6BN GVA (gross value added) and 175,000 skilled, green jobs by 2030. Yet to realise these benefits, questions and decisions around how policies are funded, related supply chains supported, and energy markets reformed will be critical. The Centre for Energy Policy's (CEP) research as part of the UK Energy Research Centre (UKERC) programme looking in particular at the heat pump rollout highlights three key findings that can help inform this action.

- The consumer price of energy is critical, in absolute terms and the price of electricity relative to gas, to achieving positive economy-wide outcomes from heat pump deployment.
- The rollout of heat pumps could mitigate the negative impacts of persistently high energy prices on the economy and households, but action to reduce the cost of manufacturing and installation and support domestic supply chains will be critical.
- There will be winners and losers across sectors and regions in terms of the jobs supported which will need to be considered within the wider context of 'levelling up', labour market participation and Net Zero skills agendas.

Determining energy prices

Unlocking the efficiency gains of heat pumps which are almost three times more (physically) energy efficient on average than gas boilers could lead to a range of economic benefits. Yet the price of energy, particularly that of electricity relative to gas, matters. As shown in Figure 1, in a hypothetical scenario where there is parity between prices (1:1), GDP gains equate to £3.8BN and net creation of jobs equates to 67,245 FTE. However, historically, electricity has been more expensive than gas which means this parity is highly unlikely. Where electricity is relatively more expensive than gas the energy savings from using heat pumps erodes with knock-on effects for household bills, real incomes and spending power that trigger economic gains. Figure 1 shows how recent high energy prices and interventions such as the price cap and Energy Price Guarantee (EPG) have impacted on the price ratio and in turn how the relative costs of running heat pumps versus gas boilers changes. Our analysis finds that the breakeven point in the price difference ratio of electricity to gas is 3.59:1; that is where the physical energy efficiency gains of heat pumps fully offset the impacts of electricity having a higher monetary price.

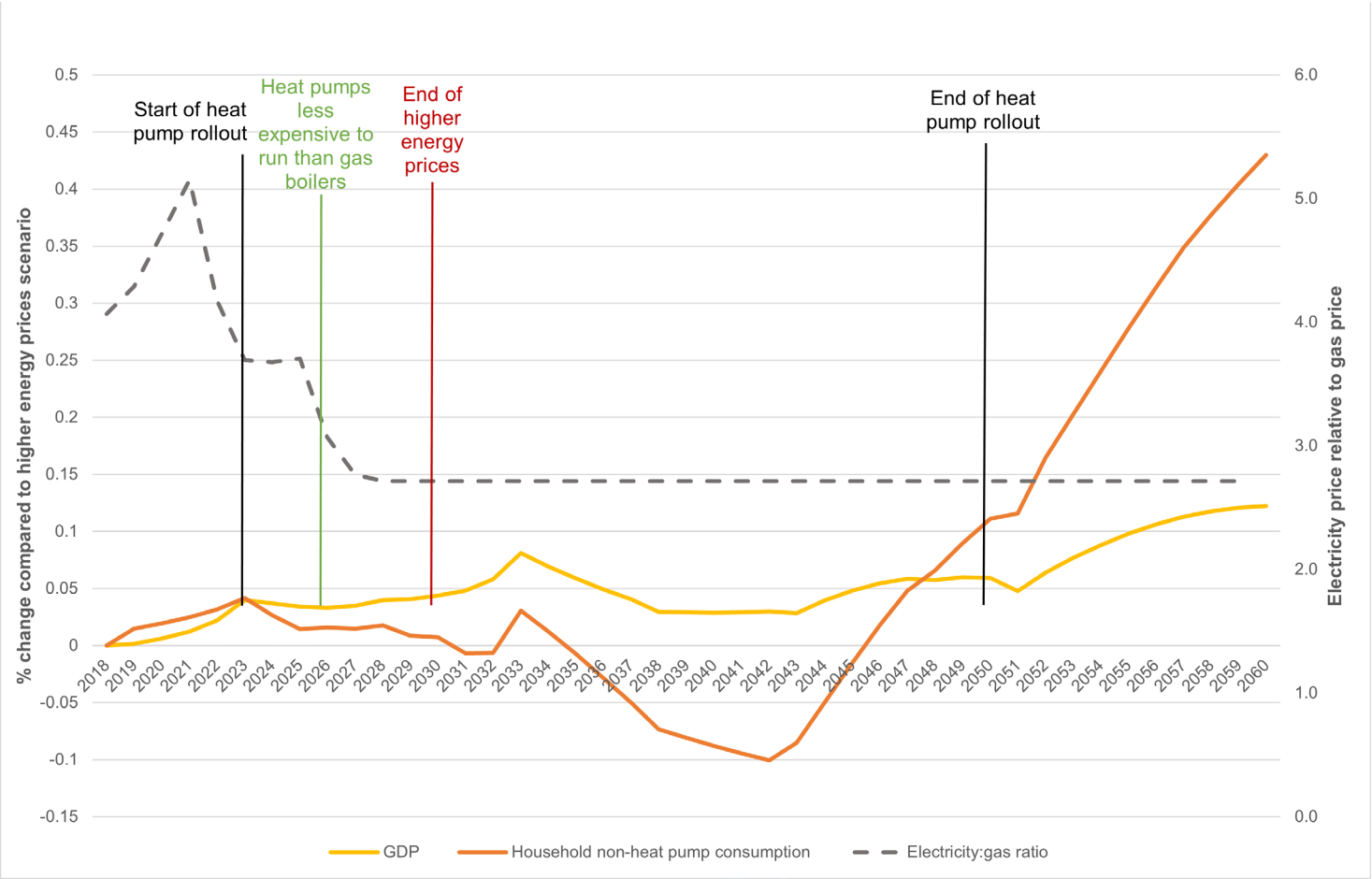
Figure 1: Impact of different GB energy market conditions on the electricity: gas retail price difference ratio



Mitigating impacts of high energy prices

Our research suggests that a peak in high energy prices in 2024 (according to HM Treasury (HMT) and Department of Energy Security and Net Zero (DESNZ) figures) will lead to a fall of over £74.4BN (3.8%) drop in GDP primarily driven by a £123.7BN (9.6%) drop in household consumption in the same year. However, manufacturing and installation associated with the heat pump rollout can mitigate these negative economic impacts. We find that where the heat pump rollout is paid for by households through interest free loans, GDP losses in 2024 (the year with the highest energy prices), are eased by £0.68BN - a 0.04% improvement. See Figure 2.

Figure 2: Impact on key macroeconomic indicators due to rollout of heat pumps paid for via interest-free loans



As the high energy price comes to an end (in 2030), GDP losses are further eased by £0.83BN. Alongside manufacturing and installation activity, negative economic impacts are also mitigated by energy bill savings as a result of heat pump use from 2026. Initially at 0.02% in 2026 but over time rising to an average of nearly 9% per household in 2050.

Maximising these economic gains and minimising the burden the on households will rely on bringing manufacturing and installation costs down. Strengthening domestic supply chains can also ease GDP losses by between £1.2BN and £1.5BN in 2024, and between £1.6BN and £2.3BN in 2030, depending on the price of heat pumps.

Assessing jobs and skills implications

The heat pump rollout will require significant upgrades to the electricity network alongside the manufacture and installation of the pumps. Activity could support job creation and income boosts in the regions where construction and manufacturing activities are concentrated.

We find that construction job creation associated with the network upgrade range from around 150 new jobs in the North East and Wales, to around 500 new jobs in the southern regions. The Midlands and Yorkshire and the Humber regions show greater job creation in heat pump manufacturing (around 2,500 new FTE jobs in 2034).

There are also consequences for other sectors with new jobs offset by losses in sectors such as finance and hospitality, affected by wage pressures from increased labour demand in manufacturing and construction. Thus, in areas such as London, where the composition of employment consists of more of these type of jobs, net employment does not improve as in other regions.

However, our findings suggest that the employment gains from the use of heat pumps tend to favour the southern UK regions (in the 1:1 case, over 12,000 and 8,000 net job gains by 2050 for London and the Southeast, respectively), which have historically hosted the larger number of jobs and economic growth, whereas other less prosperous regions do not benefit as much.

Policy implications

Based on our findings set out above we have identified three main implications for policy action and focus going forward.

1. **Bringing the cost of electricity down**

   Addressing issues around how the price of electricity is set is critical. Gas powered electricity plants (that produce relatively little of our energy and are expensive to run) are currently called on last to meet energy demand in the UK which determines the price charged. UK Government is expected to launch a second consultation in 2023 following its Review of Electricity Market Arrangements in 2022.

2. **Reducing heat pump costs and developing domestic supply chains**

   The rollout could help mitigate the negative economic impacts of persistently high energy prices. Efforts need to be targeted at lowering the costs of manufacture and installation and strengthening domestic supply chains, as well as understanding the implications of different funding models including loans and grants.

3. **Understanding regional and sectoral variations in job creation**

   In order to avoid displacement of employment across more labour-intensive and/or high wage sectors as a result of increased competition for workers in the UK's supply constrained labour market, it is crucial for decision makers to understand the drivers and potential nature of the displacement risks associated with large scale activities such as the heat pump roll-out. This understanding will be critical to informing policy action across a number of areas including on Net Zero labour and skills planning, ensuring 'Just Transitions' and addressing regional inequalities through the 'Levelling Up' agenda.

Further reading

- Calvillo, C. et al. (forthcoming) Jobs, Skills and Regional Implications of the Low Carbon Residential Heat Transition in the UK
- Turner, K., Gross, R., Katris, A., Calvillo, C., Zhou, L. and Corbett, H. (forthcoming) Unlocking the efficiency gains of switching to heat pumps: an economic opportunity? The importance of heat pump cost reduction and domestic supply chain development in the presence of persisting energy price shocks.
- Turner, K., Katris, A., Calvillo, C., Stewart, J. and Zhou, L. (2023) Unlocking the benefits of Heat Pumps: The Role of Electricity and Gas Prices. Available at: https://strathprints.strath.ac.uk/85812/
- Calvillo, C., Katris, A., Alabi, O., Stewart, J., Zhou, L. and Turner, K. (2023) Technology pathways, efficiency gains and price implications of decarbonising residential heat Available at: https://strathprints.strath.ac.uk/85933/

About the Centre for Energy Policy

The University of Strathclyde's Centre for Energy Policy (CEP) works with research, government and industry partners to understand and address the pressing public policy challenge of ensuring transitions to mid-century Net Zero targets deliver sustainable and more equitable prosperity.
https://www.strath.ac.uk/humanities/centreforenergypolicy/

About the Delivering a Sustainable and Equitable Heat Transition (SEHT) project

SEHT is part of the UK Energy Research Centre programme and aims to identify and shape economically and politically feasible pathways for the residential heat transition in the UK. https://www.strath.ac.uk/humanities/centreforenergypolicy/ourprojects/deliveringasustainableandequitableheattransitionseht/

About the UK Energy Research Centre (UKERC)

The UK Energy Research Centre (UKERC) carries out world-class, interdisciplinary research into sustainable future energy systems. Our whole systems research programme addresses the challenges and opportunities presented by the transition to a net zero energy system and economy. UKERC is an independent research centre, with researchers based in 20 different institutions throughout the UK, these are: Cardiff University, Chatham House, Durham University, Imperial College London, Lancaster University, Newcastle University, Plymouth Marine Laboratory, Science and Technology Facilities Council, University College London, University of Aberdeen, University of Bath, University of East Anglia, University of Edinburgh, University of Exeter, University of Leeds, University of Manchester, University of Oxford, University of Southampton, University of Strathclyde and the University of Warwick. https://ukerc.ac.uk/

Contact us

Hannah Corbett, Knowledge Exchange Fellow, hannah.corbett@strath.ac.uk