UK Energy Infrastructure and Supply

LSE Research Briefing

Summary

Rising energy bills and the war with Iran have renewed concerns about the UK's energy security, with the Energy Price Cap expected to rise significantly in January 2027.

Recent Budget announcements look to address the crisis. Chancellor John Healey announced that standing charges will be removed from household gas bills and costs added to the unit rate instead. Households in council tax bands A-D in England will also receive a £100 payment to help deal with rising energy bills. But is this enough?

This note **highlights LSE research focused on:**

- Policy interventions to reduce the cost of electricity 1
- Increasing infrastructure and public uptake of low-carbon energy sources 3
- The impact of high energy costs on public health 6

Policy interventions to reduce the cost of electricity

1. Cutting Consumer Costs by introducing time-of-use tariffs

- Research by Dr Shefali Khanna and co-authors at the Grantham Research Institute argues that the Levelised Cost of Electricity (LCOE), the main tool used to compare power generation technologies, leaves out system costs, the value of when and where electricity is produced, and environmental costs. Policymakers should use a dashboard of metrics instead of relying on LCOE alone.

- Dr Khanna is developing an **open-source dashboard of metrics for policymakers that will compare technologies on cost, environmental impact, system integration and reliability, rather than on a single number.**

- Her research shows that **households respond to price incentives for shifting their electricity use when the incentives are combined with smart technologies that can automate demand response.** That could reduce the need for expensive peaking generators and network reinforcement, which could

lower costs for consumers, improve reliability and reduce emissions.

- More policy costs are still charged on electricity than on gas, even after the April 2026 changes that moved most Renewables Obligation costs to general taxation. This keeps electricity expensive relative to gas, which makes it harder for heat pumps to compete with gas boilers on running costs.

- **Moving the remaining policy costs from electricity to gas, or to general taxation, would make electrifying heating cheaper for households.** Tariffs that reward people for shifting electricity use, combined with automation, could lower costs further by reducing the need for peaking generators and network reinforcement.

- Households that are not connected to the gas grid and rely on heating oil are especially exposed to fossil fuel price shocks. Policy should prioritise helping these households switch to electric heating.

- **The structure of how UK energy bills are calculated is also working against the Government's net zero ambitions**. Environmental levies fall disproportionately on electricity rather than gas, keeping the electricity-to-gas price ratio above the level at which heat pumps become cost-competitive with gas boilers.

- This structure can be reformed through **utilising time-of-use tariffs as a default and rebalancing policy costs across fuels**, resulting in lower bills, accelerated decarbonisation and enhanced energy independence.

- **A resilient energy system must address who bears residual fossil fuel risk**, not just how much clean energy is produced – and that better metrics, rural electrification, and demand-side flexibility are central to the answer.

2. Improving incentives for electricity consumers

- In a chapter for the IFS Green Budget 2026, Dr Stephen Jarvis examines how **the structure of incentives on offer for electricity consumers and generators could be altered, to improve both the electricity system's efficiency and to reach target greenhouse gas emissions at a lower cost.**

- **UK household electricity prices have risen by almost 150% since 2010.** In recent years this has been primarily due to the high price of gas, alongside the longer-term cost of decarbonising the electricity sector which has largely funded via levies and taxes on electricity use.

- Electricity prices are poorly aligned with how the costs of supplying electricity vary over time and space, therefore raising the overall cost of the electricity system.
- Policy makers should offer consumers **better incentives to use more electricity when the cost of supplying it is low**, less when the cost is high, and encourage generators to pinpoint where high demand is located.

- Per-unit taxes and levies that fund fixed costs inefficiently penalise the use of electricity. The research recommends that the fixed costs of the electricity system should instead be increasingly **funded through the use of per-customer standing charges or general taxation**.

- Incentives to reduce greenhouse gas emissions should be made more consistent across activities, so the cost of carbon is consistent with the government's emissions objectives.

- For example, currently the ETS only covers around a quarter of the UK's emissions. **An extension on the existing UK Emissions Trading Scheme (ETS) would cover more of the economy** whilst abolishing the patchwork of other taxes and charges designed to encourage decarbonisation, such as the climate change levy.

- As government looks to protect vulnerable consumers, Dr Jarvis recommends **targeted support to low-income households**, rather than blanket subsidies such as discounted rates of VAT.

Increasing infrastructure and public uptake of low-carbon energy sources

1. How to boost productivity through cutting the costs of energy infrastructure

- The UK economy's productivity has remained almost flat since 2008, with UK wages only growing by 4% from 2008 to 2024.

- There has also been a decline in manufacturing output, which can be viewed as a natural feature of post-industrial economies. However, **UK manufacturing output declined considerably faster than domestic demand for manufactured goods**, with UK household consumption of energy-intensive

manufactures holding a consistent share of GDP from 1997 to 2023.

- This gap was filled by imports, locking the UK into a structural trade deficit in goods now equivalent to roughly 6% of GDP. Since the mid-2010s, British industry has faced **energy costs close to 50% above the International Energy Agency average**. British industry has been unable to capitalise on advantages offered by the decline in the value of the pound because of rising industrial energy costs.

- Gas-fired energy generation setting the marginal electricity price as a core reason for this. Several nuclear power plants have been retired since the early 2000s. **The expansion of offshore wind has also caused network charges to rise sharply. These charges rose 70% in the UK between 2019 and 2023, compared with 29% in Germany.**

- To mitigate this, Associate Professor Christopher Sandmann proposes that there should be a **reduction in the cost of building energy infrastructure**. Energy policy should be judged by its contribution to the total cost of providing reliable low-carbon electricity. Nuclear power is more expensive to build in Britain than in France, and more expensive in Europe than in Korea or the UAE.

- **Planning reform that enables nuclear construction at French or Korean cost would be effective in improving the competitiveness of industrial energy prices.**

- **Crucially, the Government's announced regulatory reforms need to translate into shorter delivery times and lower construction costs for nuclear energy infrastructure**. Completing existing nuclear projects efficiently, such as Hinkley Point C, including working to resolve its remaining environmental approvals promptly and proportionately, and then carrying the skills and supply chain into other projects like Sizewell C, would mitigate this.

- The British Industrial Competitiveness Scheme, due to launch in April 2027, will assist British firms in remaining competitive but **a lasting reduction in energy costs also requires Britain to build and operate its energy infrastructure more cheaply.**

- **Sustained productivity growth would raise incomes and expand the tax base**, making that support easier to finance and creating more room for stronger investment in energy, transport, housing and other infrastructure.

2. Interventions to stimulate public investment in low carbon infrastructure:

- Research by Aurelien Saussay examines the **impact of Scotland's interest-free Home Energy Scotland (HES) Loan**, which encourages household photovolatic (PV) adoption through a reduction in upfront capital barriers by lowering borrowing costs and extending repayment periods.

- **The loans widened access to carbon neutral energy infrastructure at a low public cost.** Despite Scotland's low solar potential, the research shows that rooftop-solar uptake increased, with larger gains in lower-wealth areas and across urban and accessible-rural locations.

- Therefore, the research suggests that policy makers should keep zero-interest loans alongside grants for low carbon infrastructure, to encourage uptake.

- Similarly, new research found that **raising the UK-wide Boiler Upgrade Scheme grant from £5,000 to £7,500 in October 2023 resulted in wider uptake.**

- Installations in northern England increased by 24% relative to Scotland. **Installation prices also fell by around £830 beyond the extra grant,** and both effects were larger where local competition was stronger.

- As heat-pump grants are most effective where installer markets are competitive, it is recommended that government funds installer capacity alongside grants, especially where local markets are thin.

3. Decarbonising residential heating

- Research shows that heat-pumps are not evenly distributed across Britain: their deployment is dependent on local conditions and geography. The research from Dr Theodoros Arvanitopoulos, highlights that **fragmented supply chains and skills shortages contribute to heat pumps costing more to install than gas boilers**.

- **Areas that adopt heat-pump installation early can create benefits for neighbouring places** by building installer capacity, skills and supply chains, helping heat-pump deployment spread into areas where conditions are initially less favourable.

- It is estimated that for every three heat pumps installed, one is subsequently installed in a neighbouring authority with less suitable conditions.

- **Early-adopting local authorities of heat-pumps tend to be rural**, off the gas grid and reliant on oil or solid fuels for heating.

- Dr Arvanitopoulos recommends **increased place-based investment in installers, skills and supply chains to create spillover effects** that accelerate adoption across neighbouring areas, while targeted support will also be needed to prevent less favorable areas being left behind.

The impact of high energy costs on public health

1. Energy interventions as a preventative approach to health needs and social care

- Using the **English Longitudinal Study of Ageing (ELSA)**, a representative study of people aged 50+, researchers from the Care and Policy Evaluation Centre (CPEC) developed a multidimensional, data-driven measure of fuel poverty using Structural Equation Modelling to examine the link between long-term care needs and fuel poverty among older people.

- **Fuel poverty is associated with a greater risk of developing long-term care needs and worse mental health among older people**, even after controlling for health, income and other factors.

- Therefore, fuel poverty interventions should be recognised as a **preventative health and social-care policy**, given the association with both long-term care needs and mental health.

- As fuel poverty has individual and structural causes, policymakers need to address it through individual and structural measures like support for housing and fuel costs alongside reforms to the housing and energy market.