UK Energy Research Centre

Review of Energy Policy 2025

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Introduction

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The last year has witnessed the almost complete breakdown of the previous consensus amongst the major political parties about the future direction of energy policy, particularly in relation to the speed and desirability of achieving net zero. It is against this background that the Government has introduced a range of policies to advance its Mission to make Britain a Clean Energy Superpower.

Key elements of this Mission include accelerating progress towards net zero - notably by delivering clean power by 2030 - while also enhancing energy security, protecting consumers from high energy prices and creating good jobs. In the Review of Energy Policy, we explore the likely impact of these policy announcements, while also highlighting key challenges that remain in meeting the goals of the Mission.

Delivering Clean Power by 2030 has become the centrepiece of Government policy on energy, but one which faces significant challenges. A key battleground in the first half of the year was whether the REMA review should recommend a move to Zonal Pricing to improve locational signals for generation. Proponents, including some energy suppliers, government bodies and the regulator, argued that this would encourage generation where it is cheapest, and help ease congestion on the grid. However generators, transmission owners, some industry groups, investors and analysts argued that this would increase investment risk and hence increase prices in forthcoming auctions for renewable electricity. In this review, we explain why the Government ultimately rejected Zonal Pricing in favour of Reformed National Pricing, how UKERC analysis contributed to the debate, and offer national-level alternative policy options.

Another topic that gained prominence in 2025 was the pivotal role that flexing energy demand can play in meeting the Clean Power 2030 targets. With projections showing that so-called Consumer-Led Flexibility will need to almost double by 2030, a new Roadmap set out the strategic framework for achieving this. However, as we discuss, delays in delivering smart meter deployment and Market-Wide Half-Hourly Settlement, combined with fragmented flexibility markets, pose significant risks. Therefore, to deliver on the promise of Consumer-Led Flexibility, Government will need to accelerate digital infrastructure and interoperability standards, address outstanding market design and regulation issues, while also ensuring fairness to all consumers.

High UK household energy bills have once again been in the headlines as they exacerbate the cost-of-living crisis and discourage electrification of heating and transport. Despite easing since the 2022–23 energy crisis, addressing affordability concerns is a key Government priority. The 2025 Autumn Budget cut bills by scrapping the Energy Company Obligation and shifting most Renewables Obligation costs to taxation, saving households about £150/year. Our analysis shows that increased wholesale gas prices caused two-thirds of the real-terms rise in electricity bills since 2021. However, the link between wholesale gas and electricity prices will decline in the future as more renewables enter fixed-price Contracts for Difference (CfD), which should lower electricity prices by around 8%. If the Government were to implement UKERC's idea of "Pot-Zero," by converting legacy renewables to CfDs, then this would result in further significant savings.

Our review also draws attention to the unique role that biomass can offer to the UK energy system as both a source of dispatchable,

low–carbon power and as a long-duration energy store. Coupled with carbon capture and storage, it can deliver negative emissions, a key advantage over other sources of renewable generation. However, policy uncertainty, sustainability concerns, and misaligned incentives – such as schemes favouring baseload rather than flexible operation – currently limit investment and innovation. Regulatory barriers to biomass storage and unclear guidance on future support exacerbate risks. We highlight that a strategic policy approach will be essential to unlock biomass's potential to deliver flexibility, affordability, and decarbonisation.

Away from the electricity sector, Britain's gas network continues to provide most of the energy needed by households and businesses. Yet the industry faces a profound, but under-explored, challenge as decarbonisation reduces demand for natural gas. The development of the next price control framework for the gas distribution network has exposed flaws in Ofgem's regulatory model, which assumes that investment in the network can be recouped from future customer bills. Currently, the proposed solution is enhanced depreciation, but this risks significantly increasing bills which would particularly impact vulnerable households who are most likely to be left on the gas network. Given the challenges of transitioning away from gas, further government intervention seems inevitable. The future gas policy review will need to consider how to manage retirements, whether current returns to investment can be retained, and even nationalisation to manage costs and ensure fairness.

Enhancing energy security is another key pillar of the Clean Energy Superpower Mission. The UK's new Critical Minerals Strategy underscores the need for agile, ambitious policies to secure supplies of a range of materials that are vital for clean energy, electrified transport, and advanced manufacturing. The current heavy reliance on

imports from concentrated sources, notably China, is creating both geopolitical and economic vulnerabilities.
The Strategy outlines a package of measures to address these risks, including targets for domestic production, increased recycling and building resilient supply chains, backed by new finance and international partnerships. Our review identifies that implementing the strategy will require clarity on metrics, timelines, and funding, alongside increased diplomacy to secure bilateral and multilateral agreements.

Finally, we note that the Government will only be able to deliver on its Clean Energy Superpower mission if it builds the public support for the policies that are needed. The UK's new climate and nature public participation plan aims to make policies more trusted, responsive, and effective. This will be achieved through five principles, including better communication of the action being taken, more listening to people and communities, and greater collaboration to inform and inspire future action. Practically, this will require new mechanisms for transparency - showing not only how public input shapes decisions, which is the current focus - but also tools to handle opposition and controversy, not just supportive engagement. In this review, we note how the UKERC Public Engagement Observatory has helped shape the plan, and how our research both identifies areas where it can go further and, importantly, offers practical approaches to support its delivery.

As political consensus fragments and policy pressures intensify, robust independent analysis becomes ever more important. This review offers that analysis, setting recent decisions in context and examining how policies across the energy sector can deliver durable and equitable outcomes.

The Price of Power: UKERC's Mission to Drive Down Electricity Bills

Richard Carmichael, Kaylen Camacho-McCluskey, Will Blyth and Rob Gross, Imperial College London

Three years from the peak of the energy crisis, prices remain above pre-crisis levels and are still placing financial strain on many households. Energy bills are high on the political agenda, leading to action in the November Budget to cut an estimated £150 from energy bills for the typical household[1]. UKERC's Mission on Bills is investigating policy and market reforms that could reduce electricity bills further. This would help with the cost-of-living crisis and reduce distorting incentives that discourage the electrification of heating and transport.

Introduction

In 2025 the UK[i] ranked third highest among 28 IEA countries for domestic electricity prices[2]. Domestic consumer energy bill debt has risen to £3.7 billion, up from £1.8 billion in 2021[3]. Households in fuel poverty increased from 4.3 million in 2020 to 8.9 million in 2023[4]. During the height of the energy crisis in 2022-23, support schemes for households cost approximately £42bn[5].

Energy prices have eased since the height of the crisis, but making energy more affordable is a political priority, with the Government acting on bills in the Autumn Budget. Ofgem is also reviewing how costs are shared across the system[6] and announced changes to compel suppliers to offer low standing charge tariffs from January 2026[7]. Government measures to reduce bills must also support the UK's transition to an energy system that is clean, secure, efficient, flexible and fair. There is a challenge to clearly communicate these changes to counter misperceptions and erosion of public support for decarbonisation[8].

In this context, UKERC launched a Whole Systems Mission on Bills[9] to provide ideas and evidence on proposals that could reduce household electricity bills. It will review options for reducing electricity prices from end-to-end, from generation through transmission and distribution to supplier and policy costs.

i Great Britain's electricity market is distinct from Northern Ireland's but we write here largely from a shared UK-wide political and policy perspective.

The first activity is to analyse Ofgem Price Cap data to understand the components of electricity costs, and how these will change as the share of renewables paid a fixed price increases.[10]

Price Cap and Autumn Budget

In 2019, Ofgem introduced a price cap that sets a maximum unit rate and standing charge, updated on a quarterly basis. The cap applies to households on default or standard variable tariffs. For January-March 2026, the headline price cap[ii] is set at 27.69.p/kWh for electricity and 5.93p/kWh for gas, plus standing charges of 54.75p and 35.09p per day respectively. An annual energy bill is now £1,758 for a typical dual fuel household paying by Direct Debit[11].

Measures announced in the 2025 Autumn Budget impact two policy costs: 75% of the Renewables Obligation (RO) costs will be funded from general taxation, and the Energy Company Obligation (ECO) is to be scrapped. These changes should start to benefit consumers from April 2026[12].

The Drivers of Bills

Given the level of controversy surrounding increasing bills, UKERC undertook a bottom-up evaluation of the drivers of electricity prices, analysing electricity price cap data. Figure 1 compares inflation adjusted electricity bills pre-energy crisis with bills in 2025, showing real-terms price increases, and the impact of the changes made in the Autumn Budget. This allows us to provide a clear breakdown of the components of a typical bill and how they have affected prices.

The bar on the left shows the annual electricity bill for a typical household using the Ofgem price cap rates for Apr-Sept 2021, adjusted for inflation. The second bar shows the annual electricity bill using Apr-Sept 2025 price cap rates. Between these periods typical electricity bills rose by £169 in real terms, with 66% (£112) of this coming from wholesale fuel costs[iii], followed by network costs 17% (£28), and policy costs 13% (£22).

ii National average, for dual fuel customers paying by Direct Debit

iii 'Direct fuel' (DF) for electricity reflects the market price for electricity, rather than the cost of generation, and also covers the cost of the Capacity Market and Contracts for Difference.

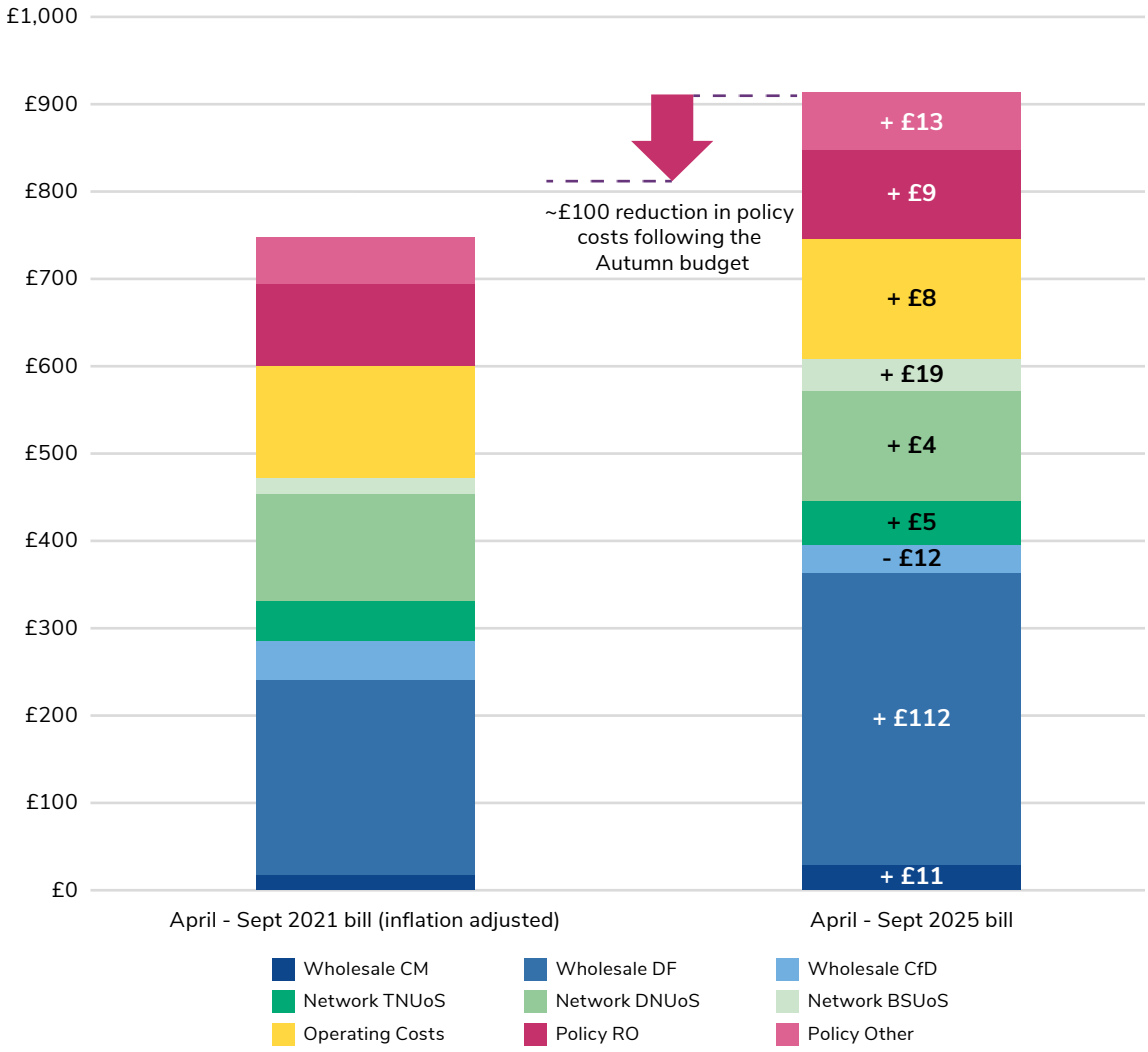

Figure 1. Typical annual household electricity bill based on Ofgem Price Cap: Apr-Sept 2021 vs Apr-Sept 2025 (inflation adjusted).[13]

Increasing CfDs Will Reduce Bills

Our analysis shows that wholesale gas price increases have been the biggest driver of electricity price increases since 2021. Despite gas generators accounting for only one-third of electricity generation, many other generators also receive revenues linked to the price of gas. We estimate that gas prices currently drive the cost of electricity for up to 90% of generation, exposing consumers to considerable gas-price risk.

Looking toward the next 3 years, this link between wholesale gas and electricity prices is set to weaken. This is due to a shift towards fixed price contracts for renewables as an increasing volume of new renewables scheme come onstream, with prices fixed under the 'contracts for difference' (CfD) regime. Our analysis suggests that the proportion of time that gas sets the price of electricity will fall from 90% to 60%, reducing susceptibility to gas price shocks.

The renewables projects due to come on stream in the next 3 years will have fixed

prices below the current cost of gas-fired generation, leading to downward pressure on prices. Together with other structural changes in the market, we estimate that this could reduce wholesale prices by about £7/MWh, or 8% relative to today's prices[14].

Pot-Zero

One option for strengthening these downward trends driven by CfDs for new generation is to change the payment mechanism for older renewable generators. The potential for this is investigated in UKERC's 'Pot-Zero' report[15]. The latest Pot-Zero update revisits proposals to reform support for legacy low carbon generators under the Renewables Obligation (RO). At present, these generators receive support payments in addition to wholesale electricity prices, which arguably result in excessive costs for consumers. The changes announced in the Autumn Budget remove around £2.3 bn of RO policy costs from domestic bills, but this is now funded through public spending, 25% of RO costs are still levied on households, and commercial customers are unaffected by the change.

Pot-Zero offers a solution by converting RO-projects to CfDs through an auction pot for older renewable schemes. CfDs stabilise prices for both consumers and generators, breaking the link between electricity and gas prices. Pot-Zero could deliver savings of between £2 and £8 billion per year in the late 2020s. The scale of these savings depends on strike price scenarios and future market conditions. Prior to the policy shift made in the budget, we estimated that, if implemented in 2027, Pot-Zero could reduce prices by between £7/MWh and £25/MWh, worth in the region of £20 to £80 per household per year in the late 2020s.

Reappraising the benefits of Pot-Zero post-Budget suggests that whilst the impact on domestic consumers has been partially achieved by other means, the total potential cost savings to the economy remain substantial. If Pot-Zero were implemented successfully, the RO costs now borne by the Treasury would fall, and a wider array of domestic and commercial consumers would benefit.

Conclusions and Next Steps

The principal driver of increasing electricity prices continues to be the impact of gas prices on wholesale fuel costs. As we move forward, the rising share of renewable generation with a fixed price CfD will help to break this link. Some policy costs have now been mitigated, for domestic consumers at least, by shifting legacy policy costs onto general taxation. However, it is possible to reduce the economy-wide costs and benefit commercial customers by reforming how older renewables schemes are remunerated. In future work, UKERC will explore other options to reduce bills, examples include how to hold future CfD prices down, reduce the costs of curtailment, and minimise the costs of network upgrades and refurbishment.

Delivering Consumer Flexibility in GB Energy Systems: Progress and Priorities

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Introduction

During the last year there has been considerable progress on policy for consumer-led flexibility in Britain, an issue at the heart of the Clean Energy Superpower mission. Key initiatives included the publication of the *Clean Flexibility Roadmap*[16], a government consultation on consumer engagement, continued rollout of smart meters, and ongoing actions to develop the enabling architecture for flexibility. At the same time, the range of smart tariffs and innovative consumer offers on the market has continued to expand. These developments signal growing recognition of the role consumer flexibility can play in a secure, affordable, and equitable clean energy system, but significant uncertainties remain around scaling to meet 2030 targets.

Policy Developments in 2025

Flexibility, the ability to adjust energy supply, storage or consumption to maintain system balance and ensure electricity networks operate within safe limits, is increasingly vital as renewable generation grows and electricity demand shifts due to the electrification of transport, heating, and industry.[17] It is achieved by incorporating dispatchable generation, storage, interconnectors and heat networks, and increasingly through demand-side measures that incentivise consumers to increase, decrease, or shift consumption. Matching demand to renewable output helps lower costs for consumers by reducing the need for expensive new power plants and network infrastructure, and maximising the use of low-cost renewables.[18]

Consumer-led flexibility, from households and businesses, already helps reduce system costs, but has the potential to play a much more important role[19, 20] as millions of small-scale assets are adopted, including electric vehicles (EVs), heat pumps, photovoltaics (PV), battery storage, and smart appliances. Consumer flexibility can also help to give people more control over their energy use, lower bills and support participation within the energy system.

The *Clean Power 2030 Action Plan* (CP30) recognises flexibility as a critical enabler of a decarbonised power system and the joint publication by DESNZ, Ofgem, and NESO of the *Clean Flexibility Roadmap* was an important step. The Roadmap sets out a strategic framework for scaling all sources of flexibility. Projections indicate 51–66 GW of flexible capacity will be needed by 2030, rising to over 200 GW by 2050. Of this, consumer flexibility is expected to deliver up to 15.6 GW in 2030 (Figure 2) and 81.6 GW by 2050. Heat and transport dominate, with flexible heating accounting for 45% of consumer flexibility in 2030, while smart EV charging rises from 25% in 2030 to 62% in 2050.[21]

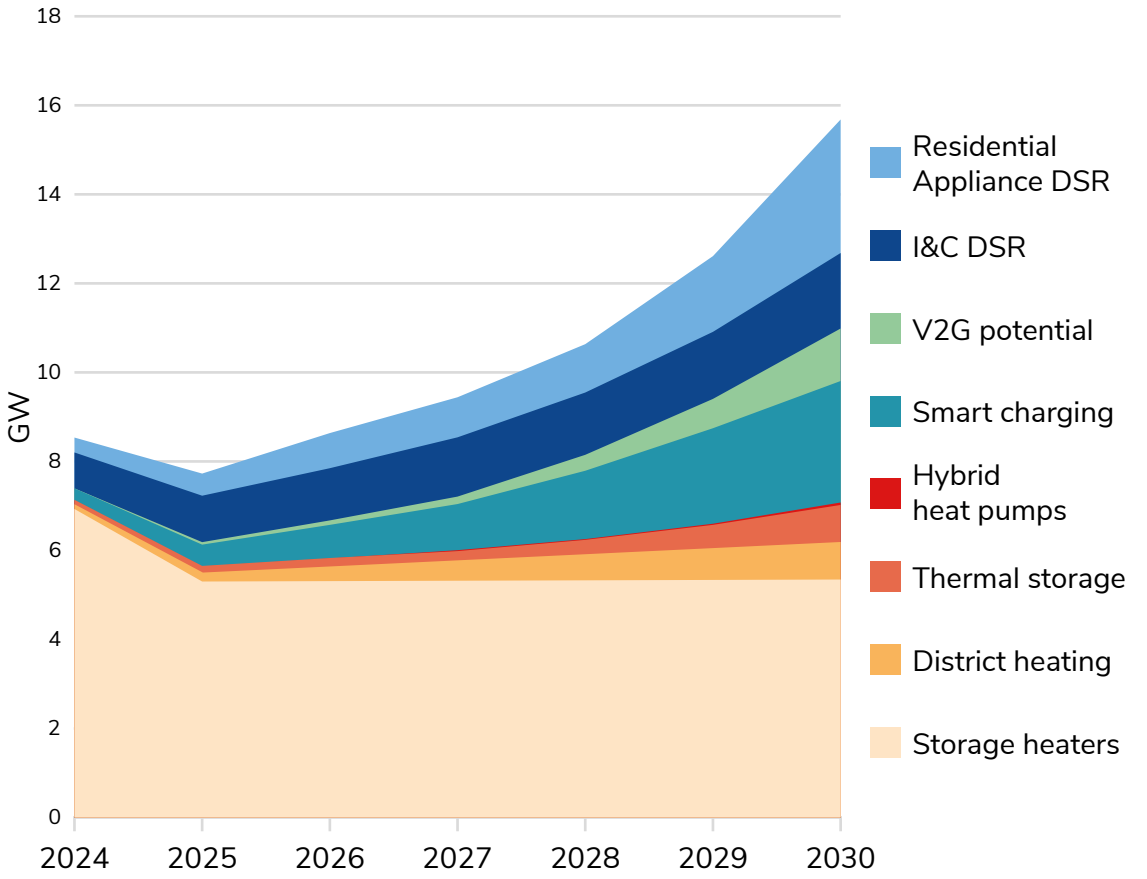

Figure 2. Consumer-led Flexibility (FES 2025 Holistic Transition)[22]

The actions in the Roadmap will need to be delivered quickly to help scale multiple sources of flexibility in the context of significant investment in generation and network build. This is challenging for consumer flexibility given that many of the underpinning actions have been slow to be implemented. In particular, the smart meter rollout remains sluggish, with technical connectivity issues, low consumer engagement and installation difficulties.[23] In mid-2025, 67% of domestic and small business meters were smart or advanced, with around 61% (35 million) operating in smart mode,[24] but the roll out has been delayed multiple times since 2011.[iv]

Similarly, Market-Wide Half-Hourly Settlement (MHHS), a key enabler of consumer flexibility through faster, more accurate electricity settlement, has faced repeated delays.

Making the Market

Flexibility service providers experience multiple barriers in accessing and stacking revenues across NESO, distribution and wholesale markets. Ensuring integration between markets will be essential to unlock the maximum potential of consumer flexibility.

iv Obligations on suppliers to install smart meters in domestic and non-domestic properties are likely to be extended, see https://www.gov.uk/government/consultations/smart-metering-policy-framework-post-2025/ and https://www.gov.uk/government/consultations/non-domestic-smart-meter-rollout-post-2025/non-domestic-smart-meter-rollout-post-2025-consultation-document-accessible-webpage.

Developments such as NESO's Demand Side Flexibility Routes to Market Review, Elexon's evolving role as Flexibility Market Facilitator, and modifications to the Balancing and Settlement Code to support aggregation[v] have all helped to make markets more accessible to flexible assets in 2025. NESO's Demand Flexibility Service became a year-round, in-merit tool to support system balancing with around 2 million consumers signed up last winter.[25]

At the distribution-level, DSO markets have grown rapidly,[26] but the locational nature of markets, limited price signals and market complexity has resulted in challenges in contracting sufficient capacity.[27] Progress is also underway on asset registration, data sharing infrastructure, consumer consent, interoperability standards and regulation for smart appliances, load controllers and tariffs.[vi] These initiatives are important to support the development of consumer flexibility markets, but it will be essential to ensure timely delivery throughout 2026 and beyond.

Consumer Engagement and Fairness

Despite these developments, much of the focus has been on technical, market and regulatory enablers with limited attention on how consumers engage with or experience flexibility. The government's July consultation on consumer flexibility engagement[28] was therefore a welcome step, but the focus on exploring the scope for an engagement framework by 2028 feels slow.

The market for flexible tariffs and services is developing rapidly with analysis suggesting close to 200 branded products and tariffs are now in the market.[29] Much of this innovation has focussed on asset-based tariffs, for consumers with EVs and heat pumps. While creating opportunities for asset owners to benefit from flexibility is important, and all consumers will benefit through lower system costs, this approach risks excluding consumers without flexible assets and those unable to change their energy use behaviours.

v Elexon has implemented various modifications to the Balancing and Settlement Code to support consumer flexibility. P415 supports independent flexibility aggregators to participate in the wholesale electricity market and P483 allows consumers with non-smart meters to participate in energy flexibility markets prior to full implementation of half-hourly settlement. See https://www.elexon.co.uk/bsc/mod-proposal/p415/ and https://www.elexon.co.uk/bsc/article/elexon-helps-more-consumers-to-trade-flexibility-offers/.

vi Through the government's Smart and Secure Energy System programme.

There is a need to ensure that low-income and vulnerable consumers are not left behind. Considerable learning is being generated on the barriers to consumers engagement. For example, the *Inclusive Smart Solutions Programme*, which concluded in 2025, highlighted key barriers for low-income and vulnerable consumers and proposed principles for equitable access.[30] These insights should inform future policy to ensure flexibility does not exacerbate existing inequalities. We welcome the *Warm Homes Plan*'s emphasis on supporting low-income groups to access flexible, low carbon technologies, but delivery and trusted communications will be key. Additionally, the outcomes of Ofgem's Cost Allocation Recovery and Review 20[vii] should be closely coordinated with consumer flexibility policy.

Uncertainties and Priorities for 2026 and Beyond

Despite good progress, several barriers persist for consumer flexibility. Going forward, priorities include:

- **Equity and Inclusion** – ensuring flexibility services are accessible and beneficial to all requires a framework for consumer engagement, with independent advice and support, and transparent data on participation. Explicit equity metrics could be adopted as part of the Clean Flexibility Roadmap.

- **Market Design and Regulation** – including finalising and implementing the Market Facilitator framework, aligning local and national flexibility markets, implementation of demand turn-up into NESO's Demand Flexibility Service, and ensuring retail market reforms enable innovation while protecting vulnerable consumers.

- **Digital Infrastructure and Interoperability** – ensuring interoperability standards and smart functionality are enabled through implementing the Smart Secure, Electricity Systems (SSES) programme of legislation, standards and licensing. As well as ongoing improvements to smart meter rollout and functionality.

- **Coordination**: consumer flexibility sits across many policies and organisations, requiring effective coordination. Interactions between national and local actors remain fragmented and there is a lack of clarity on how flexibility will be integrated into emerging Regional Energy Strategic Plans. Ensuring alignment, coordination and accountability across over 50 actions within the Roadmap will be vital.

While 2025 laid important groundwork, delivering widespread, equitable consumer flexibility will require sustained policy attention and cross-sector collaboration in 2026 and beyond.[31] As heat pumps, EVs, and other consumer technologies scale, they could either strain the system or, with strong flexibility, play a central role in reducing costs, supporting system operation and engaging people in the transition.

vii In July 2025 Ofgem initiated analysis of how energy system costs are allocated and recovered from consumers, including examining the current system of standing charges and unit rates: https://www.ofgem.gov.uk/call-for-input/energy-system-cost-allocation-and-recovery-review

Electricity Market Reform: UKERC's Contribution to the Policy Debate and the Decision on Zonal Pricing

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The Zonal Pricing Decision

One of the most closely-followed and hotly debated energy policy events of 2025 was a decision made in July[32] by the Secretary of State for Energy not to proceed with zonal pricing. Zonal Pricing (ZP) had been identified the previous year[33] as one of the more significant potential reforms to emerge from the three-year Review of Energy Market Arrangements (REMA), set up to make recommendations about how markets should be reformed to better cope with the needs of a low carbon system. ZP focused on one subset of these issues, namely problems with the current market arrangements in setting accurate locational signals for operational decisions (e.g. when to deploy particular assets in a given location) and investment decisions (e.g. where to build new assets). ZP aimed to address these problems by separating Great Britain's current single wholesale market

into different geographic zones, each with different prices determined by the balance of supply and demand in that zone. UKERC played a significant role in the final decision not to proceed with zonal pricing and instead to pursue a set of alternatives under 'reformed national pricing', providing evidence regarding the potential negative impacts on consumers of introducing ZP at this stage in the transition.

UKERC's Input to the Decision

UKERC provided independent analysis to feed into this debate through presentations to government and industry stakeholders, and culminating in the publication of a working paper and associated blog.[34] The analysis was guided by the following *a priori* observations:

- A key driver of the difference in wholesale prices between zones is the degree of network constraints between the zones. Prices will only be different if the flow of electricity between zones is constrained.
- Prices, as well as the volume of supply and demand in each zone, are therefore very sensitive to the future roll-out of the grid. Grid roll-out is a long-term phenomenon, typically taking 10 years or more to progress from plans to implementation.
- Growing challenges with levels of curtailment of wind farms in Scotland (forced reductions in volume of output) due to network constraints that prevent their power being exported to England during very windy periods, are the result of a decade of under-investment in the grid and ongoing work to maintain and upgrade the network.[35]
- In response to this and to facilitate a fundamental reorienting of the generation mix towards, often geographically dispersed, low carbon generation, very significant structural changes to the nation's electricity grid system are being planned via NESO's Holistic Network Design and Beyond 2030 Network plans.[36]

- Imposing changes to the market structures ahead of these planned changes to the physical structure of the system risks putting the cart before the horse, creating unstable price signals and uncertain sales volumes for generators. These risks could increase the investment costs for low carbon generation at a time when at least 20GW of new capacity of wind alone is needed to meet Clean Power 2030 (CP30) objectives. This could potentially bake in higher than necessary costs for consumers over the 15-20 year duration of renewables contracts, or deter investment and risk under delivery against the clean power targets.

- The issue of volume and price risk for renewable energy investors associated with uncertainty over grid roll-out appeared to be an under-researched element of previous cost-benefit analyses of the policy, and a useful area for UKERC to contribute.

UKERC's analysis involved running Strathclyde's 14-zone electricity system model set up to represent supply and demand patterns in a zonal market. We looked at different scenarios of network build-out to assess how uncertainty over the degree of transmission constraints between zones feeds through to volume and price risks faced by renewables investors. We then used a financial risk analysis tool to assess the degree to which these volume and price risks for investors could feed through to the costs to consumers.

Consumers are affected because these risks feed through to the price paid to investors under the contracts-for-difference (CfD) mechanism. These contracts are allocated through auctions, with upcoming Auction Round 7 and 8 expected to add significant capacity to the system ahead of 2030. Contracts in these auctions last for 20 years, so any uplift in prices bid into these auctions by project developers to cover additional investment risk would feed directly through to the amount paid by consumers.

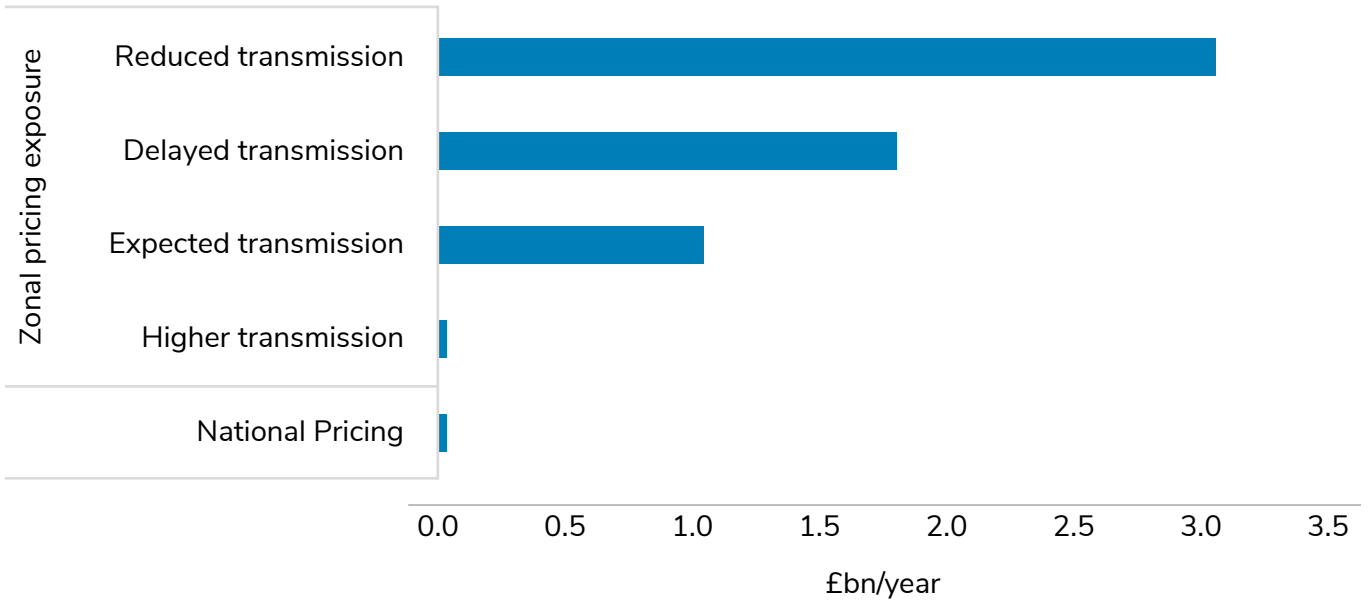

Figure 3. Cost of Uncertainty over Zonal Pricing

We estimated that the scale of this impact could be in the range of a £5-20/MWh uplift in the cost of a unit of electricity purchased by government on behalf of consumers in the upcoming auctions, depending on investors' view of transmission and volume risk. In the worst case, this would add up to £3bn in annual costs to consumers, which should be considered as part of a full cost-benefit analysis.

In the end, the decision not to proceed with ZP took investor risk impacts into account alongside multiple other considerations, including perceptions of fairness and equity for consumers associated with split geographical pricing for energy.[37]

UKERC's attention is now focused on providing further analysis and research into alternative reforms that could be made under reformed national pricing. UKERC has published a working paper reviewing alternative options for locational pricing within a national price market setting out a range of options for improving incentives for market participants regarding their investment and dispatch decisions, as well as options for improving the mechanisms that NESO uses for managing constraints and re-dispatch.[38]

UKERC also co-hosted with the UCL Centre for Net Zero Market Design a workshop involving industry and government stakeholders on what options might be prioritised under the new reforms. This provided options for improving locational investment decisions (including approaches to strategic spatial energy and network planning, transmission charging and planning reforms), as well as measures to improve operational efficiency of markets (including ways to shift location-related trades out of the balancing mechanism into forward markets, and maximising use of networks to reduce constraints). In other related work, UKERC's updated analysis on the "Pot-Zero" idea to reduce the impact of renewable support on consumers in the near term, highlighted potential savings estimated at between £2bn and £8 bn per year in the late 2020s.

Storing Energy with Biomass: a System Flexibility Solution

Mike Colechin and Keelan Colechin, Cultivate Innovation

The UK's National Energy System Operator (NESO) has identified that biomass can be used as dispatchable generation to "*help meet demand during times of low wind and solar output*", contributing to the delivery of a more resilient energy supply.[39]

NESO also quotes the Climate Change Committee (CCC), who identified bioenergy with carbon capture and storage (BECCS) as the "*best long-term use of scarce bioenergy resources*".[40]

A recent study co-funded by UKERC and the Supergen Bioenergy Hub sought to understand the implications of these perspectives from NESO and the CCC, drawing on knowledge from public, private and academic-sector stakeholders.[41] The study also explored the potential for sustainably produced biomass to act as a flexible, low carbon store of energy within the UK energy system, alongside the delivery of BECCS. This would build on the existing role of biomass as a source of low carbon dispatchable power (LCDP) within electricity markets, but also its function as a store of energy in gas, heat and transport fuel markets.

Large-scale deployment of renewable technologies for electricity generation, and to displace fossil fuels in the heat and transport sectors, is increasing the requirement for long-duration energy storage to accommodate seasonal and weather-related variations in wind and solar electricity generation. The solutions to this variability involve storing energy in different locations and in different forms across the electricity, heat and transport systems. In some industrial settings, this is leading to the development of hybrid systems that can use both renewable electricity and on-site stores of liquid or gaseous biofuels.[42]

A Cost-Effective Solution

The capital and operational costs of bioenergy are well understood. This knowledge could be used to deliver a lower-cost solution to the long-duration energy storage challenge, complementing other solutions. Smaller-scale biomass operations could also deliver both BECCS and a range of other system benefits, including flexibility and energy storage. In addition, new bioenergy plants designed to provide flexibility could do so with greater

efficiency.[42] Such plant improvements could, if realised, further increase the potential of biomass to deliver a range of value streams to plant owners and operators.

Bioenergy infrastructure and supply chains, such as seasonally harvested crops, waste wood and forestry by-products, currently store energy at scale over relatively long periods. There is the potential to use this energy storage to facilitate greater flexibility in the operation of heat, gas and electricity systems and markets.

The volumes of sustainably produced biomass currently available in the system are commensurate with the scale of need for long-duration energy storage, and there are operational assets that can use these resources to support the system.[42] Additional work is needed to establish the scale of this potential on a commercial basis and in the context of the wider economy.

Whole Systems Thinking

When considering the role of bioenergy in delivering both negative emissions and flexible stores of energy, a whole systems approach should be taken. Whilst the cost of energy production on any plant will be important to its commercial viability, the true value that the operation delivers must be considered in a whole systems context, including the role of appropriate policy and regulation.

The flexibility potential of biomass operations is diverse, but also geographically distributed. Smaller, distributed operations can support local economies, make efficient use of indigenous resources, and reduce waste. These small-scale operations could have greater political viability than some larger-scale options for long-duration energy storage.

Flexible operation could, however, have other impacts on sustainable biomass production. Incentivising energy storage without also incentivising increases in plant capacity could reduce the amount of bioenergy in the

system and have a detrimental effect on hard-won feedstock supply chains. Any decision that reduces the volumes or increases the price of biomass feedstock in non-BECCS applications could adversely impact supply chains. Any adverse impact on biomass production could in turn reduce the potential for BECCS implementation.

Implications of BECCS

When considering the development of BECCS operations, opinion is divided over whether BECCS plants could or should operate flexibly. There is a belief that creating negative emissions with BECCS is always the more valuable than delivering flexibility. In many contexts this needs to be challenged.

There are many uncertainties about the timing and availability of CO_2 transport and storage solutions; however, some small-scale biogas operations are ready now to deliver BECCS and could combine this with seasonal energy storage and flexibility. In addition to negative greenhouse gas emissions, these operations could provide both firm and dispatchable power to electricity markets whilst delivering similar energy storage services to heat, gas and transport fuel markets. With appropriate support, other smaller-scale operations could also be converted to deliver BECCS.

Future work will need to take account of the transition to BECCS and the relative value that both negative emissions and lower-cost energy stores deliver to the energy system. The two are not necessarily mutually exclusive but require policy frameworks and incentives that create commercial benefits from delivering both services to the overall system.

Policy Implications

All current uses of biomass within the UK energy system are shaped by Government policy, incentives and regulation. This creates opportunities and challenges for Government whose actions will play a key role in setting the future direction of bioenergy.

Government plans, such as Clean Power 2030, stress the need for strategic long-duration flexibility, and LCDP.[42] Bioenergy is cautiously discussed as an option for providing this flexibility in documents such as the CCC's 7th Carbon Budget[43] and the previous Government's Biomass Strategy.[44] However, some bioenergy solutions are given more attention than others in this regard, with biomethane being discussed as a promising LCDP option in both the Biomass Strategy and NESO's most recent Future Energy Scenario documents.[45]

While this storage and flexibility potential is recognised, current incentives and regulations do not encourage flexible use of biomass. Schemes such as Renewables Obligation Certificates (ROCs) effectively incentivise baseload bioenergy operations, an antithetical approach to encouraging flexibility. Some plant operators also cite regulatory challenges surrounding biomass storage as a barrier.

There is significant uncertainty in the sector surrounding the future direction of policy and support for bioenergy, leading to a lack of investment in new or existing infrastructure. Greater flexibility of operation will be unlikely without such investment. This uncertainty could, in part, be due to the pressures being placed on Government to reduce overall consumption of biomass due to sustainability concerns.

Despite these challenges, there are opportunities for Government to support a more flexible use of bioenergy resources. Incentive mechanisms, such as a capacity market for bioenergy plants, could financially facilitate the use of biomass as a long-duration store of energy. A strategic policy vision for the flexible use of bioenergy could help establish confidence in the sector and attract necessary investment. Additionally, new regulations around key areas like biomass storage and commoditisation could help to enable such operations. Core to all of these will need to be new guidance on biomass sustainability, to both manage public concerns and ensure net environmental benefit from bioenergy use.

Further research and development work is needed to provide additional evidence to support these findings, but also to shape the policy and commercial models required to realise the lower-cost energy storage potential of bioenergy.

The Financial Perils of Gas Network Decline

Louis Fletcher, University of Warwick

By any measure, Great Britain's gas network is one of the country's most critical pieces of infrastructure. It conveys the gas supplies arriving at Britain's shores – from the North Sea, at Liquid Natural Gas terminals, and interconnectors with Europe – across the country via 288,000km of pipelines.

Britain remains a profoundly gas-dependent country, and this vast latticework of pipelines supplies 2.5-3 times as much energy as the electricity grid each year.[46]

During the transition to net zero, declining gas customer numbers will remove the network's source of revenues, even though we will continue to rely upon it to provide essential supplies to homes, industry and power plants. Over the last year, this predicament has loomed over preparations for the network's next price control period (2026-2031), known as 'RIIO-3'. The ensuing discussions have made clear the limits of the post-privatisation regulatory regime administered by Ofgem, and there is now an urgent need for new thinking. What policy framework can best support the decline of the gas network?

The Gas Stranding Crisis

The gas grid is financed via a 'Regulatory Asset Base' model developed in the 1990s for newly privatised utilities. When network companies make capital investments to upgrade and maintain the gas grid, these investments are added to their 'regulated asset value' along with a permitted return on investment. Companies then recoup this value from bill-paying customers over a 45-year asset lifetime on a front-loaded basis. A feature of this framework is that companies finance investments by raising debt, then use their revenues from billpayers over time to pay off that debt to outside (bond) investors and fund dividends to internal (equity) investors.

This model was not built with net zero in mind.

First, recovering capital expenditure from customers over multi-decade asset lives breaks down when the network is on a path of terminal decline. If there are no customers left on the network in 2050, whatever quantity of investment is scheduled to be recovered after that date (£4 billion and growing) will be lost.[47] Similarly, a system whereby gas network companies finance investments through the issuance of debt on the promise that they can pay it off with proceeds from future bill payers will not work in the 2040s when the customer base is vanishing. Together, this is the problem of *stranded assets*.

Second, when the gas industry was privatised, there was no effort made to allocate responsibility for its end-of-life liabilities. In the offshore oil and gas industry, there is a robust legal framework of 'serial liability' assigning decommissioning costs to past and present operators. Prior to their privatisation, the nuclear industry's liabilities were spun off into a decommissioning fund that is co-financed by the state and industry, while the coal industry's liabilities were separated into a state-funded Coal Authority. In the case of the gas network, nothing was done. We are now facing two huge liabilities. First, the cost of disconnecting twenty-four million customers from the gas network at a unit cost of £1,150-£1,450,[48] computing to a total liability of £28-£35 billion. Second, the cost of digging up the gas network and making it safe for permanent abandonment, which the engineering consultancy Arup estimated could cost a further £25 billion.[49] Yet there is no legal framework assigning responsibility for such a national retirement programme. This is the problem of *stranded liabilities*.

Ofgem's Proposed Solution

Ofgem, the independent energy regulator, only has limited powers – it is not a policy-making entity – and so its response to this stranding crisis is timid by design.

The core of its solution is to accelerate the timetable along which investments are recovered from billpayers so that the industry's regulatory asset value is paid off by 2050.[50] In effect, costs will be recovered by raising bills while the network still has a large customer base. This will be introduced for RIIO-3 (2026), but with two major caveats. It will not apply to the national transmission system at all, and in the case of the distribution system, it will only apply to new investments.

This will help to lessen the scale of the regulatory asset value left to be paid off in the 2040s. But, even putting aside the fact it only applies to new investments in the distribution network, it does not resolve the problem of stranded assets.

As recent modelling by SGN and Citizens Advice (Figure 4) has shown, the whole financing model will break down in the 2040s, regardless of depreciation rates.[51] Customer numbers will fall faster than the rate of investment needed to maintain the network. This is because segments of the gas network can only be retired when all customers have been disconnected, meaning that large sections of the network will have to be maintained for the sake of relatively few users. Even if all past investments into the network have been paid off, new investments still need to be financed and recovered from a customer base that will shrink towards zero in the 2040s.

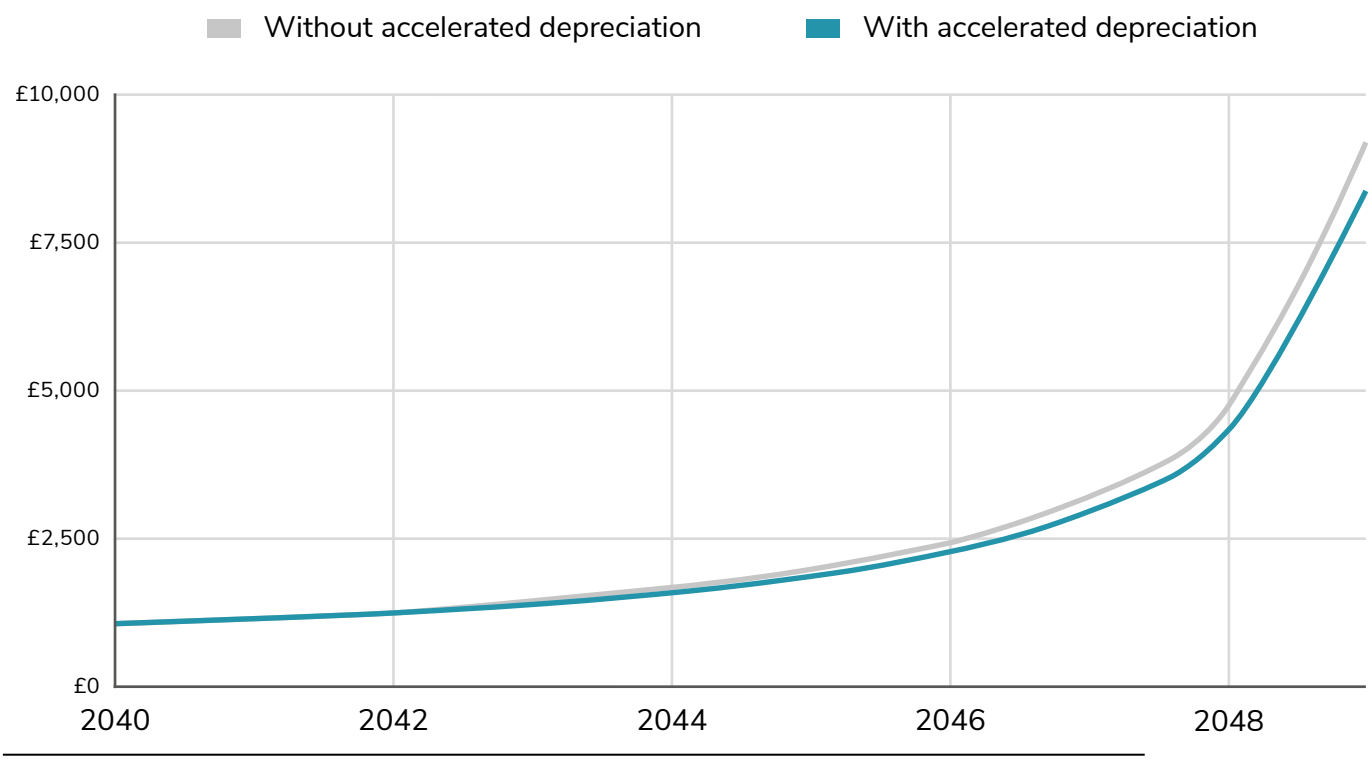

Figure 4. Effect of depreciation on gas bill value Source: Citizens Advice, 2025, The Great Gas Switch Off.

At the same time, the more bills are raised, as network costs are spread across a smaller and smaller pool of customers, the more likely customers are to exit the network – forcing remaining households to bear even more of the costs. This could become a self-amplifying death spiral for the network. It is those least able to leave the gas network (low-income and rental households, and residents of multi-occupancy buildings) who would be most likely to bear the brunt of spiking bills in the 2040s. This is clearly a politically and morally unsustainable scenario. Gas distribution companies fear that if Ofgem's solution to the recovery of their investments depends on the fulfilment of this crisis, it cannot be credible.[52] Surely, something will have to be done to avert this crisis.

It is unclear whether Ofgem has the powers to do anything about the stranded liabilities problem. It is currently conducting a review into the gas disconnections framework, which will help clarify a confusing situation where customers have two parallel routes to disconnect: a self-funded 'voluntary' route, and a free 'health and safety' route whose expenditure is added to network costs and charged to the entire remaining customer base.[53] Neither option is sustainable when scaled. Charging users on exit undercuts the transition to heat pumps and the government's own subsidies. Charging the remaining gas customer base only magnifies the problems raised by asset stranding. The option most favoured by respondents to Ofgem's consultation is for the government to step in and nationalise the costs.

The state will, ultimately, have to rescue the situation. In its June update on the midstream gas system, the Department of Energy Security and Net Zero (DESNZ) note the "*challenges*" of accelerated depreciation, touting its intent to explore "*credible long-term alternatives to support cost recovery*" ready for the RIIO-4 price control period (2031-2036).[54] Awkwardly, therefore, while Ofgem is proposing accelerated depreciation as a solution for RIIO-3, it is having to caveat that it is ready to "*adapt*" to the outcome of the government's review for RIIO-4.[55] DESNZ

promises a series of consultations and calls on the future of the gas system over late 2025 and 2026.

Reimagining the Gas Network

The post-privatisation regulatory regime cannot deal with the gas network's stranding crisis. What is now urgently required is a wide-ranging debate on the future of the gas network in pursuit of an overarching strategic vision of how the state can act to simultaneously solve all of the interlocking problems of gas network decline at once.

The state will have to bailout the gas industry in one form or another, absorbing disconnection costs, establishing a decommissioning authority, and underwriting the recovery of investments. The policy question is how to design this bailout to minimise the costs borne by tax and bill payers. This can be done in three ways. First, the lower the investment in the network between now and the point of retirement, the lower the costs at risk of stranding that need to be recovered. Investments to continue physically and digitally upgrading a declining gas network – the gas network's baseline expenditure has risen to £17.8 billion for RIIO-3 – could be pared back.[56] A planned area-by-area approach to system retirement could avoid having to keep large stretches of pipeline online to support a scattering of residual customers. Second, if government debt and/or guarantees were used strategically, billions could be saved on corporate debt interest rates and equity risk premiums, and used to seed a decommissioning fund. This could involve government debt, debt raised via the government-backed securitisation of future electricity bills, and state guarantees on investment recovery. Third, though challenging, the state could attempt to reach a quid pro quo settlement with gas network companies on a conditional bailout, where state support is offered in exchange for contributions to a decommissioning fund.

Securing Materials for Clean Power: Strategy, Geopolitics and Implementation

Gavin Bridge, Durham University and Natalie Ralph, University of Warwick

The UK's Clean Power Mission needs minerals and metals for its delivery. Growing demand across energy, defence, manufacturing and AI have led governments around the world to designate certain minerals as 'critical' and launch strategies to secure supplies.

The UK government released a new Critical Minerals Strategy in November 2025. Policies and tools are now needed to implement the strategy and navigate a dynamic geopolitical environment. Assertive action by allies and competitors towards critical minerals requires UK statecraft to be agile and ambitious, aligned with international partners, and attuned to stakeholder demands.

Clean power, energy storage and electrified heat require critical minerals.[57] The global production and processing of these minerals is geographically concentrated: the top three countries now account for 86% of production across 20 minerals (up from 82% in 2020).[58] China has built up significant processing and refining capacity and is now the dominant producer for many critical minerals. Supply chains are vulnerable to disruption as producer countries seek to harness their position to enhance national economic development or achieve geopolitical leverage. Congo, for example, banned cobalt exports in February

2025 in a bid to secure higher prices. China introduced new export controls on rare earths in April 2025 and extended them in October as part of an escalating trade war with the US. Dominant mineral producers are also able to use their market power to scupper investment in alternative sources of supply. With the UK's ambitions around clean energy, advanced manufacturing and defence anticipated to accelerate demand for critical minerals, the need for an updated national strategic perspective is clear.[59]

Features of the Critical Minerals Strategy

The new Strategy targets the 34 minerals on the UK's Critical Minerals List, defined by their current importance to the UK's economy and vulnerability to global supply risks. It also targets a set of 'growth minerals' associated with anticipated demand in sectors targeted by the government's Industrial Strategy (e.g. copper and uranium). Its primary objectives are to secure supplies of critical and growth minerals by "*optimising domestic production*" and "*building resilient UK and global supply networks*" working with international partners. The Strategy quantifies these goals: by 2035, 10% of industrial demand for critical minerals (in aggregate) is to be met through domestic production (lithium has a specific target of > 50,000 tonnes); 20% via product recycling; and no more than 60% of demand for any critical mineral is to be met by imports from one country.

To support these objectives, the strategy proposes a new 'demand aggregation platform' to map UK demand for critical minerals at a relatively granular level. This could help the UK attain international long-term offtake agreements and facilitate responsible supply chains, but timelines for implementation, funding commitments and other key details are needed. The strategy also makes critical minerals projects eligible for several existing sources of public finance and provides an additional £50 million in support.

There are some ambiguities within the current strategy document. It is unclear whether the £50million of public money is an annual

commitment or (a far less compelling) total over the Strategy's 10-year horizon. While advocating the UK "*make the most of its mineral deposits*", the strategy says little about new exploration or prospectivity: it largely assumes UK's production potential is defined by *existing* sites. It is unclear whether national percentage targets (for domestic production and recycling) are to be calculated by value or weight. This matters because the list of critical and growth minerals includes bulk materials measured in hundreds of thousands of tonnes (like iron and copper) alongside other minerals used in fractions of these amounts (like niobium and gallium). If measured by weight, potentially both the 10% and 20% targets could be met by action on just one or two minerals (e.g., scrap steel recycling).

The inclusion of a product recycling target is welcome – clean power technologies and battery energy storage present opportunities for materials circularity[60] - although few specifics are provided. Government will publish a cross-sectoral Circular Economy Action Plan in Spring 2026.

A Need Now for Implementation

Attention must now turn to developing the policies, tools and the 'statecraft' required to implement the strategy's objectives.[61] Four things will be key to implementation. First, UK statecraft around critical minerals must be *agile* so it can respond to the dynamic geopolitical landscape and disruptive technological trajectories characteristic of critical minerals.[62] There has already been innovation in UK public finance around critical minerals – such as UK Export Finance's Critical Minerals Supply Finance (2024) and Critical Goods Export Development Guarantee (2025) offerings – and further adaptation will be needed. Other governments secure supply using a wider range of financial tools (including offtake agreements, stockpiling and overseas equity participation) and demonstrate a greater appetite for risk.

To be competitive, UK policies need to be *ambitious*, given the scale of strategic action elsewhere on critical minerals. China's control over production and refining dominates the

geopolitical landscape, but US government intervention is transforming the geoeconomics of mineral supply. Trump's One Big Beautiful Bill rolled back Biden-era demand-side support for clean energy but also injected significant public capital into critical mineral support – including $2bn to boost US mineral stockpiles, and $5bn for investments in supply chains via the Industrial Base Fund.[63] A landmark deal with MP Minerals made the US Department of War the largest shareholder in this rare-earth producer, committing the Pentagon to 100% offtake and a 10-year price floor. The EU has also raised ambition on critical minerals, announcing 60 strategic projects inside and outside its territories (e.g., Tungsten West in Devon) and the RESourceEU Action Plan to accelerate the objectives of the Critical Raw Materials Act.[64] Ambition and agility are required just to stand still: this year a flagship rare earth refinery shifted its UK investment to the US, and a UK manufacturer of rare earths metal was sold to US investors.

Greater *alignment* with international partners is necessary. The UK lacks a continental-scale geography from which to source the range of materials it needs (unlike the US and EU) and the financial capacity to go it alone. Partnerships can leverage UK strengths - including a highly capable Geological Survey, major financial markets, and reservoirs of technical and developmental know-how - and the UK's role within multilateral initiatives such as the G7's Critical Minerals Action Plan and NATO's new stockpiling project.[65] Beefing up bilateral arrangements, however, will be essential. Outline agreements and "*priority partners*" have already been established (the Strategy identifies the US, EU, Canada, Australia, Saudi Arabia, India and Japan) and coordinated alignment and bold diplomacy are now needed to yield real impacts on UK supply chains.

Finally, statecraft around critical minerals needs to be *attuned* to stakeholder demands along the value chain. Critical mineral supply chains are more than conveyor belts for securing materials or the technologies in which they are embedded.[66] They distribute revenues and risks, and present opportunities to reduce (or exacerbate) social inequalities. UK public money is being used to facilitate mining and industrial projects - and more may be required - but taxpayer support for these activities is not guaranteed. Addressing the socio-economic and environmental aspirations of workers and communities along the value chain - within and beyond the UK – will be an increasingly important component of statecraft and central to the sustainability of UK critical mineral supply chains.

Energising Participation? Responding to the UK Government's Climate and Nature Public Participation Plan

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On 3rd December 2025 the UK government published its long-awaited climate and nature public participation plan: *Energising Britain: Your voice in our Clean Energy Superpower Mission.*[67] In joining the existing climate public engagement strategies of the Scottish[68] and Welsh[69] governments, this marks a potentially significant moment in recognising the importance of, and developing a coordinated national approach to, public participation in addressing climate and environmental issues.

The government's new plan[67] has three goals: first that "*People have the facts and understand the scale [and] pace of change*", second that "*Policies are responsive to people's needs [and] are trusted*", and third that "*People have the information and resources that they need*". This is underpinned by five principles to: *communicate* the action being taken, *listen* to people and communities, *enable* households to enjoy the benefits, *grow* people's access to low-carbon technologies and choices, and *collaborate* to inform and inspire climate and nature action.

The UKERC Public Engagement Observatory[70] is pleased to have informed and contributed to the plan's development. This has included roundtables with UK Government departments, Ministers, Chief Scientific Advisers and The British Academy,[71, 72, 73] an ongoing collaboration and knowledge exchange with the Department for Energy Security and Net Zero (DESNZ)[74], and working in partnership with Natural England to establish a Public Engagement Laboratory.[75]

The Observatory[76] has demonstrated the importance of taking a whole-systems

approach to public engagement,[77] evidencing the diverse, existing and ongoing ways that people are engaging,[78, 79, 80] and improving how decision-makers and participation processes respond to this.[81, 82] Overall, the government's new public participation plan makes some good progress. The Observatory's work highlights areas where it can go further and offers pathways to support its delivery.

Diversity and Difference

An essential ingredient for the successful delivery of the plan will be recognising the diverse ways that publics can and do engage with energy, climate and nature. The plan shows progress in this respect but can go further. The emphasis is on communication and information provision which forms the focus of two of the three overall goals, and on invited public engagement through deliberation, social research and behaviour change. This relatively narrow view assumes an uninformed and disengaged public that government needs to energise to "take *people with us*".[67]

Communication and invited engagement are necessary. However, what is largely missing from the plan is recognition of and ways of evidencing the diverse, existing and ongoing public engagements with climate and nature where people are already energised.[77, 78, 79] There is important reference to community energy and community-led engagement at the local level, and some acknowledgment of the experience and expertise of publics, but many other existing and citizen-led engagements are left out.

For example, a major elephant in the room is how the plan ignores public engagements that take the form of opposition, resistance, protest or dissent. While such engagements have always sparked into being around energy, climate and nature actions, they are further intensifying through the rise of anti-net zero sentiment and resistance.[83]

Despite this, the plan focuses almost exclusively on 'positive' or supportive engagements. To be effective and 'trusted' it needs to establish ways of recognising more challenging and oppositional engagements, understanding the public issues and concerns they raise, and responding to them.[84,85,86] More broadly, the plan will need ways of handling difference, disagreement and controversy which are always present in climate and nature action.[87]

While the government's proposed annual 'Energising Britain' event promises to broaden the evidence base beyond its standard behavioural and social research capacities by highlighting "*community-led climate and nature action*"[67], a discrete event like this is unlikely to be sufficient. Evidence of diverse existing engagements from across systems on an ongoing basis is also required, as demonstrated by the UKERC Observatory,[70,76,80] the Public Engagement Laboratory with Natural England[88], and recommended in Defra's 2022 *Review of Public Engagement*.[89]

Listen and Respond

The plan's second principle - "*listen to people and communities so their voices guide what we do*"[67] – is a crucial and often missing component of public participation.[77,90] This was a challenging part of the evidence provided to government, so it is significant to see a commitment to "*listen to the views that people have provided*" so "*the government can make policies that are more responsive to their needs*".[67] Responsiveness is crucial but is easier said than done. The real challenge will be putting this into practice to demonstrate how decisions and policies made by government and others are being energised by diverse public participations. Our work suggests some ways forward.

In listening and responding to public engagements it is imperative that government and other decision-makers are transparent in explaining where, how and why public views or actions have been taken into account or not.

This latter step does not routinely occur, is not emphasised in the government's plan, but is essential to "*building trust and legitimacy*".[67, 84, 85, 86, 90] As is the need to listen and respond to the diverse existing engagements highlighted above and the additional societal concerns, values and solutions they raise.

Taking this forward will require a concerted effort to develop new processes and tools for listening and responding to public participation and making this publicly accountable and transparent. Through showing leadership in demonstrating these new mechanisms government can further energise the responsiveness of other climate, nature and energy decision-makers to ongoing public engagements. Collaboration experiments undertaken by the Public Engagement Observatory and the Natural England Public Engagement Lab also provide examples of how this can work in practice.[74, 81, 82, 88]

A Whole-Systems Approach

UKERC's Observatory has developed a whole-systems approach to public engagement[77] and in our most recent national mapping report[80] we set out recommendations for taking this forward in practice. Several aspects of the government's plan speak to a more joined-up and systemic approach. These include a commitment to "*working across government departments*", how the plan itself "*can be a resource*" for others, how it "*builds on a wide range of activities already taking place*", involves government "*teaming up with people and organisations*", and harnessing "*data and insight that comes from local and community-led engagement*". [67]

These are all welcome developments. As is the commitment to launch an internal Climate and Nature Participation Hub to build capacity and help policymakers. However, as experienced with Natural England[88], there is a need for such entities to go beyond guidance and best practice in individual engagement methods and be outward looking to serve actors across a wider system of participation. This points to additional elements and entities that will be needed in both implementing the government's plan and energising a more systemic approach nationally[80], including:

- The maintenance and use of evidence and datasets of existing public engagements across wider systems.
- Ways of organising, connecting and joining up public engagements and responses to them across organisations, disciplines, places and scales.
- New organisational entities and capacities to enact these more cross-cutting and systemic approaches to participation.
- A monitoring and evaluation framework that is currently missing from the plan, which should go beyond evaluating discrete engagement processes in isolation to consider what is an effective system of public participation and engagement.
- Arrangements and processes for government and other decision-makers to access social science insights and expertise on public participation on an ongoing basis.[91]

The government's new public participation plan is an important and promising start but, as we have argued, there are areas where it needs to go further as it moves to delivery. We see these as opportunities for the UK government to show innovation and leadership in public participation and how it is responded to. We look forward to continuing our collaborative work with government, other organisations and publics to energise a national system of climate and nature public participation that truly works with and for society.

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