

**Written evidence submitted by Professor Thiemo Fetzer
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SUMMARY

1. Professor Fetzer's data-based research has created an empirical framework for measuring the energy savings potential and quantifying the cost and benefit analysis of energy savings investments in the UK.
2. His analysis shows that the Energy Price Guarantee (EPG) disproportionately benefits well-off households as the reduction in the unit rate relative to market prices disproportionately benefits households with higher levels of energy consumption; and this advantage is skewed even among high-earners. Modifications to the tariff structure, incorporating higher charges for usage beyond a certain level, would enable subsidies to be better targeted and incentives to be sharpened.
3. His analysis also highlights that the UK has a large and untapped energy savings potential: England and Wales alone could save up to 29% of primary energy consumption in the residential sector through reduced electricity and natural gas consumption used for space heating and hot water generation if residential properties were upgraded to their highest energy efficiency standard – primarily through improved insulation measures. However, the EPG weakens incentives to invest in energy efficiency upgrades by around 30%.
4. Energy efficiency upgrades would provide permanent financial relief to households and offer large environmental benefits. Energy efficiency investments could permanently lower CO2 emissions which itself has a large present and future monetary value as carbon taxes are set to increase energy prices going forward. It should also be stressed that energy savings investments could pay for themselves within a relatively short period of time especially if carbon taxation was expanded to heating fuels.
5. It is important to highlight that the UK government, unlike governments in other countries, actually has at its disposal much of the data needed to ensure timely, targeted, and cost-effective interventions. With these data, there are broad sets of alternative policies that could be considered, as discussed in more depth in the submission.
6. It is imperative to build more evidence to understand why existing schemes have not been successful in achieving scale on energy-saving measures, in order to assess in greater depth how to target support.
7. Professor Fetzer would be glad to discuss his work with the Committee or to give oral evidence if the Committee would find that helpful.

Introduction

1. This submission is made on behalf of Professor Thiemo Fetzer and his research team, based in the Department of Economics at the University of Warwick.
2. Professor Fetzer is developing research focused on the energy- and climate crisis¹. The energy crisis aligns three societal objectives in the single policy dimension: energy savings. Well-targeted energy savings will help households achieve lower energy bills, contribute to saving the environment through lower CO2 emissions and at the same time, provide material national security benefits by reducing the UK's dependence on energy imports from overseas.
3. This submission also reflects the research contributions of Dr Ludovica Gazzè, Assistant Professor at the University of Warwick. Dr Gazzè is an environmental and health economist² researching urban policy issues.
4. This submission is based on previous and ongoing work by Professor Fetzer, Dr Gazzè and their team on the energy crisis, and addresses questions 1 and 6.
5. The analysis is informed by Energy Performance Certificate data, available for some 50 per cent of the UK's building stock, and actual energy consumption data at a granular level available through the UK's National Energy Efficient Data Framework (NEED)³.
6. The researchers have built a dataset that allows them to model the impact of the energy price shock across households for around 50% of the UK residential housing stock down to the property level; to simulate effects of different energy price scenarios or policy choices; to quantify the hidden energy savings potential; to evaluate and design policy proposals ex-ante, and to develop a framework to evaluate policy impacts in real time.
7. *In brief, Professor Fetzer's analysis concludes that the scheme as designed means that the UK government is missing an opportunity to fast track an equitable climate transition and is unnecessarily costly.*
8. *The EPG as implemented is fiscally costly, disproportionately benefits the better off, and weakens incentives to save energy in the short and longer term.*
9. *It is recommended that the government adopt a more targeted approach to supporting households. A two-tier energy tariff, while not the best from a pure economics standpoint, is perhaps the most immediately achievable in the UK, working with local authorities and integrating several data sources. Alongside this the Government should consider a targeted programme of measures to cut energy use, incentivised through a time-limited system of means-tested grants and tax deductions that are ideally clawed back through a change in property taxation (capital gains and stamp duty). The scheme as currently designed could be replaced by creating a consistent policy approach that pursued two main aims:*

¹ <http://www.trfetzer.com/climate-crisis-research/>

² <https://sites.google.com/view/ludovicagazze>

³ Fetzer, T., Gazzè, L., & Bishop, M. (2022). [How large is the energy savings potential in the UK? CAGE Working Paper.](#)

supporting energy-poor households in weathering the energy crisis and supporting the government's ambitious net-zero strategy.

Q1: The design and operation in practice of the Energy Price Guarantee Scheme and Energy Bill Relief Scheme

10. The EPG is a major intervention in energy markets. Its two components are a standing charge paid by all connected households, and a unit rate. The aim of the EPG was to ensure that an average household would not pay more than £2,500 per year for electricity and gas.

11. The EPG allowed a significant increase in the standing charge in line with OFGEM's 2022 recommendations, but capped the unit rate at a level notably lower than OFGEM's recommendation.

12. This resulted in a scheme which is fiscally costly, untargeted, and disproportionately benefits the better off, whilst also lowering incentives to save energy in the short and longer term.

13. In more detail:

- i. **The EPG disproportionately benefits well-off households:** the uniform increase in the standing charge increases the financial burden for households regardless of consumption, a burden disproportionately borne by lower income households; while the reduction in the unit rate disproportionately benefits households with higher levels of consumption – typically the better off⁴. Income is one of the strongest drivers of energy use. This is an insight that can be derived from data that is held within BEIS.⁵
- ii. **Even among households set to benefit most from the EPG there are large inequalities:** Even among the highest earners the EPG vastly benefits a small group. There are an estimated 280,000 households with an annual income above £150,000. A small group of 14,000 households among this group of high-income households is set to benefit more than twice as much from the EPG compared to the nearly 50% of all other households in this high-income group⁶. These super-consumers benefit most from the EPG, relative to the OFGEM unit price cap⁷.
- iii. **The EPG weakens incentives to invest in energy efficiency upgrades by about 30 per cent:** by lowering consumer prices relative to market prices, the EPG weakens the incentive temporarily to save energy by cutting energy consumption, and also negatively affects incentives to permanently lower consumption through investing in energy efficiency

⁴ Fetzer, T., Gazze, L., & Bishop, M. (2022). [Beyond the Energy Price Guarantee. With or Without?](#) Cage Policy Briefing no 39

⁵ See Figure 1 in policy briefing.

⁶ Fetzer, T. (2022) [The Government's Energy Price Guarantee is Subsidising High Carbon Lifestyles – Byline Times](#)

⁷ See Figure 3 in policy briefing.

upgrades. This disincentive effect is particularly concentrated in areas that are quite affluent with high property prices and high incomes.

- iv. **Households with the highest energy consumption levels are least encouraged to make energy saving measures:** analysis of EPC data shows that among the households in the top ten percent of energy use, energy efficiency upgrades could save 1/3 of this overall consumption, while a household in the top 5 percent of consumption could realise savings of more than 7,500kwh per year – three times higher than the potential energy savings of the average household in England and Wales.⁸

14. Another flaw in the EPG is the lack of involvement of local councils. Conversations with local councils during the research into this issue have highlighted that despite more closely understanding the needs of the population, local councils feel underfunded and under-supported to help with the transition to net zero. National government programmes can sometimes miss important population subgroups, such as rural, rental, and middle-income populations.
15. A broader and more coherent strategy is needed, under which the national government works with local authorities. Community-level strategies could also help the government support households on their journey towards energy efficiency. Research in this area shows that first-hand experience and word of mouth can go a long way to convincing people to adopt green investments, while communities joining together for larger projects such as solar panels might help reduce costs.

Q6: The options government is considering for future schemes.

16. The research has demonstrated that the EPG as currently designed and implemented is regressive and stifles price signals that would otherwise encourage energy saving measures.
17. A more effective use of public money in the long term would be an energy policy designed with two main aims in mind:
- supporting energy-poor households in weathering the energy crisis, and
 - supporting the government's ambitious net-zero strategy.
18. It is therefore recommended that any new policy should follow four tenets:
- i. **Preserve price-signals to encourage energy savings and investments in energy savings** - this is important to anchor public's perceptions of the value that permanent energy savings have in a world with higher energy price
 - ii. **Provide targeted financial relief for households without the financial means to cover increased energy bills** – this is important for social

⁸ Fetzer, T., Gazze, L., & Bishop, M. (2022). [How large is the energy savings potential in the UK? CAGE Working Paper.](#)

cohesion to improve societal resilience and broad support around the Net zero target

- iii. **Provide targeted incentives to homeowners, housing associations and local councils to make building upgrades in order to exploit the UK's large and untapped energy savings potential** – this will achieve permanent changes in the level of energy use, but needs to be soundly evidence-based.
- iv. **Tackle constraints on investment in energy saving – skilled workforce shortages, outdated planning constraints and lack of economies of scale** – efficient mitigation of supply side constraints requires on-the-job-training, encouraging local economies of scale and the two can work together if incentives are right for households to coordinate action.

Tenet 1: Preserve price signals to encourage energy savings and investment in energy efficiency

- 19. In economics, prices convey information about scarcity, and influence consumer decisions.
- 20. By artificially lowering the cost of energy consumption, relative to market prices, the EPG distorts incentives to invest in energy savings. The analysis finds that the EPG weakens energy savings investments by around 30 per cent. A replacement scheme should be designed in such a way as to avoid this pitfall. A two tier tariff in which consumption beyond a certain level is charged at a higher rate is not best, but would preserve price signals for consumers with highest energy use who are also more likely to be able to finance retrofits. A move to a variable price cap or a scheme as implemented in Germany⁹ that leverages the tax system to make it progressive should be the longer term goal, but requires significant investment in data processing and handling capabilities across tiers of government.

Tenet 2: Provide targeted financial relief for households without the financial means to cover increased energy bills

- 21. Targeted support measures need to preserve price signals but also be practical to implement in a UK context and easy to understand by householders.
- 22. From an economic standpoint, one of the best approaches has been put forward by a German economic expert panel and has been adopted by the Scholz administration. This effectively allows the energy prices to increase without a cap, which preserves the energy savings incentives that a high price signals to consumers. At the same time the scheme provides a lump sum transfer of support to households that is set to subsidise up to 80% of last year's energy consumption. High earning households have to pay income tax on the transfer payment so it becomes highly targeted, preserving the energy savings incentives and avoids the untargeted handouts to higher income earners that also happen to

⁹ [The final details of Germany's €99 billion energy support scheme – EURACTIV.com](https://euractiv.com/en/energy/energy-policy/germany-99-billion-energy-support-scheme)

live in real estate with most energy saving potential.

23. This is, however, a complex system which may be difficult to explain to consumers/households, and for which the necessary data may not be readily available in the UK¹⁰. A two-tier tariff, while not being the “best” from an economics standpoint, is a medium term compromise. It could be tied to other metrics but that requires more visibility and more data.
24. The two- tier tariff presented in *Beyond the Energy Price Guarantee. With or Without?* Cage Policy Briefing no 39 briefing paper¹¹ has been designed with a similar cost to the EPG but would be better targeted and result in an estimated 12.7million households being better off than under the EPG.
25. Its key features are: a two-tier tariff wherein the standing charge would be fixed at the level of the October 2021 price cap, as would unit prices for the first 9,500 kWh of natural gas consumption and the first 2,500 kWh of electricity consumption. As 50% of UK households consume less than 12,100 kWh of natural gas and 2,900 kWh of electricity, this would drastically limit energy price increases for the bulk of households.¹² The second tier of the energy tariff would be set at steeper levels which could be aligned with the EPG. For example, a second tier unit price of 20 pence per kWh for natural gas and 60 pence per kWh for electricity, together with the first tier described above, would have a similar cost to the government as the EPG.
26. This would offer a much more progressive path to preserve and strengthen energy savings in the groups where those savings are most easily found.
27. By using public data the researchers have been able to create a data set allowing them to model the impact of the energy price shock across households for around 50% of the UK residential housing stock down to the property level, and to quantify the potential energy savings available. With access to anonymized individual level meter data that is held in BEIS, linked with other admin data, it would be possible to evaluate policy proposals with much more precision for the near universe of households. It is not clear why it would take more than a year to put this data infrastructure in place with BEIS holding meter-level data since at least 2014. Granular data could be used to simulate the policy impact of changes to the EPG by household income/by energy efficiency/by tenure in order to better understand the impact on specific low-income, high-energy usage households such as large families or people with disabilities.

Tenet 3: Exploit the UK’s large and untapped energy savings potential, embedded in its energy inefficient building stock

28. Analysis of Department for Levelling Up, Housing & Communities data¹³ finds that 10.9 million properties in England alone could benefit from energy efficiency

¹⁰ It is Professor Fetzer’s understanding that the data is technically available in the UK but split between several government departments.

¹¹ Fetzer, T., Gazze, L., & Bishop, M. (2022). *Beyond the Energy Price Guarantee. With or Without?* Cage Policy Briefing no 39

¹² [National Energy Efficiency Data-Framework \(NEED\): consumption data tables 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/data-and-data-sets/national-energy-efficiency-data-framework-need-consumption-data-tables-2021)

investments in terms of reduced energy use, reduced energy bills, and reduced carbon emissions.

29. At least 5.8 million properties would benefit from improved wall insulation such as solid or cavity wall insulation, 2.8 million properties would benefit from roof or loft insulation and 7.1 million properties could benefit from floor insulation. Further, there are at least 3.7 million properties that could benefit from condensing boiler upgrades.
30. Analysis of EPC data suggests that England and Wales alone could save at least 30 per cent in energy usage through such straightforward upgrades as these.
31. Energy savings potential is greatest in higher-income households. It is recommended that a future scheme be designed to encourage well-off households to realise energy savings through investment tax credits, for example, whilst supporting lower-income households to do the same through targeted grants. Both the fiscal cost of the tax credits- and the grants could be clawed back through a reform of stamp duty and capital gains taxation on primary residences.
32. Public programs should be targeted and crucially, this targeting should not be solely based on EPC, but incorporate broader information on the demography and the occupants' circumstances as, while EPCs are, on average, accurate, the realized energy savings strongly depend on who and how people live in their property. This information is not incorporated in the EPCs but is incorporated in the empirical toolkit developed by Professor Fetzer. With appropriate support the method developed and deployed to ensure better targeted retrofits.
33. Analysis of the potential energy savings available through efficiency upgrades suggest that energy bills could be cut by £10bn per year (on October 2022 prices) with an upfront investment of £60bn-£65bn, thus paying for themselves within six to seven years. As the UK is not on target to meet its net zero targets¹⁴ it is imperative to extend carbon taxes to domestic energy use. Permanently higher energy prices need to be communicated to anchor household expectations so as to disabuse households of expectations regarding cheaper energy in the near term.
34. The Financial Times presented the researchers' analysis of the data using an accessible, interactive tool on 16 Nov 2022¹⁵, while the full detail is available in *How large is the energy savings potential in the UK? CAGE Working Paper 644*¹⁶. The savings would be permanent and structural.

¹³ Gazze, L: How to help UK households manage rising energy bills - and decarbonise at the same time <https://theconversation.com/how-to-help-uk-households-manage-rising-energy-bills-and-decarbonise-at-the-same-time-197476>

¹⁴ See for example: [UK will miss net zero target without urgent action, warns Lords committee - Committees - UK Parliament](#)

¹⁵ [How UK households could save £10bn a year by making homes more energy efficient \(ft.com\)](#)

¹⁶ Fetzer, T., Gazze, L., & Bishop, M. (2022). [How large is the energy savings potential in the UK? CAGE Working Paper no 644.](#)

35. In addition to providing permanent financial relief to households, energy efficiency upgrades would permanently lower CO2 emissions by an estimated 25 to 40 million tons per year.
36. Given the scale of these potential savings, the Government may therefore wish to consider a well-targeted and amply publicised **national insulation, boiler replacement and air-source heat-pump program operating via grants or tax incentives**. A targeted means-tested grants program could help low-income households that do not have the means to afford the upgrades, while for higher income households, a homeowner energy savings upgrade incentive program operating via tax-credits could be devised to encourage homeowners to take up energy efficiency measures. The fiscal cost of the tax credits- and the grants could be clawed back through a reform of stamp duty and capital gains taxation on primary residences.

Tenet 4: Tackle constraints on investment in energy saving – e.g lack of skilled workforce, outdated planning constraints.

37. The UK's conservation rules could be responsible for up to 3.2million tonnes of avoidable CO2 emissions annually by placing heavy restrictions on the ability of homeowners to retrofit listed buildings or those in a formally designated Conservation Area¹⁷. Preserving the character requires local collective action and the UK should consider and support efforts to overcome local collective action problems to achieve scale. The research team is looking for institutional and financial support to build research-led evidence base on effectiveness.
38. Barriers to communication or misalignment of incentives need to be tackled through improved information flows and better data sharing using interoperable systems. For example, at the end of a tenancy, landlords should be reminded of their statutory obligation to raise the EPC rating at a time when the opportunity cost of doing so is low. The research team is trying to assemble a set of local authorities to carry out an impact evaluation for such an intervention at scale.
39. Thoughtful **reform of planning laws and guidance** could balance preserving heritage assets against the benefits of achieving greater energy efficiency in the UK's housing stock.
40. In addition, **a broad array of supporting measures** should be considered, such as:-
- **a national energy savings lottery** -- To encourage broad participation in an energy savings program, the UK government could set up an energy savings lottery in which households that achieve energy demand reductions relative to their previous year's energy consumption (verified through meter readings), get to participate in a lottery that is offering cash prizes. Such a scheme may encourage behavioural change around energy use.

¹⁷ Fetzer, T (2023) Regulatory Restrictions and climate action: Evidence from conservation areas in England CAGE Working Paper 654

- **a national energy savings champions** program to support local collective action. The existing schemes, at least the documentation of which that is in the public domain, has not been rigorously evaluated using standard and modern program evaluation techniques. The reports are typically presenting case study evidence from which it is hard to generalize findings. The underlying incentivization also seems particularly poor.

Conclusions

41. Professor Fetzter's data-based research has created a framework for measuring the energy savings potential and quantifying the cost and benefit analysis of energy savings investments in the UK.
42. The analysis shows that the EPG disproportionately benefits well-off households as the reduction in the unit rate relative to market prices disproportionately benefits households with higher levels of energy consumption; and this advantage is skewed even among high-earners. Modifications to the tariff structure, incorporating higher charges for usage beyond a certain level, would enable subsidies to be better targeted and incentives to be sharpened.
43. The analysis also highlights that the UK has a large and untapped energy savings potential: England and Wales alone could save up to 29% of primary energy consumption in the residential sector through reduced electricity and natural gas consumption used for space heating and hot water generation if residential properties were upgraded to their highest energy efficiency standard – primarily through improved insulation measures. However, the EPG weakens incentives to invest in energy efficiency upgrades by around 30%.
44. Energy efficiency upgrades would provide permanent financial relief to households and offer large environmental benefits. Energy efficiency investments could permanently lower CO₂ emissions which itself has a large present and future monetary value as carbon taxes are set to increase energy prices going forward. It should also be stressed that energy savings investments could pay for themselves within a relatively short period of time.
45. It is important to highlight that the UK government, unlike governments in other countries, actually has at its disposal much of the data needed to ensure timely, targeted, and cost-effective interventions. With these data, there are broad sets of alternative policies that could be considered.
46. It is imperative to build more evidence to understand why existing schemes have not been successful in achieving scale on energy-saving measures, in order to assess in greater depth how to target support.

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