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BRIEFING PAPER October 2023

MAKE CLEAN HEAT ACCESSIBLE TO ALL

OPTIONS FOR LOWERING HEAT PUMP RUNNING COSTS

JAMES DYSON

There are significant economic and environmental benefits associated with electrifying our homes and economy. All energy users should see the financial benefits of moving to net zero. However, electricity prices are currently higher than fossil gas, due in part to the imbalance of social and environmental levies, which are loaded onto electricity bills. Per unit of energy, levy costs are almost 8 times more expensive for electricity than gas.

UK consumer electricity prices in 2023 were the fourth highest out of 25 International Energy Agency members,[1] and prices increased at a higher rate than in comparable European nations following Russia's invasion of Ukraine.[2] High electricity prices in the UK can discourage households from switching to a heat pump – further frustrating already sluggish rates of heat decarbonisation. They also place unfair costs on homes heated with direct electric, who are more likely to live in fuel poverty.

The current government has committed to publish a Fairness and Affordability Call for Evidence on the options for energy levies to help rebalance electricity and gas prices and to support green choices.[3] Several options have been proposed by industry and civil society, including removing levies from all electricity bills – ending the unfair additional tax burden on clean electricity.[4] Other longer-term changes to the UK's energy retail market could also help

[1] UK government, 28 September 2023, **Quarterly Energy Prices**

[2] Household Energy Price Index, 2023, **Monthly Update**

[3] UK government, 15 December 2021, **BEIS Update: Statement made on 15 December 2021**

[4] Electrify Heat, 2021. **Training, Trust and Tariffs: Electrify Heat's priorities to boost the heat pump market**

lower electricity prices, including via the review of electricity market arrangements (REMA), and increasing deployment of demand side flexibility.

The Fairness and Affordability consultation, which was originally due to be concluded in 2022, is yet to be published. External factors have impacted decision-making – including the gas crisis, and fiscal strain caused by inflation and Covid pandemic. Nonetheless, there remains an imperative to lower the running costs of clean, electric heat to support decarbonisation. Near-term solutions can be considered as a stepping stone to lower running costs for electric heat users. Longer terms reforms should still be pursued to permanently restructure energy bills and remove the unfair tax burden, supporting economy-wide electrification.

E3G has assessed options to rebalance levies to support the decarbonisation of heat and alleviation of fuel poverty. While noting the benefits of incentivising economy-wide electrification through shifting levies from all electricity bills into general taxation, as a near-term step, we propose a targeted exemption for electric heat users –a clean heat discount. We find that an exemption on 3.5 MWh of electricity per year for electrically heated homes would reduce running costs by around 15% for heat pumps and 5% for direct electric heating.[5]

A targeted exemption on levies for electric heating would reduce bills for an electrically heated household by £130 a year if implemented in 2024. This would make heat pumps as affordable to run as a gas boiler, while supporting the significant number of fuel-poor homes that use direct electric heating.

Solutions to lower the running costs of clean heat

Heat pump uptake in the UK is stagnant compared to other European nations. In 2022, only 55,000 heat pumps were installed, compared to 200,000 in neighbouring France. The government's technology grant, the Boiler Upgrade Scheme (BUS), is well behind the number of monthly grants required to reach its target of supporting 90,000 installs by the end of 2025.[6]

Following Russia's invasion of Ukraine and the subsequent spike in international energy prices, running costs have become an increasing disincentive to heat

[5] See the Methodology Annex for more information about why the proposed exemption is set at 3.5 MWh/year, and how the reduced running costs were estimated.

[6] UK government, 28 September 2023, **Boiler Upgrade Scheme Statistics**

pump adoption. Out of 25 International Energy Agency members, in 2023, UK domestic consumers pay for the fourth most expensive electricity, but the ninth cheapest gas.[7] The comparatively high cost of electricity compared to gas makes switching from a gas boiler to a heat pump more difficult to justify economically. Several factors contribute to the high cost of electricity, which can be addressed over shorter and longer timeframes.

Levy rebalancing

One near-term option being considered is "rebalancing" the social and environmental levies paid on energy bills. The government committed to consult on this in the 2021 Heat and Buildings Strategy, aiming to make decisions by 2022.[8] Since then, the government has indicated it will consult on rebalancing before the end of financial year 2023/24.[9]

Levies pay for important programmes to support fuel poverty reduction, energy efficiency improvements and electricity decarbonisation. Per unit of energy consumed, levy costs are almost eight times more expensive for electricity than gas. See Figure 1 for the total levy costs and their constituent components for both electricity and gas.

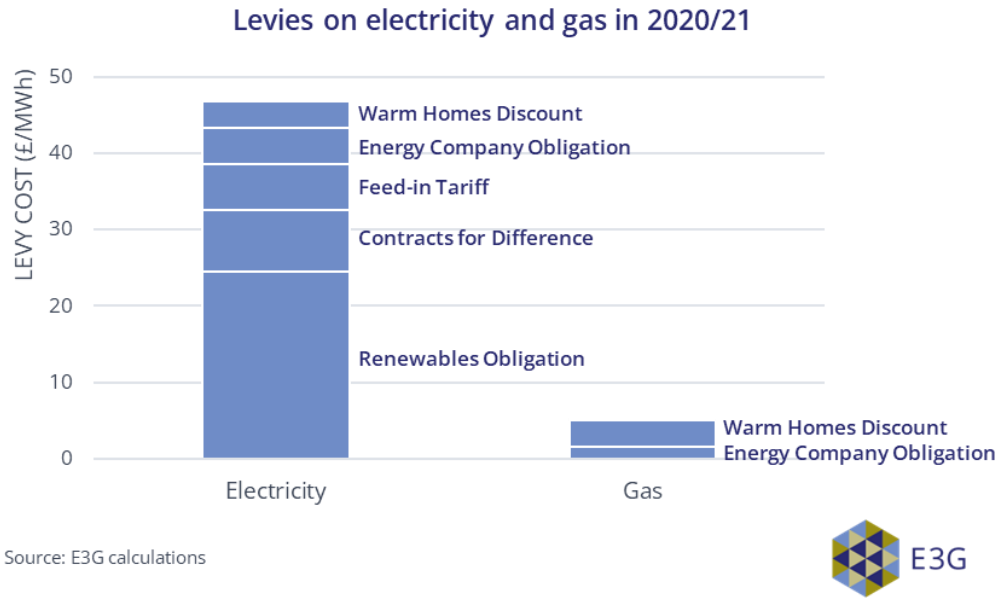

Figure 1. Levy costs in £/MWh consumed for Financial Year (FY) 2020/21. 2021/22 and 2022/23 saw a low cost for Contracts for Difference due to the spike in gas prices and are

[7] UK government, 28 September 2023, **Quarterly Energy Prices**

[8] UK government, March 2019, **Heat and Buildings Strategy**

[9] According to government presentation to stakeholders.

therefore not likely to be representative if gas prices stabilise and fall. See the Methodology Annex for a full outline of the method, sources and assumptions.

Higher levy costs on electricity than on gas means electrically heated homes pay far higher levy costs than homes heated by gas boilers. For an average home heated by a gas boiler, gas levies amounted to around £30 in 2020/21, or almost 8% of running costs.[10] In the same year, an average home heated by a heat pump paid £150 in total levy costs just for heating, plus £120 in levy costs for electricity used for appliances, making a total of £270 in levy costs. If the total cost of electricity for an average home heated by a heat pump is around £1200 per year, levies account for around 23% of running costs.

Long-term changes to electricity pricing

Additional, long-term efforts to reduce electricity costs include reforming the retail electricity market. This will be considered in REMA. However, the time it takes to successfully implement reform to electricity markets means that shorter term action to reduce the costs of electricity is required.

Another option to reduce running costs is by enabling consumers to capitalise on the value heat pumps can offer the energy system. Preheating homes can reduce pressure on the grid at peak times. At other times, heating homes with abundant low-cost renewables can make the most of available resources. Innovative offerings from suppliers coupled with strong consumer protection would ensure this system gives consumers great heat outcomes and experiences while reducing their bills. This would support the UK's transition to a low-carbon electricity grid, reducing the need for expensive peaking plant and new networks. A small trial found shifting heat pump use to off-peak tariffs did not substantially reduce thermal comfort, although more research is needed to make this more widely available.[11] Changes to capacity market rules could also let energy companies capitalise on this value and pass cost reductions on to consumers for using heat pumps as flexible assets.

[10] E3G own calculations. "Average home" defined as a 2–3 bedroom home using 11.5 MWh of gas and 2.7 MWh of electricity.

[11] Nesta, September 2023, **Automating heat pump flexibility**

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Direct electric heating

2015 research found that 2.3 million homes are heated by direct electric heating; 0.5 million of these households live in fuel poverty.[12] "In 2023, there are slightly more direct electric heating systems than in 2015, and expert opinion indicates a high proportion of direct electric-heated households are in fuel poverty. Direct electric heating without thermal storage is highly energy intensive and inflexible, making it expensive and adding strain on the grid. The high cost of electricity means these households pay a premium for their heating. Furthermore, because most energy levies are paid per unit of energy consumed, these households pay more policy costs.

Inflexible direct electric (e.g., resistive heating) heating systems should be discouraged. However, including existing homes with direct electric heating in measures to lower the cost of electricity used for heating would offer welcome support to a significant number of fuel-poor homes. Modern, flexible forms of direct electric heating with thermal storage are more efficient and flexible and could have a role in some homes.

Options for levy rebalancing

The anticipated consultation on addressing the way policy costs are levied on energy bills presents a near-term opportunity to deliver a tangible reduction in electricity running costs. There are several ideas for rebalancing, see Table 1 for an overview.

Table 1. Overview of options for rebalancing

Option	Explanation
Move all levy costs from electricity to gas bills	For an average home heated by a gas boiler, this option would increase levy costs for gas-heated homes by around £30 a year.[13] This would reduce the cost difference between electric and gas heating, making the cost of running a heat pump almost the same as a gas boiler. However, this option could also have complex and uncertain negative social impacts on fuel-poor homes.[14] Nearly 100% of homes are electrified, while only 85% are connected to the gas grid. Therefore, moving electricity levy costs onto gas bills means the same cost is shouldered by a smaller

[12] Ofgem, 11 December 2015, **Insights paper on households with electric and other non-gas heating**

[13] E3G own calculations

[14] Citizens Advice, 5 October 2023, **Balancing Act**

Option	Explanation
	group of customers, meaning the cost per customer will be greater. Robust guardrails would be needed to ensure the bills of fuel poor and vulnerable homes are not increased.
Move all levy costs into general taxation	In comparison to levying policy costs on energy bills this option would mean levies are paid for via a more progressive taxation system. Energy bills would be reduced for all households, with the highest proportional benefits going to lower income homes. This option would end the unfair tax burden on electricity users, and support an economy-wide shift towards electrification. This option could cost around £5bn to substitute levies on domestic energy use, and a further £5bn if levy revenue for industrial energy use is also included.[15]
Adjusting taxes or applying carbon taxes	In these options, the tax rate applied to electricity and gas could be adjusted to make electricity less expensive and gas more expensive. Levies could either be kept on bills or removed and costs moved to general taxation. This option could have similar impacts on running costs and potential negative distributional impacts as full or partial rebalancing.
Clean heat discount or partial rebalancing	In this approach, a portion of the electricity used by electrically heated households is exempted from levies. Revenue foregone under this approach would be recouped through income tax, or through another mechanism. This approach means the benefits are targeted, and the overall cost to HMRC is lower. For ease of implementation, a discount equivalent to around 3.5 MWh of electricity could be added to electrically heated homes bills. If the scheme was run on an opt-in basis, an appropriate certificate would need to be identified to evidence that the home is electrically heated.

Clean heat discount

Electrically heated homes could be discounted or exempted from paying levy costs on a portion of electricity these homes use for heating. This provides a targeted reduction in electricity pricing. If designed to exempt RO, FiT, ECO and GBIS for 3.5MWh of electricity, between 2024/25 and 2026/27 (for illustrative purposes) it could save electrically heated homes an average of around £130 a year.[16] This amounts to 15% of heat pump running costs (coefficient of performance (COP) at 2.8) and 5% of direct electric running costs. The average cost in revenue foregone, over three years between 2024/25 and 2026/27,

[15] E3G own calculations

[16] CfDs are not included in the exemption because they are technically levied on top of wholesale costs, meaning including them would complicate implementation. Secondly, CfDs also have the potential to pay back to consumers, so removing them could create situations where heat pump users miss out on bill savings.

would be a maximum of £390 million a year for all electric heating, or £90 million a year for heat pumps alone and £300 million for direct electric heating alone.[17]

For heat pumps installed in efficient homes, the clean heat discount saving would deliver a proportionally larger saving than in less efficient homes. For other homes, combined with a flexible tariff which preheats homes using off-peak electricity, the measure would make the cost of the heat pump lower than heating with a gas boiler. An overview of the estimated costs and savings of different approaches is set out in the Methodology Annex. Further action to reform the electricity market would help ensure heating a home with a heat pump was always cheaper than using a gas boiler by ensuring the cheaper cost of renewables is properly reflected in energy bills. Table 2 provides an overview of running costs and savings from a levy discount and smart tariff for a gas boiler, air source heat pumps running at COPs 2.8 and 2.94, and direct electric heating.[18]

Table 2. Average annual heating costs for a medium-sized household before and after levy discount and a smart tariff (2024/25 to 2026/27, for illustrative purposes). Includes the daily standing charge for gas but not electricity (heat pump users can disconnect from the gas grid).

Heating	Before levy discount (£)	After levy discount (£)	After smart tariff (£)
Gas boiler	694	694	694
Heat pump (COP 2.8)	843	710	639
Heat pump (COP 2.94)	803	673	586
Direct electric	2362	2229	2228

Source: E3G own calculations.

[17] See the Methodology Annex for further details on how these figures were calculated.

[18] COP of 2.8 based on UK government BUS **consultation response**, 2.94 based on the results of research by the Energy Systems Catapult's **Interim Heat Pump Performance Data Analysis Report**

Scheme design and implementation

Levy rebalancing should be implemented in 2024. Levy costs discounted could include the Renewables Obligation, Feed-in Tariff, the Energy Company Obligation and Great British Insulation Scheme. Electrically heated households could be renumerated by either exempting a portion of electricity used, or retaining the levies but adding a discount to bills equal to the amount paid for levies. The former option could be more difficult to implement than the latter if it involves significant alterations to policy cost methodologies.

Denmark, which has successfully grown its heat pump market (between 2015 and 2022 there was a fivefold increase in heat pump installations) exempts electric heating from policy costs.[19] When a home is registered as being electrically heated, the household pays a lower rate on policy costs (£1/MWh compared to £120/MWh). Eligible households are allotted 4 MWh of levy-free generation per year. It is the responsibility of the building owner to make sure information is correct and up-to-date on the Danish Building and Household Register, which determines whether a household is eligible for 4 MWh of low-tax electricity.

The revenue foregone from exempting electrically heated homes should be paid for through income tax to ensure the policy is paid for using the UK's most progressive approach to revenue raising. The cost of the scheme should be part of a wider funding boost to electrify heat, increase energy efficiency and reduce fuel poverty.

The total amount of electricity discounted could be set at a defined amount. For the purposes of this study, we have used 3.5 MWh, which is the amount of electricity used by a heat pump to heat a medium-sized home to the same degree as a gas boiler. The level of the exemption could be tailored to the wattage of the electric heating device installed. However, this would add an additional administrative element.

Implementing the levy exemption would require coordination between consumers, energy companies and government. To identify eligible homes, a combined approach where suppliers reach out to consumers, combined with an opt-in mechanism, is likely to have the most success in ensuring all eligible consumers benefit. There is no national register of home heating, so a wide-

[19] Private briefing for E3G by the Danish Embassy to London.

ranging campaign by government and energy suppliers would be necessary. Heat pump suppliers could provide information on installation of a new device. When a heat pump is installed, the process should be automatic.

Eligible homes will require a certificate to validate their heating source. Options include, Building Regulation Heat Pump Certificate, MCS certification, and EPC data. The level of subsidy provided to homes could be kept static to make the scheme simpler to administer than approximating electricity demand based on the power output of the heating unit. A mechanism to address revenue foregone by the exemption would need to be designed. If HMT absorbed any costs, a subsidy would need to be directed towards suppliers based on the number of eligible homes they support.

Phase-out of the policy would need to be considered so that heat pump users did not face a price hike once relieved. For example, ending the clean heat discount could be coordinated with changes to capacity market rules and potentially significant savings through flexible heat use.

About E3G

E3G is an independent climate change think tank with a global outlook. We work on the frontier of the climate landscape, tackling the barriers and advancing the solutions to a safe climate. Our goal is to translate climate politics, economics and policies into action.

E3G builds broad-based coalitions to deliver a safe climate, working closely with like-minded partners in government, politics, civil society, science, the media, public interest foundations and elsewhere to leverage change.

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