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Funding a Low Carbon Energy System: a fairer approach?

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Key messages

- To recover the cost of energy policies which support the transition towards a low carbon energy system, levies are applied to household and business energy bills. This briefing note focuses solely on the levies applied to households.
- Money from households subsidises renewable energy sources of electricity and heat, and funds programmes that improve energy efficiency in low income households. These help deliver a cost effective low carbon pathway and address important issues such as fuel poverty. Without these improved energy efficiency measures, the average annual household energy bills would be £490 larger than they are today.
- Energy policy costs are applied to household electricity and gas bills, equating to £132, or 13% of the average energy bill in 2016. However only 17% of these costs fund energy efficiency programmes supporting low income households, with concerns raised by the Energy Saving Trust that the current system is "unfair".
- The poorest households contribute £271 million per year towards energy policy costs. The 2016/17 cost of the Carbon Savings Communities and Affordable Warmth schemes, which are designed to help the poorest homes, was £220 million. Therefore the poorest homes are self-funding these schemes.
- This research highlights how low-income households are hit hardest by the current arrangements. The poorest households spend 10% of their income on heat and power in their homes, whereas the richest households only spend 3%, so any increase in prices hits the poor disproportionately.
- In addition, household electricity and gas use represents only 12% of total final UK energy use. "Total" energy use includes all the energy used to provide households with the products they buy and the services they access, and includes energy embodied in imports.
- If we calculate the full supply chain energy embodied in all goods and services, the lifestyles of the richest require nearly four times more energy than the poorest, but because levies are only raised on household electricity and gas bills the richest only pay 1.8 times more towards the energy policy costs.
- Placing policy costs on businesses, or funding the costs from general taxation would lower the burden on the poorest households. The general taxation approach would better align energy demand with policy costs, and would reduce costs for 70% of UK households. The poorest households would pay nothing, saving them £102 a year, while the richest households would pay an additional £410 a year (under £8 a week).
- While none of the funding approaches offer a "perfect solution" in terms of distributional impacts, raising the funds through general taxation offers a fairer and practical approach.
- The taxation approach would require leadership and a long term commitment to avoid leaving the policy vulnerable to short term budgetary changes. It is recommended that this approach and moneys raised are locked in for a decade to mitigate risks associated with changes in Government.

The need for energy efficiency and affordable energy

Tackling climate change requires a complete transformation in our energy system, while also improving the efficiency with which energy is used in an attempt to reduce energy demand. As outlined in the Government's Clean Growth Strategy[1]:

> "Clean growth means growing our national income while cutting greenhouse gas emissions. Achieving clean growth, while ensuring an affordable energy supply for businesses and consumers, is at the heart of the UK's Industrial Strategy."

The UK Government is a key player in delivering this goal and has played an active role in driving innovation in low carbon energy supply, and improving the efficiency of homes and businesses. This has involved investment that has successfully driven down the prices of renewables, and funding schemes such as the Energy Company Obligation (ECO) to deliver energy efficiency in homes.

The Committee on Climate Change[2] highlights that without improved energy efficiency measures, average annual household energy bills would be £490 larger than they are today. This reduction is partly due to ECO targeted energy efficiency schemes which are an essential part of the Government's response and help deliver a low cost pathway to achieving our Carbon Budgets. However this saving is also due to household efficiency improvements made independently by homeowners.

While the average savings for households through improved energy efficiency is encouraging, key delivery agencies, like the Energy Saving Trust (EST), have questioned whether "fuel poor" households have benefited equally. As pointed out by EST's Head of Policy, David Wetherall:

> "…it's unfair for the half of households living in fuel poverty who don't qualify for ECO support. For these people, ECO is only a cost on their bills and the risk of fuel poverty becomes more pronounced. The same problem applies to low income households who do qualify for ECO fuel poverty support but who do not need upgrades installed."[3]

This policy brief provides new evidence that explores the distributional effects of meeting the costs to households under different scenarios. Distributional impacts consider how energy policy costs are applied across UK households of varying income levels. We do this by calculating the complete energy requirements of these households, considering both direct and indirect energy use.

This brief recognises that our lifestyles and basic needs are fuelled by energy and that this goes beyond simply heating and powering our homes. We propose a number of recommendations that would ensure a more equitable distribution of impacts arising from future energy policy.

Breakdown of household energy policy costs

Currently, the energy policy costs added to household electricity and gas bills account for 13% of the average total energy bill (£132 per year)[4], raising a total of £6.5bn[5] in 2016. For comparison, in 2015/16 the Climate Change Levy raised £1.8 bn[6] from UK businesses. A breakdown of the current consumer-funded energy schemes is provided in Figure 1. Most of the money is used to support the provision of renewable energy: 58% through the Renewables Obligation, 2% through long term contracts between energy generators and government, and 18% through the Feed-in Tariff scheme where participants are paid set tariffs for producing low carbon electricity. 12% is used to fund energy efficiency programmes under the ECO targeted at fuel poor households, and the Warm Homes Discount accounts for a further 5% allowing certain households to apply for reductions on their energy bill. The remaining 5% supports the scheme to replace traditional gas and electricity meters with smart meters. In addition, these policy costs increase the price of energy, encouraging households to use less. A small percentage of the levy has the potential to be returned to low income households through ECO and the Warm Homes Discount both of which are energy efficiency programmes however these account for only 17% of the total funds raised. Latest figures show that of the 1.8 million properties that have had energy efficient measures installed through ECO and the Green Deal, 980,000 (54%) of these households were classified as low income and/or vulnerable.[7]

Figure 1

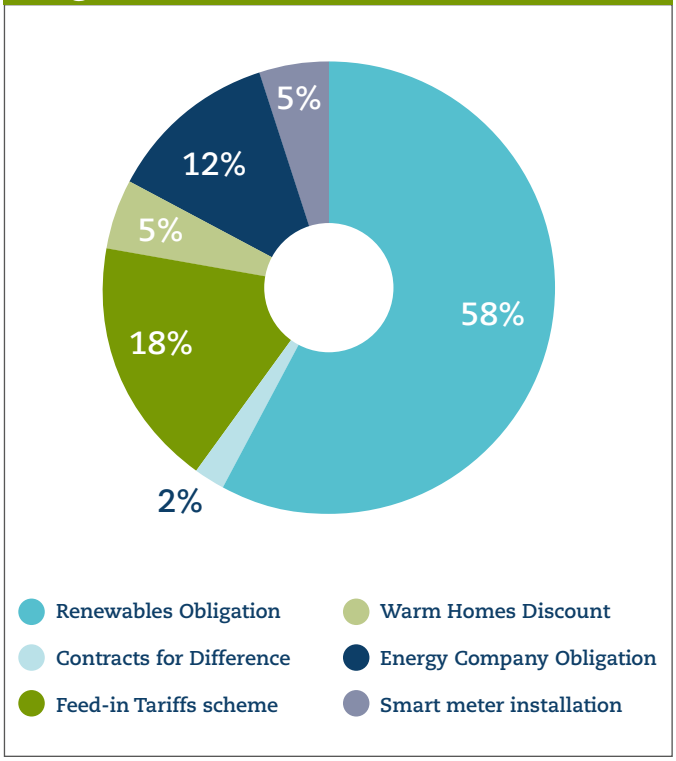

Figure 1: Breakdown of policy costs (National Audit Office (2016). 'Controlling the consumer-funded costs of energy policies: The Levy Control Framework')

Energy service demands in the UK

Energy provides essential "life support" for everyone. The services provided by energy include not only space and water heating for our homes, energy for cooking, power for lighting and appliances, and fuel for our cars, but also provides households with their consumer products, leisure activities, and other services and infrastructure. We call these requirements for energy, "energy service demands". At present, government raises the money it needs to improve the whole energy system from a levy on a limited number of energy service demands, namely home heat and power.

Applying novel methods that link the flow of energy through our economic system to household and government activities, we are able to assess the direct and indirect energy requirements associated with each of these energy service demands. An example of an indirect energy use is the energy used in manufacturing a mobile phone, which in our analysis is classified as helping meet the energy service demand associated with communication[8].

Figure 2 presents a simplified map showing how energy sources flow and are transformed through the economic system to meet household energy service demands and the energy demands for government and capital expenditure. Energy is used directly by households (flow shown in light grey) or it is embodied in the energy services used by households, government and exports. Energy can be provided either from domestic sources (i.e. energy used in the UK) or it is imported as embodied energy from overseas.

Energy used for shelter[9] and transportation account for 37% and 32% of the total, respectively[10]. All the food, products and services delivered to households account for the remaining 31% of their energy demand. If energy policy costs were applied to businesses these would potentially be passed on to consumers through higher product prices. The Committee on Climate Change (CCC) calculated that this would add 3 pence to an average £10 basket of goods and services in 2016[11]. At present, some energy policy costs are added directly on to household energy bills which only account for 12% of the total energy services. Therefore, if household energy bills are a larger proportion of a household's total spend, you will be unduly disadvantaged.

We now turn to looking at how the household share of energy policy costs are distributed across households with different levels of income and different spending patterns.

Figure 2

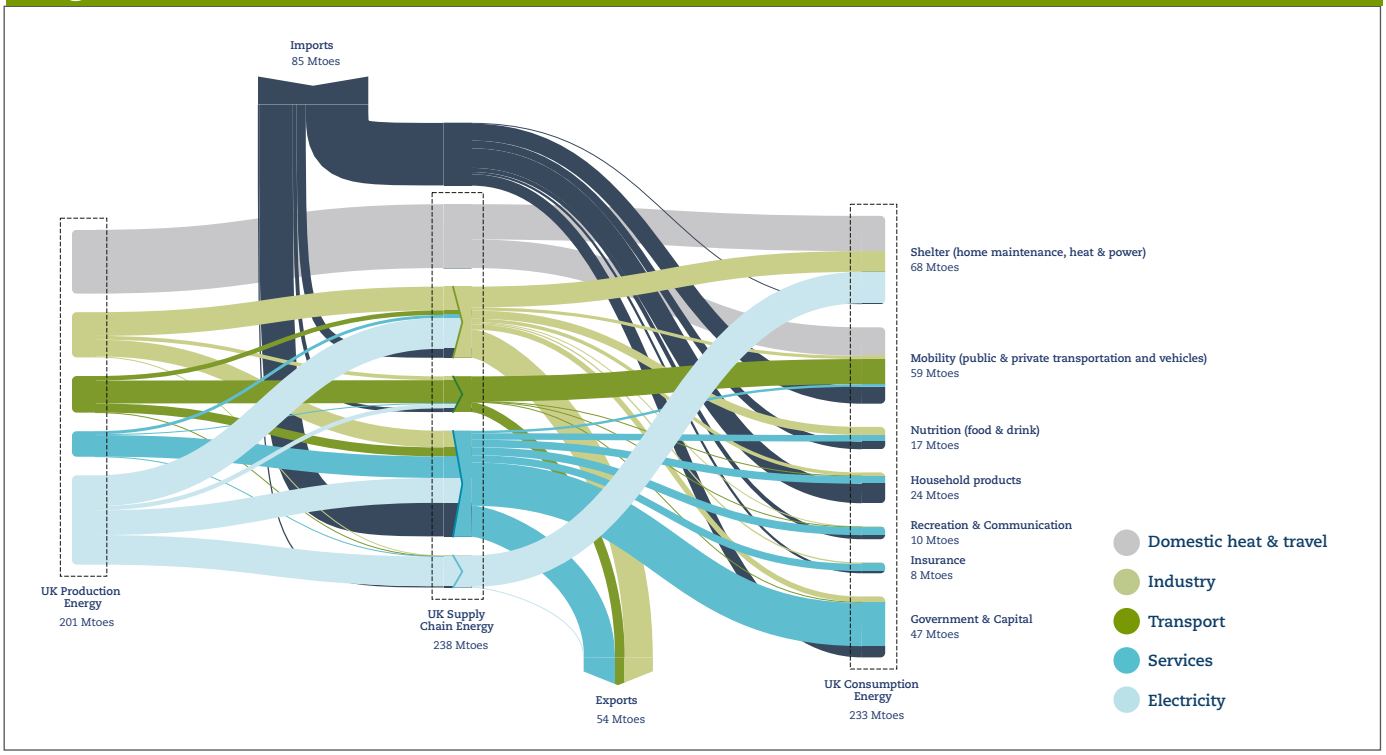

Figure 2: Relationship between the energy system and energy service demands – the energy demand chain
Sankey diagram produced using a tool designed by simon@arm-riding.com

Distributional impacts of energy policy costs

We have calculated energy use according to the expenditure patterns of household income deciles in the UK (i.e. dividing UK households into 10 income groups from the poorest 10% to the richest 10%). This allows us to compare energy demand across UK household income groups, considering all their energy service demands, not just heat and power (see Figure 3).

In 2014[12], the richest 10% of households each consumed an average 12.7 tonnes of oil equivalent compared to 3.3 tonnes consumed by the poorest 10%[13]. Thus, when considering the total energy service demand for all households, the richest households consume almost 20% compared to the poorest, who consume only 5%. The energy required for heating and powering the home represents a greater proportion of a poorer household's energy use; with poorer households spending a much greater proportion of their income on energy (10%) than the richest households (3%). Figure 3 shows an approximately linear growth in the energy consumption across the deciles with the exception of the highest 10%. Here we see a substantial increase in comparison to the previous group.

Meeting energy policy costs by taxing household energy bills is therefore regressive for two reasons. Firstly, the increase in direct energy use bills that results from these costs hits the poor hardest, as these energy costs account for a greater share of their income than for richer households. Secondly, and less well appreciated, is that direct energy use on home heating and power represents a much smaller share of the richest households total energy use. Therefore energy policy costs assigned directly to households are only levied on a quarter of the total energy consumption of the richest households. As a result, the richest homes use nearly four times more total energy than the poorest but only pay 1.8 times more towards energy policy costs.

Households with a below average income are paying 30% of the households' share of energy policy costs while their income represents 22%. Richer households with 78% of the income, pay only 70% of these policy costs. We do recognise that part of the policy costs, met by households, go towards energy efficiency measures which target the fuel poor but argue that it is unfair for the poorest homes to be funding schemes designed to help those most in need. We estimate that the poorest 10% of households currently contribute £271 million towards energy policy costs. Between October 2016 and September 2017 the costs of the Carbon Savings Communities and Affordable Warmth schemes, which are designed to help the poorest homes, came to £220 million[14]. The poorest homes are, in effect, self-funding these schemes. In addition, the Energy Savings Trust warn that only 50% of fuel poor households qualify for efficiency measures funded by ECO[15] since these are targeted to benefit claimants rather than those defined as fuel poor, and the majority of the tariff funds renewable energy schemes, not energy efficiency programmes.

Figure 3

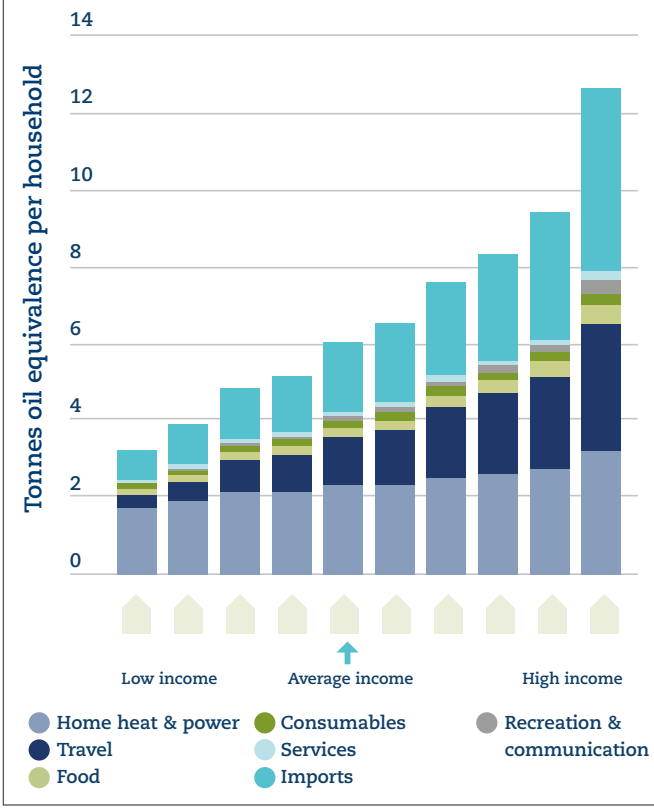

Figure 3: Energy demand by income decile and energy service (2014.) See Appendix for details of methods used to derive this data

Government support for the transition to a low carbon and more efficient energy system is vital given the urgency of tackling climate change. However, a continuation of the current approach increases the risk that low income households are being priced out of access to energy services, despite targeted investment in policies aimed to help low income households with bills. Household energy prices in Denmark and Germany[16] are higher than in the UK and if UK prices aligned with parts of the continent, the number of fuel poor household would increase.

As recent research from the UK Energy Research Centre has demonstrated,[17] there are substantial energy and carbon savings to be achieved by improving the efficiency of UK homes, with significant social benefits. However, the current approach for raising these funds is highly regressive. We now consider alternative approaches to meeting energy policy costs.

Alternative approaches to meeting energy policy costs

In this section we compare three options for funding energy policy costs currently placed on household energy bills. These are:

- **Option 1: Household energy bills** – this is the current approach where all the costs are placed on heating and power.
- **Option 2: Business energy bills** – costs are added to the energy used or supplied to households by businesses. Businesses will pass on some of these costs to households who purchase their goods and services.
- **Option 3: General taxation** – costs are raised through household income tax.

Figure 4 shows the proportion of household income that contributes to the energy policy costs in each case.

Funding energy policy costs from household bills only (Option 1), where 13% of the energy bill funds energy policy, is regressive because the richest households pay just 0.16% of their annual household income compared to the poorest households paying 1.50% (over nine times greater).

In Option 2 (which is a levy on both household and business energy bills), the richest homes now pay 0.19% of their annual household income towards energy policy costs and the poorest household's contribution reduces to 1.05% (nearly six times greater). Based on the current energy policy costs, Option 2 saves the poorest homes £31 a year (compared to Option 1) while increasing the burden on the richest 10% by £43 a year. Whilst this approach is an improvement on the current system, it remains regressive and still places a significant burden on the poorest UK households.

The final approach (Option 3) demonstrates the distributional effects of including energy policy costs in general taxation. Following the UK income tax brackets from 2016, Option 3 would mean that the poorest houses are exempt from any additional costs and the richest households would contribute 0.50% of their annual household income. Compared to Option 1, this general taxation approach would reduce costs for 70% of UK households, while the richest 30% would see an increase. The lowest income group would save £102 a year with the highest income group paying an additional £410 a year. A saving of £102 a year for the lowest income households could make a significant difference for them, while an additional cost of less than £8 a week for the households with the highest income is a relatively small difference.

Figure 4

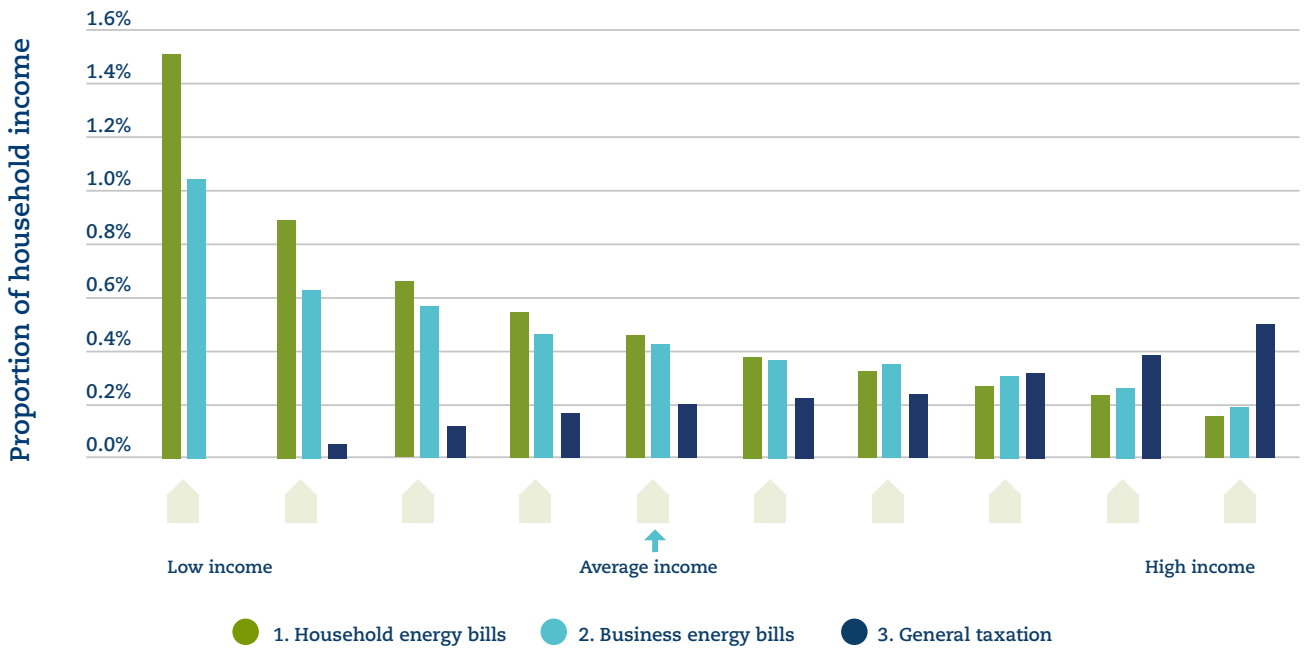

Figure 4: Proportion of household income required to meet different energy policy funding approaches

Conclusions

Policies to support the transition to a low carbon energy system are essential. Even though some of these policies lead to savings in the medium to long-term, they have costs that need to be recovered. These policies ensure that society does not meet even higher climate change costs in the future. In addition, many of the levies applied provide a positive return on investment, for example retrofitting our homes.

However, it is important that meeting statutory carbon targets does not place an undue burden of responsibility on many households in the UK that are struggling to meet basic needs. Clearly, we need practical and simple approaches to funding energy policy costs that are easy to administer.

It is not always possible for costs to follow a "polluter pays principle". At the same time, there is considerable variation in the distributional impacts of the three different methods outlined in Figure 4. While none of the methods offer a "perfect solution" in terms of distributional impacts, raising the funds through general taxation offers a fairer approach in principle.

The current approach is often seen as a practical solution that allows policy stability and ensures that energy policy goals are not undermined with annual adjustments in the Government's budget. There are concerns that this budget cycle can pose a risk to long-term funding of low carbon energy.

There is clearly a perceived trade-off between policy stability and inequality. However, they are not mutually exclusive and an approach that demonstrates a strong, long-term commitment to the UK's low carbon future can also address inequality.

The results and methodology have been published as an annex to this briefing note. Access this online at http://www.ukerc.ac.uk/publications/funding-a-low-carbon-energy-system.html

References

1 BEIS (2017) https://www.gov.uk/government/publications/clean-growth-strategy

2 CCC(2017) https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/

3 http://www.energysavingtrust.org.uk/blog/clean-growth-plan-new-approaches-needed-make-fuel-poverty-impact

4 NOA (2016) https://www.nao.org.uk/report/controlling-the-consumer-funded-costs-of-energy-policies-the-levy-control-framework

5 From Figure 3 in NOA (2016). We recognise that energy policy costs are also levied on businesses however this analysis in purely considered with the distributional impact of energy policy costs added to household energy bills.

6 HM Treasury (2017) https://www.gov.uk/government/publications/spring-budget-2017-documents

7 BEIS (2018) https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-headline-release-january-2018 (reporting period covers May 2015 to Nov 2017)

8 We calculate the full supply energy associated with demand by UK households and government using a multi-regional input-output model developed at the University of Leeds. For further information on the methods, please refer to the Appendix

9 Shelter includes energy used for heat and power and the embodied energy required to maintain a home which includes rental costs.

10 For further information and data please refer to the Appendix.

11 CCC(2017) https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/

12 This is the latest year for which consumption-based energy accounts for the UK are available

13 We use the Living Costs and Food Survey Table A6 Expenditure by Income Decile to disaggregate UK household expenditure

14 BEIS (2018) https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-headline-release-january-2018 (reporting period covers May 2015 to Nov 2017)

15 Energy Savings Trust (2017(http://www.energysavingtrust.org.uk/blog/clean-growth-plan-new-approaches-needed-make-fuel-poverty-impact

16 Eurostat (2017) http://ec.europa.eu/eurostat/documents/10186/8482435/Q12017_electricity_prices_graphics.pdf

17 Rosenow, J., Eyre, N., Sorrell, S., Guertler, P. (2017): Unlocking Britain's First Fuel: The potential for energy savings in UK housing. UKERC/CIED Policy Briefing. Available at: http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html

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