So which households can benefit from energy efficiency and is there an argument to fund from the public purse?

Policy Briefing 04

January 2017

Household energy efficiency-multiple benefits

Improving household energy efficiency has a positive impact on a more efficient household's income. This is because money saved by the permanent reduction in energy bills will be available to spend year on year. An EPSRC funded team at the Centre for Energy Policy and Fraser of Allander Institute at the University of Strathclyde has analysed the macroeconomic expansion likely to follow successful energy efficiency measures. This highlights the multiple dividends of energy savings, boosted GDP, employment and income benefits which result from energy efficiency measures. This latest work begins to explore the impact of focusing policy only on fuel poor households but finds that the more wide-ranging the boost to energy efficiency, the greater the economic expansion is likely to be. The multiple dividends are particularly obvious in the case where all households rather than just fuel poor households are targeted. This is due to both the greater stimulus and limited spending power of low income households. Governments should consider the wider economic and social benefits of spending on energy efficiency when designing energy efficiency policy, evaluating its outcome and making budget decisions.

Boost wider economy and disposable income

The EPSRC project analysis simulates the economy-wide and macroeconomic impacts of improving household energy efficiency.

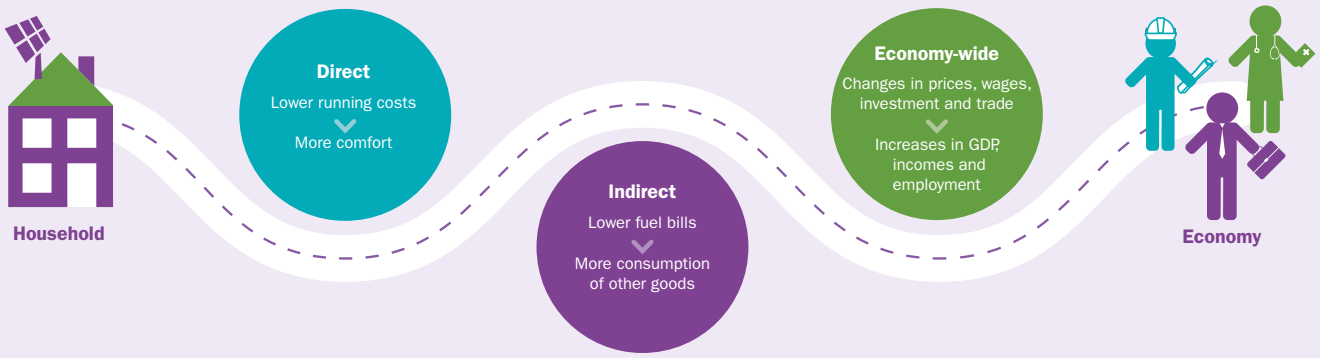
- A projected GDP expansion of around 0.15% results when all UK households are included in an energy efficiency initiative which allows 10% less energy to be used in delivering heating and lighting services.
- Low income households benefit via a 0.6% improvement in their disposable income. The improvement is both through the sustained savings on fuel bills and boost to the wider economy.

Who is this project of interest to?

This project aims to engage with stakeholders on the topic of the multiple benefits of energy efficiency, commonly discussed using the term "rebound". This briefing presents the results of economy-wide modelling of impacts of energy efficiency investment and explores the implications of findings for policy makers.

The results should be of interest to a wide range of groups including, UK and UK devolved governments, domestic and international policy makers, energy organisations, academics and NGOs.

HOUSEHOLD ENERGY EFFICIENCY – MULTIPLE BENEFITS



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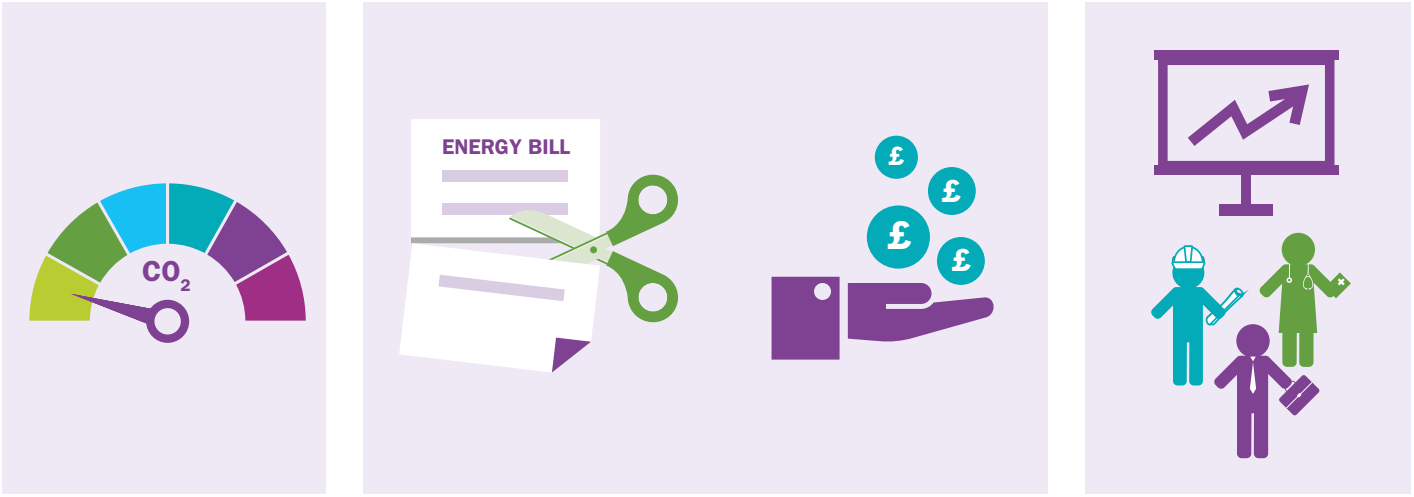
Which households should be the target of energy efficiency policy?

It may be argued that, where energy efficiency policy requires the support of the public purse, focus should be on helping those households who are currently unable to heat their homes sufficiently. Our research shows that the more wide-ranging the energy efficiency investment the higher the macroeconomic impact.

Low income households benefit both from their immediate improved disposable income and the generally positive economic expansion created by the wider government investment. This leads to the idea of energy efficiency as an infrastructure investment because it is of value to the economy as a whole as well as delivering energy security improvements and CO_2 reductions. However, both the economic expansion and the wage and capital incomes realised from it are greater where higher income households also increase energy efficiency and spend more.



Impact of different government funding approaches

Our analysis assumed that the government would aim for a balanced budget by either temporarily diverting funds from another public function (e.g. roads, services etc) or increasing income tax across all households to fund household energy efficiency improvements. The modelling suggests that using either form of support and including all households in the policy, produces a long term GDP expansion of roughly 0.15% from a one off and permanent 10% improvement in energy efficiency. The majority of this was achieved within 6 years, but is sustained over time.

Focusing the energy efficiency support only on 20% of households with lowest incomes, and doing so by diverting funds limits the GDP expansion to 0.015%. Raising income tax and targeting only the fuel poor with government support delivers no long term economic expansion. This is due to negative impacts from a decrease in disposable income across all households resulting from the tax.

Thus the modeling suggests that both the means of providing support for energy efficiency programmes and how they are targeted should be carefully considered when new policies are designed. Future research, ideally in consultation with policy decision makers, is desirable.

How should the government evaluate the impact of energy efficiency policy?

Previous policy briefings (see back page) have highlighted the macro economic benefits of energy efficiency measures for households and the short term and long term CO_2 reduction delivered. We have also explored the economic benefits of energy efficiency improvements in industry. The current analysis focuses on a projected 10% improvement in the energy efficiency of all UK households and suggests a sustained GDP expansion of around 0.15%. This is significant in the context of the average annual economic growth rate normally sought for the UK of 2-3%. Moreover, the source of the expansion is important as it is a direct result of public policy rather than private sector activity. The challenge to policy makers is where to draw the boundary on the cost vs. benefits of directly supporting energy efficiency in considering public spending.

Different households use energy and benefit differently from economic expansion

As would be expected for a country with a colder climate like the UK, lower income household groups spend a greater share of their budget on energy and may as a result suffer fuel poverty. Their energy expenditure is mostly for residential (heating and lighting) use. As income increases, the share of energy in total expenditure decreases (though spending on fuels for transport increases) as does the absolute size of the energy bill. Investment in energy efficiency in different household income groups has different effects on the wider economy. Lower income households have limited overall spending power and benefit less from wage and capital income gains generated by economic expansion. Their additional spending may be on warming their homes better and it is likely to provide only a small spending boost to the economy. Higher income groups may free up more spending with consequent benefits to themselves and a larger impact on the economy as a whole.

THE CHALLENGE FOR ENERGY POLICY AND CO_2 REDUCTION – REBOUND EFFECTS

Direct

Cost-effective efficiency improvements make energy services cheaper, thereby encouraging increased consumption of those services.

Indirect

Cost savings from energy efficiency improvements may be spent on other goods and services whose provision involves energy use and emissions at different stages of their international supply chains. For example, savings on heating bills may be used to purchase laptops made in Asia and shipped to the UK.

Economy-wide

Shifts in consumption patterns may trigger multiple changes in prices, investments and incomes in both domestic and international markets. Energy efficiency improvements by firms may lower output prices, boost productivity and competiveness, encourage economic expansion and thereby increase energy consumption.

Transformational

In some cases, efficiency improvements may help open up markets for new technologies and systems, triggering entirely new energy-using applications, products and industries.

Institutions

The project 'Energy saving innovations and economy wide rebound effects' is funded by the EPSRC under the 'Working with the End Use Energy Demand Centres' call (EPSRC grant ref:EP/M00760X/1).

The project led by Professor Karen Turner, Director of the Centre for Energy Policy (CEP) at the University of Strathclyde International Public Policy Institute. The project involves researchers from the Centre of Energy Policy and Fraser of Allander Institute at the University of Strathclyde and several external collaborations.

The project commenced in March 2015 and will formally complete in February 2017.

Project website: **www.cied.ac.uk/research/impacts/energysavinginnovations**

Other outputs

'Increasing energy efficiency, improving household incomes and boosting the economy' Karen Turner, Fiona Riddoch and Gioele Figus **www.strath.ac.uk/research/internationalpublicpolicyinstitute/ourblog/september2016**

'How Improving Household Efficiency Could Boost the Scottish Economy' Karen Turner, Fiona Riddoch and Gioele Figus **www.strath.ac.uk/research/internationalpublicpolicyinstitute/ourpolicypapers/**

'Increasing energy efficiency in Scottish Households' Gioele Figus, Karen Turner et al **www.strath.ac.uk/research/internationalpublicpolicyinstitute/ourpolicypapers/energyarchive/**

'Household Energy Efficiency Could Help Boost the Economy' **http://ec.europa.eu/environment/integration/research/newsalert/pdf/household_energy_efficiency_could_help_boost_economy_49si7_en.pdf**

'Capturing the Mutliple Benefits of Energy Efficiency' **www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency/**

How to engage with us

Engaging with stakeholders is a core element of this work and we would be interested to hear from anyone who would like to find out more about the project – its outcomes and any future stakeholder events.

For more information please contact

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