

**Professor Karen Turner,
Holyrood Policy event: Fuel Poverty
29 September 2015**



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The Economic Benefits of Increased Household Energy Efficiency Across the UK

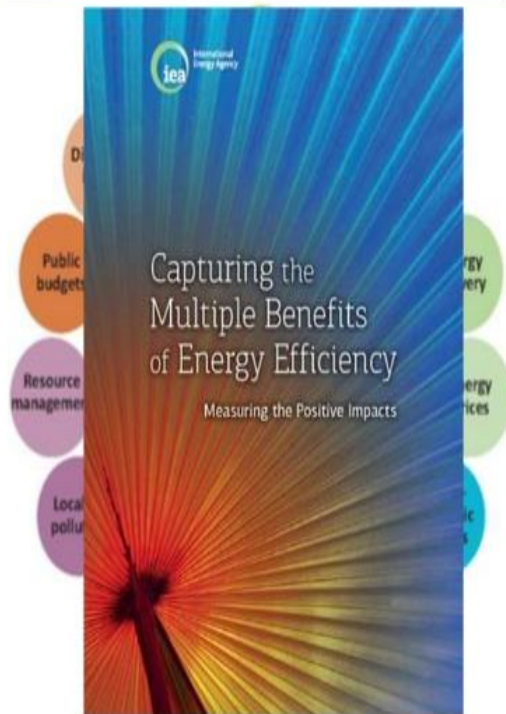
DRAWING ON JOINT WORK WITH PATRIZIO LECCA, PETER MCGREGOR, KIM SWALES (FRASER OF ALLANDER INSTITUTE, FAI) AND LISA RYAN (UNIVERSITY COLLEGE DUBLIN)

CURRENT WORK:

**EPSRC PROJECT: 'ENERGY SAVING INNOVATIONS AND ECONOMY-WIDE REBOUND EFFECTS'
CEP, FAI WITH CENTRE FOR INNOVATION AND ENERGY DEMAND (SUSSEX)**



EE has multiple benefits



IEA (2014), *Capturing the Multiple Benefits of Energy Efficiency*, OECD/IEA, Paris.





Multiple benefits

- Primary aim – cost effective energy efficiency improvements to deliver energy savings/reduced energy use at sectoral and economy-wide levels
- Issue of ‘rebound’ effects triggered by decrease in price of energy service
 - E.g. more efficiency boiler, cost of heating at 20 degrees for one hour falls – can afford to heat for longer or turn up thermostat
 - May not be a ‘bad thing’ if homes under-heated
- Trigger for a stimulus to the wider economy
- Where efficiency increases in industrial energy use – productivity-led growth
- Where efficiency increase in household energy use – demand-led growth
- Change in what is consumed
- But also level of consumption – income boosted by falling energy costs and increased economic activity



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Source: Lecca, P.,
 McGregor, P. G., Swales, J.
 K., & Turner, K. (2014).
 The added value from a
 general equilibrium
 analysis of increased
 efficiency in household
 energy use. *Ecological
 Economics*. 100, 51–62.
 Doi:10.1016/j.ecolecon.20
 14.01.008.

European
 Commission

Science for Environment Policy

Household energy efficiency could help boost the economy

Improving the energy efficiency of homes could have positive economy-wide impacts, recent UK research suggests. It would allow householders to spend the money they save on energy on other products and services. Although this additional demand and the associated production in non-energy sectors would partly offset the energy saved in the home, this 'rebound effect' does not completely outweigh the household energy savings.

This study explored the links between increased energy efficiency of UK households and the wider UK economy using 'general equilibrium' modelling. In particular, researchers investigated a potential 5% improvement in [energy](#) efficiency, which they assumed would occur as a result of technological improvements (e.g. more efficient appliances) that allow a household to continue operating at the same capacity, but using less energy.

Financial savings from this lower energy use will probably mean that householders use their appliances more than before, creating 'direct rebound effects'. This study also considered 'indirect rebound effects'. These occur because the cost savings allow householders to spend more money on goods and services other than energy. The energy used by other sectors that provide these goods and services can reduce the overall benefits of the initial improvement in household efficiency. To understand these rebound effects, the researchers assessed the energy usage of 21 economic sectors. These included four energy sectors (1. coal; 2. refined oil (and also nuclear fuel that goes to the electricity generation sector - analysed together with oil, as these two sectors were integrated in the study's source of data); 3. gas; 4. electricity) and 17 other sectors, including food, textiles/clothing and finance.

The model's results suggest that the 5% improvement would have positive effects on the national economy, because increased real income and spending on non-energy sectors has a greater economic impact than the same amount of spending on energy. The effects would



Fuel poverty?

- New EPSRC project – focus on distributional issues, identifying different household income groups
- As well linking energy use and efficiency improvements to household ‘investment’ decision – e.g. to increase efficiency (miles per gallon) in driving, do you purchase a new car?
- Multi-sector economy-wide models of the UK and Scottish economies
- In the meantime, work building on IEA Multiple Benefits work on considering welfare impacts of energy efficiency
- Simple modelling exercise simulating a 5% increase in efficiency in electricity and gas use by UK households
- Try to capture fuel poverty issues by considering what happens to the share of income different household income groups spend on energy
- Rebound plays a role – lowest income households gain most in terms of income but are also most energy intensive and rebound more in their electricity and gas use

Figure 1. Impacts on key macroeconomic indicators from a 5% increase in efficiency in household use of electricity and gas (% change from base case)

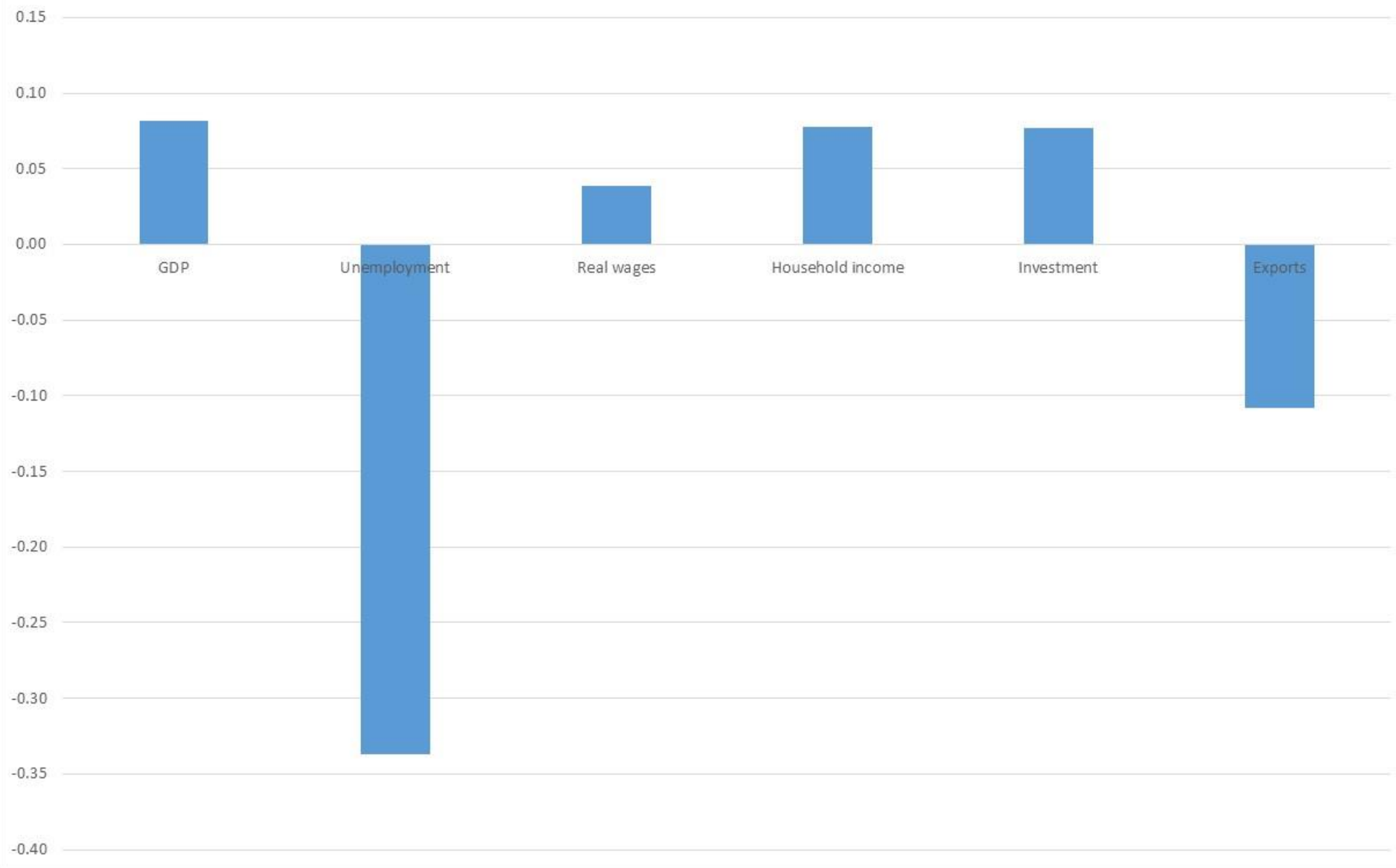
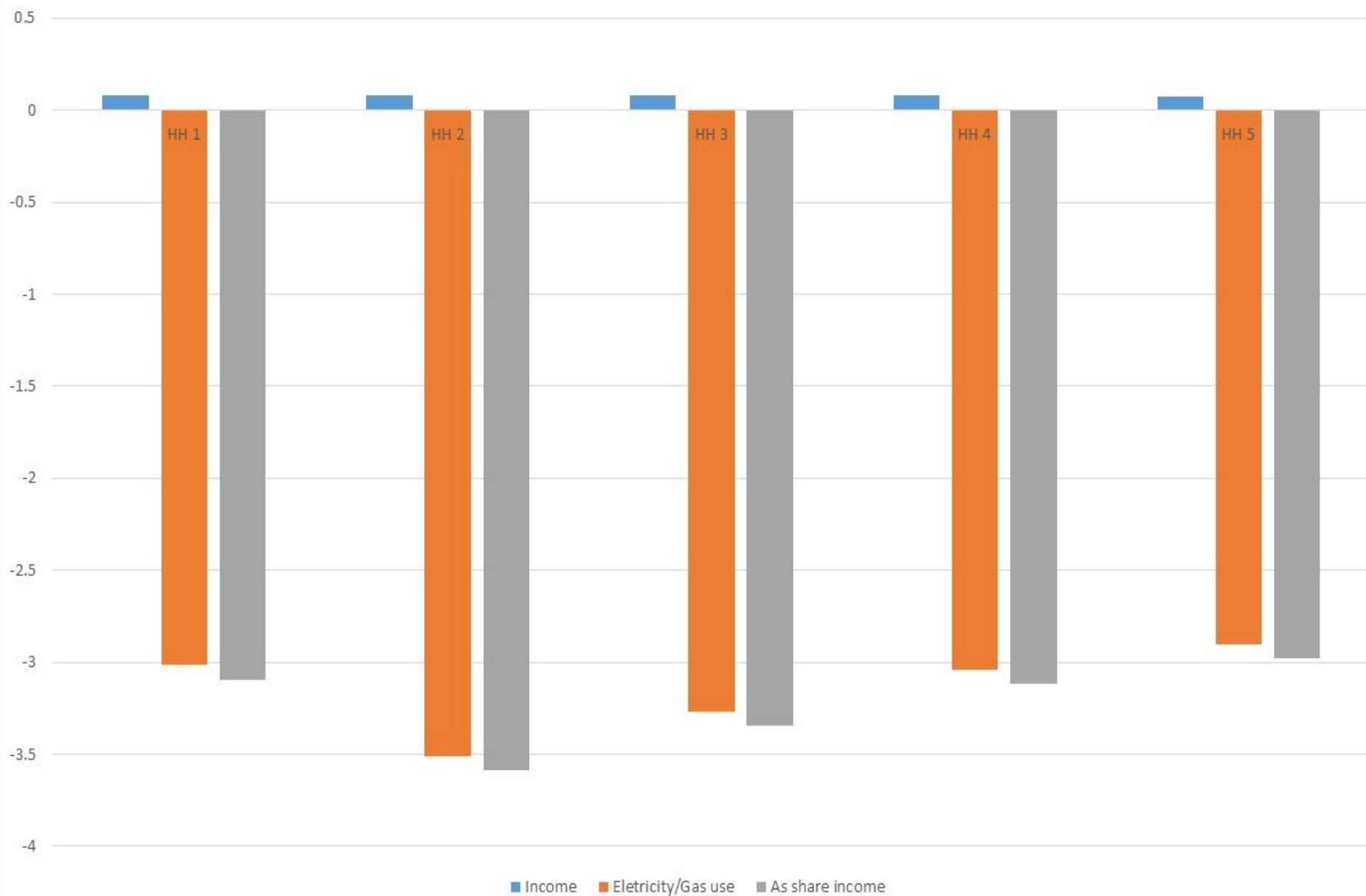


Figure 2 - % impact on income and on electricity and gas use (absolute and share of income) from a 5% increase in efficiency in electricity and gas use - 5 household income quintiles





Conclusion?

- Increasing efficiency with which households use electricity and gas increases income in all household income groups
- Greatest income boost in lowest income households
- Income rises while energy use (not all – some reallocation of spend to driving cars!) falls so share of income spend on electricity and gas falls
- Not by a great deal here – but a move in the right direction
- But lowest (and highest) household income groups also the most energy-intensive to start out.....so they 'rebound' most
- So share of income spent on electricity and gas falls by less in the lowest (and highest) household income groups

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**WE ARE AT AN EARLY STAGE IN OUR PROJECT – FEEDBACK
AND INPUT ON HOW WE PROCEED IS VERY WELCOME!**

Thanks for your attention



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