

The need to investigate socio-economic and skills impact of energy policy actions and new innovations

Energy Innovation Emporium, TIC 31 May 2017

Theme Session: Socio-Economic Development, Green Jobs, &
Skills

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(DRAWING ON LESSONS LEARNED - EPSRC GRANT REF: EP/M00760X/1)



Our challenge for this afternoon

- To have a good discussion with the aim of coming out of the session with a statement on
- ***What is the state of play in terms of analytical (and communication) capability in Scotland regarding understanding potential socioeconomic and skills development impacts and challenges?***



Taking wider perspective to inform public, politicians and policy

- Energy policy isn't just about resolving the familiar 'trilemma'
- Particularly when considering big (and costly) 'game changers', understanding of wider public policy (and public and politicians) is perhaps the crucial challenge
- Moreover, need to ensure that supply chain and skills capacity are present and able to respond
- How can we get people thinking in this way?
- A new way of thinking.....multiple benefits?
- Not that new? Not just recognising policy trade offs anymore – can we 'have our cake and eat it'?
- Unlikely – ***crucial to conduct rigorous policy analysis, using frameworks/approaches trusted by policy decision makers (e.g. HMT) and to communicate messages honestly and effectively***

Making the macroeconomic case for CCS

The Centre for Energy Policy at the University of Strathclyde argues that the UK's decision to scrap its CCS commercialisation competition brings into sharp focus an urgent need to consider the economic service role of capture, transport and storage activities.

By Karen Turner and Julia Race



The Role of Economical-Technical System Modelling in Considering the Value of CCS



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“HM Treasury raised concerns about the merits of the carbon capture and storage competition given fiscal constraints”

‘Briefing for the House of Commons Environmental Audit Committee’ by the National Audit Office, July 2016 (page 7)

Analysis:

It is considered that this decision was reached because there were key omissions in the information provided to Treasury:

- The wider economic and fiscal case not made
- The near-term benefits were not argued e.g. employment in developing infrastructure
- The longer term benefits of establishing an economic service activity were not considered



Consider current policy language

ENERGY STRATEGY – SCOTLAND'S ENERGY EFFICIENCY PROGRAMME (SEEP)

NATIONAL INFRASTRUCTURE PRIORITY FOR ENERGY EFFICIENCY



Achieving these targets will mean that to be fit for the future Scotland's homes, commercial properties and the public sector estate will need to be near zero carbon by the middle of this century. Delivering this will be very challenging and must be done in a way that is both socially and economically sustainable. Improving the energy efficiency of Scotland's buildings, decarbonising their heat supply and tackling fuel poverty will have many positive benefits including supporting jobs nationwide, enhancing businesses' competitiveness, as well as improving health and early years outcomes.

Energy efficiency has lasting stimulatory effects

- September 16 - Scottish Government inclusion of investment in energy efficiency in **post-Brexit economic stimulus package**
- Initial policy focus? – impacts on fuel poverty, public budgets.....output and job creation triggered by building activity to make homes and public buildings more energy efficient.... but how much **additional sustained activity?**

1. Gains to the Scottish economy resulting from the total **£20m spending boost alone** are largest in the year that the spending and retrofitting take place and must be set against the impact on the government budget of making the expenditure (partly offset by gains from the expansion).

Assuming spending and retrofit in 2017....

2017 GDP +£3.9m, jobs +121,

public budget -£18.2m

2020 GDP +£1.76m, Jobs

+31, public budget

+£0.42m

2027 GDP +£0.72m,

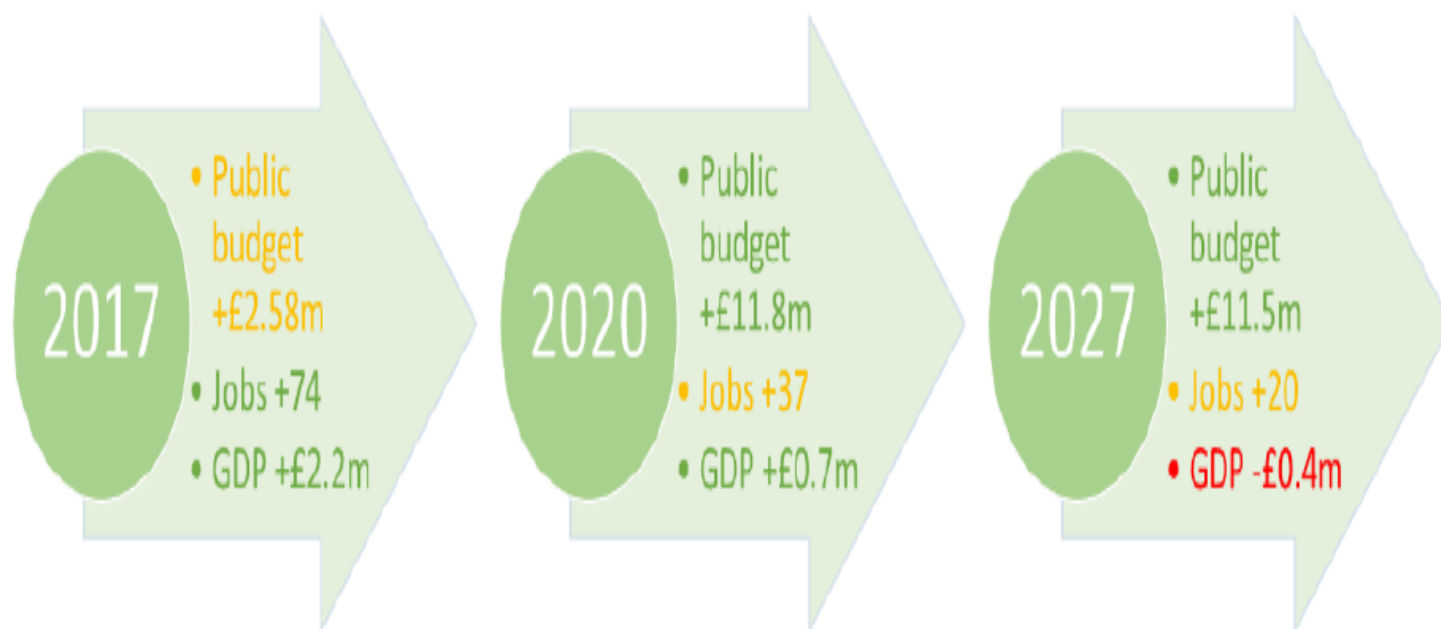
Jobs +12, public

budget +£0.2m



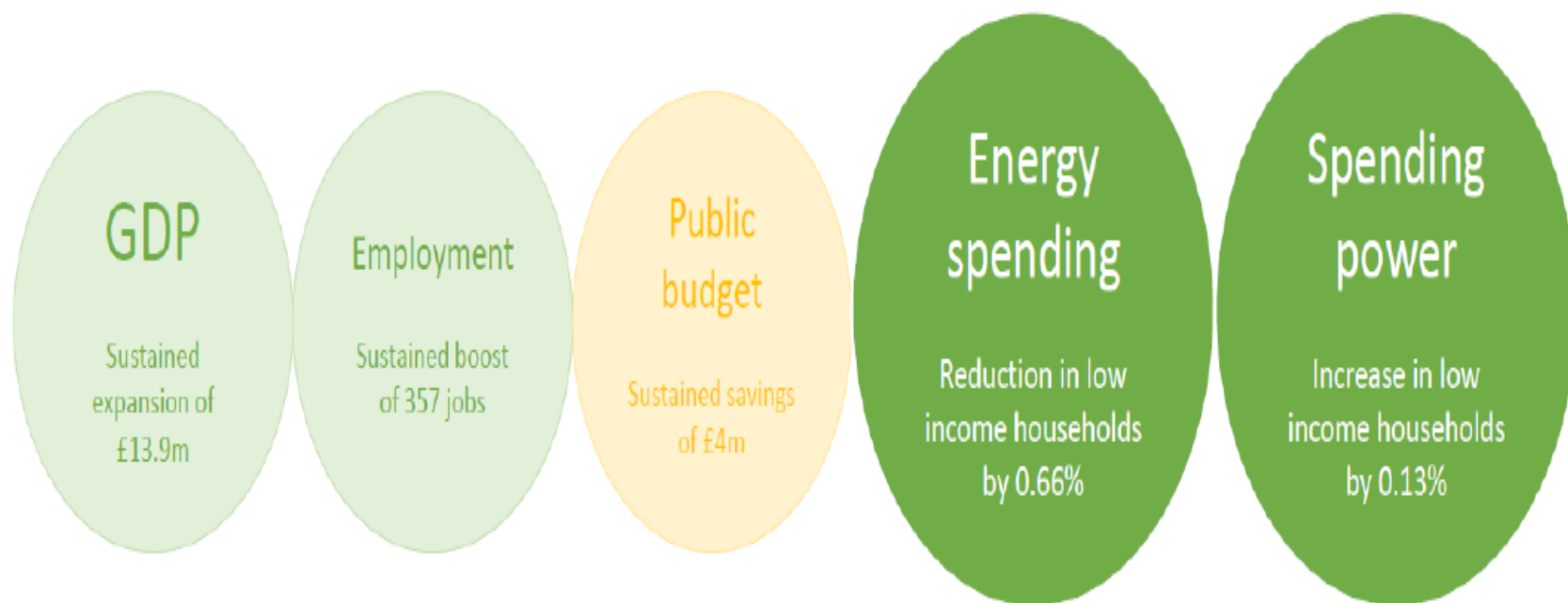
In the case of the £10m spent on increasing energy efficiency in public buildings, a sustained return to the public purse may be secured as a result of reduced costs of delivering public services. However, depending on the response of energy supplier, this may come at the cost of reduced Scottish GDP, though employment may fare slightly better.

If even just a 2.5% reduction in physical energy requirements is achieved in the public sector...



The greatest all round socio-economic return may be realised as a result of increasing energy efficiency in low income households. This is in terms of a sustained boost to Scottish GDP, employment and public finances (recovering a significant part of the £10m spend). The key impact in terms of fuel poverty is that not only will spending by low income households on energy fall, the purchasing power of low household real incomes will rise in a sustained way.

If a 2% reduction in energy required to provide heating, lighting and cooking in low income households is achieved ...



Energy efficiency has lasting stimulatory effects

- Further, and lasting, economic stimulus generated by what happens once increased efficiency takes effect
 - Increased disposable household income
 - Savings from lower energy bills redirected to spending on other things
 - Depending on how economy responds, some winners and losers
 - But likely net lasting gains at economy-wide/macroeconomic level
- Even clearer story in efficiency improves in industrial energy use, particularly in energy and/or export intensive, or key upstream supply chain
- Argument developing pace and a wider audience.....



**June 2015
Thematic Issue 49**

**Exploring the Links
between Energy
Efficiency and
Resource Efficiency**

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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.

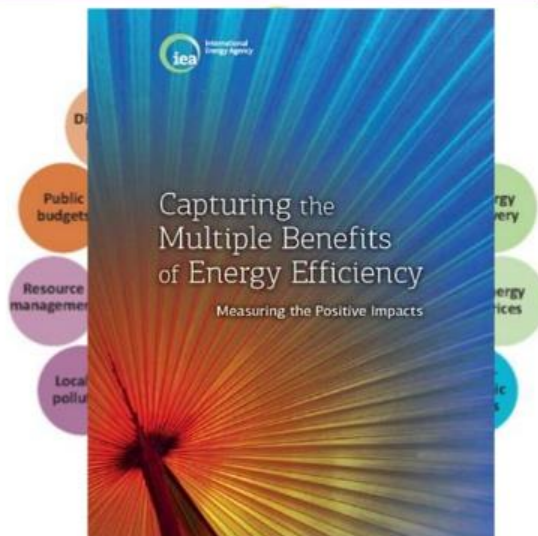
The model's results suggest that the 5% improvement would have positive effects on the national economy, because increased real income and spending on non-energy sectors has a greater economic impact than the same amount of spending on energy. The effects would



Multiple Benefits of Energy Efficiency (IEA, 2014)

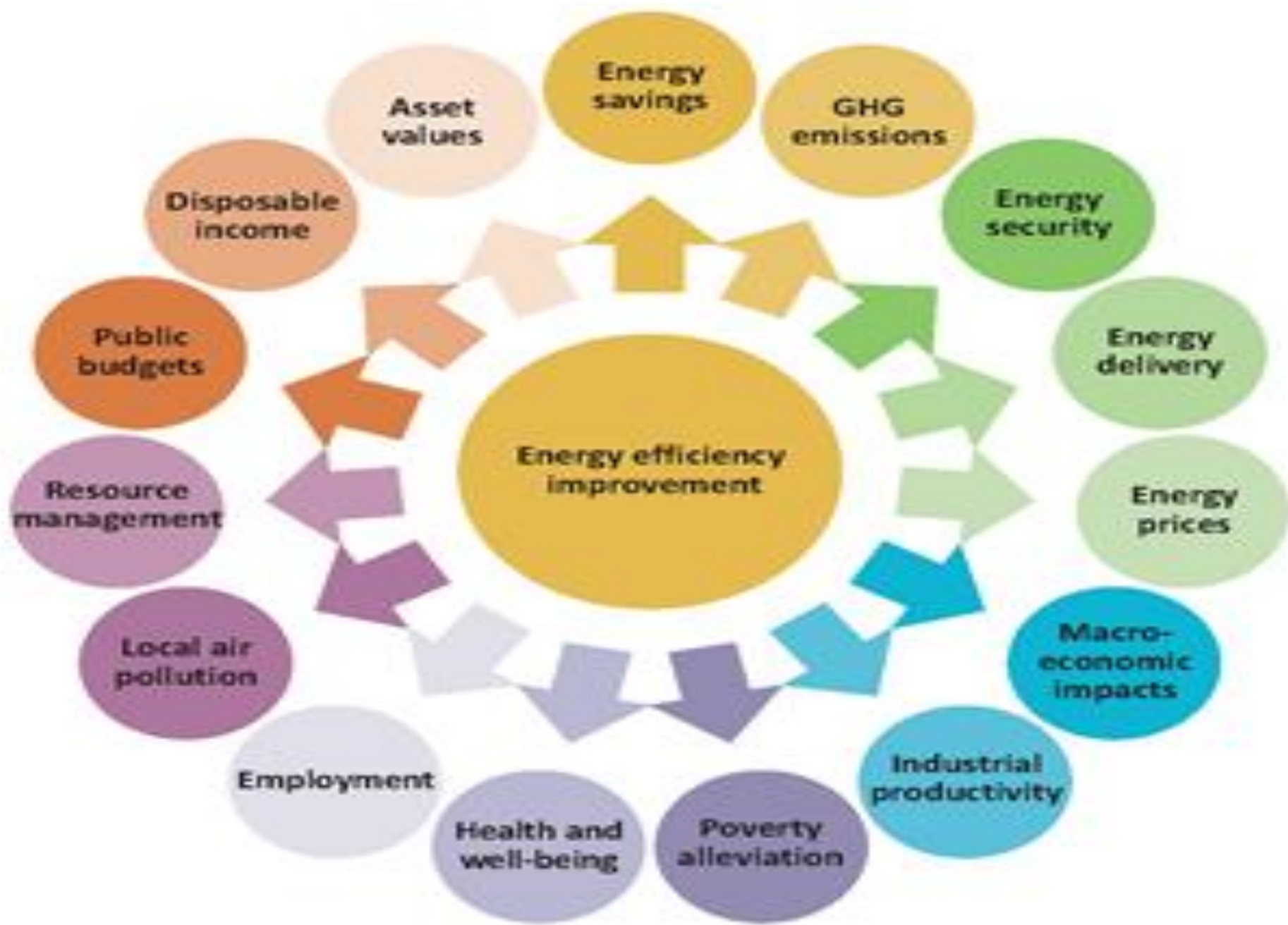
EE has multiple benefits

DATABUILD
Research & Solutions



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







Multiple benefits thinking not limited to energy efficiency....more current policy language



The pillars

Harnessing the industrial opportunities from new energy technologies

In nuclear, the decision to proceed with the first new nuclear power station in a generation at Hinkley Point is accompanied by a commitment to develop a strong UK supply chain to support the sector, with EDF expecting over 60 per cent of the project's construction value to be placed with UK companies. In turn investment in nuclear skills – at college and university level – is upgrading both the domestic capacity to provide the labour required and the level of skills and income in the local workforce.

7. **Delivering affordable energy and clean growth** – we need to keep costs down for businesses, and secure the economic benefits of the transition to a low-carbon economy.



Not just about the potential for benefits



The challenge

There are three major challenges for energy policy that our industrial strategy will address.

First, to ensure that the shift to a low carbon economy is done in a way that minimises the cost to UK businesses, taxpayers and consumers.

THE ECONOMIC IMPACT OF HYDROGEN AND FUEL CELLS IN THE UK

A Preliminary Assessment based on Analysis of
the Replacement of Refined Transport Fuels and Vehicles

Martin J. Smith, Oluwafisayo Alabi, Nick Hughes,
Paul Dodds, Karen Turner and John T.S. Irvine



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H₂FC SUPERGEN
THE HYDROGEN AND FUEL CELL RESEARCH HUB

Headline message of input-output modelling

A significant move away from current UK use of refined fuels in private transport towards hydrogen can be expected to yield a valuable increase in GDP and employment

- ❑ The likely gains will come not only from the production and distribution of hydrogen in the UK but also from the ***range of service sector activities***, including finance, involved in a potentially ***strong domestic supply chain***.
- ❑ Key driver of findings: ***the current supply chain for petrol and diesel is highly import-intensive***.

Key questions/issues

1. *Can we expect that hydrogen supply will share strong domestic supply chain properties of proxy sectors used in the paper (electricity and/or gas supply)?*
2. *What will the substitution between fuel types look like, and how long will it take to happen?*
3. *What are the implications of retaining a fossil fuel base in the fuel supply chain, and what if it is imported rather than domestic?*



General Conclusions/Recommendations

- ❑ Modelling did not take direct account of the increasing penetration of renewables/low carbon source of electricity for electrolysis
- ❑ Key point here is that supply chain implications are good, with much already in place and servicing other industry
- ❑ Skills and training are 'evolution rather than revolution' and can be built on the basis of extant provision which supports existing industry
- ❑ UK IP retention will mainly be about the retention of *highly skilled and highly mobile innovators and employees*
- ❑ The establishment of one or more **Industrial Clusters** could significantly enhance UK economic HFC success, particularly given significant export potential
- ❑ Importance of early R&D and successful adoption at home – but much to learn from elsewhere, e.g. German NOW example of a single cross-cutting support agency





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