UNIVERSITY of STRATHCLYDE
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CENTRE FOR ENERGY POLICY

EPSRC Event for the Energy Saving Trust
London, 27 July 2016

Session 2 2:00-4:00pm

A TOOL FOR ASSESSING ENERGY/CARBON IMPLICATIONS OF SPENDING DECISIONS

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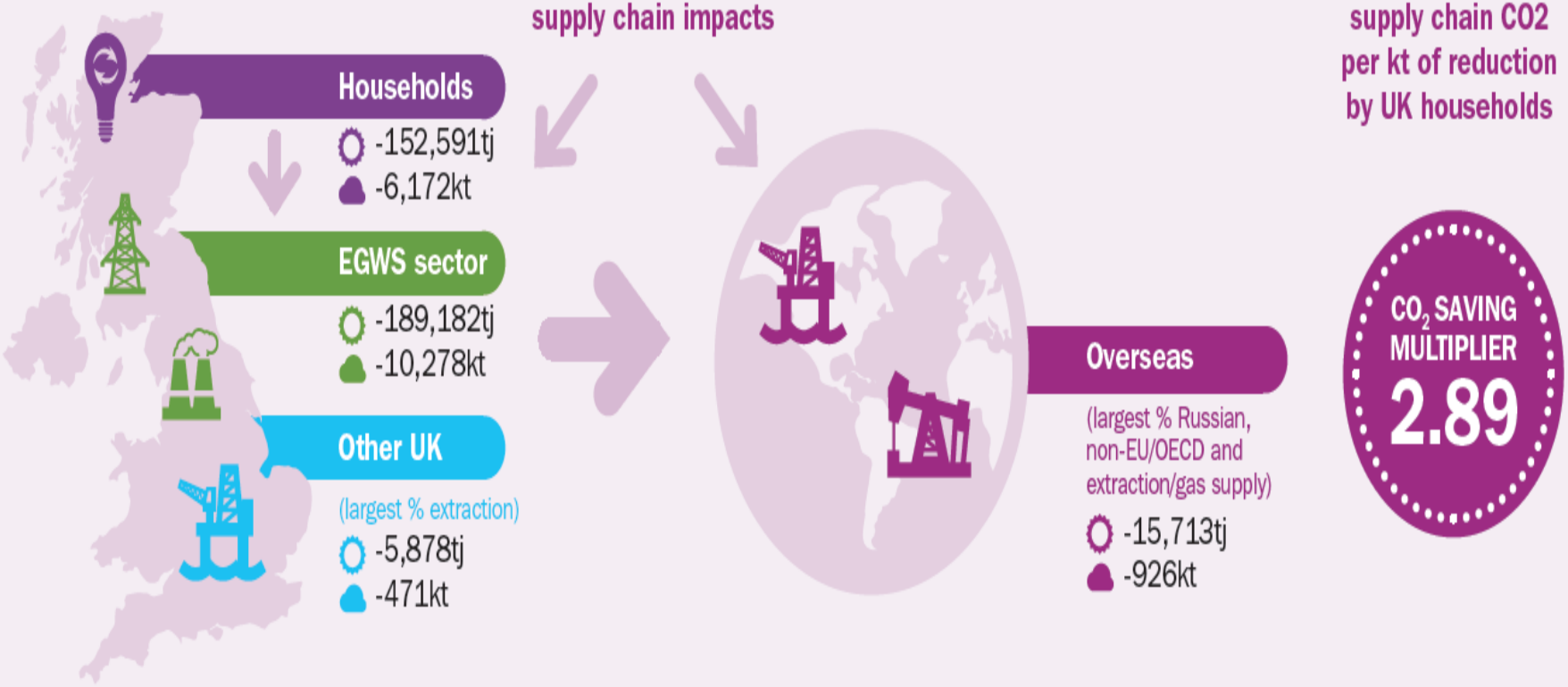
Input-output multipliers: assessing carbon/energy implication of different types of spending

- WIOD global inter-country input-output database
- Use of multiplier analysis to consider UK and international energy use and carbon impacts of different spending allocations
- WIOD permits ***full 'carbon footprint'*** analysis with impacts broken down by industries within countries
- Use of Scottish or UK IO tables (Scot Gov, ONS) permits more detailed sectoral analysis but, without adjustment, just territorial emissions
- Policy brief – focus on ***restating rebound*** in terms of initial ***energy/carbon savings multiplier*** that is then eroded (but not wiped out) by positive rebound effects

OUTPUT MULTIPLIERS (IMPACTS PER £1M SPEND)

	Energy	CO_2
UK Electricity, Gas and Water Supply	+59.676tj	+2.96kt
UK Hotels and Restaurants	+4.45tj	+0.22kt
Global Food and Drink	+9.88tj	+0.49kt

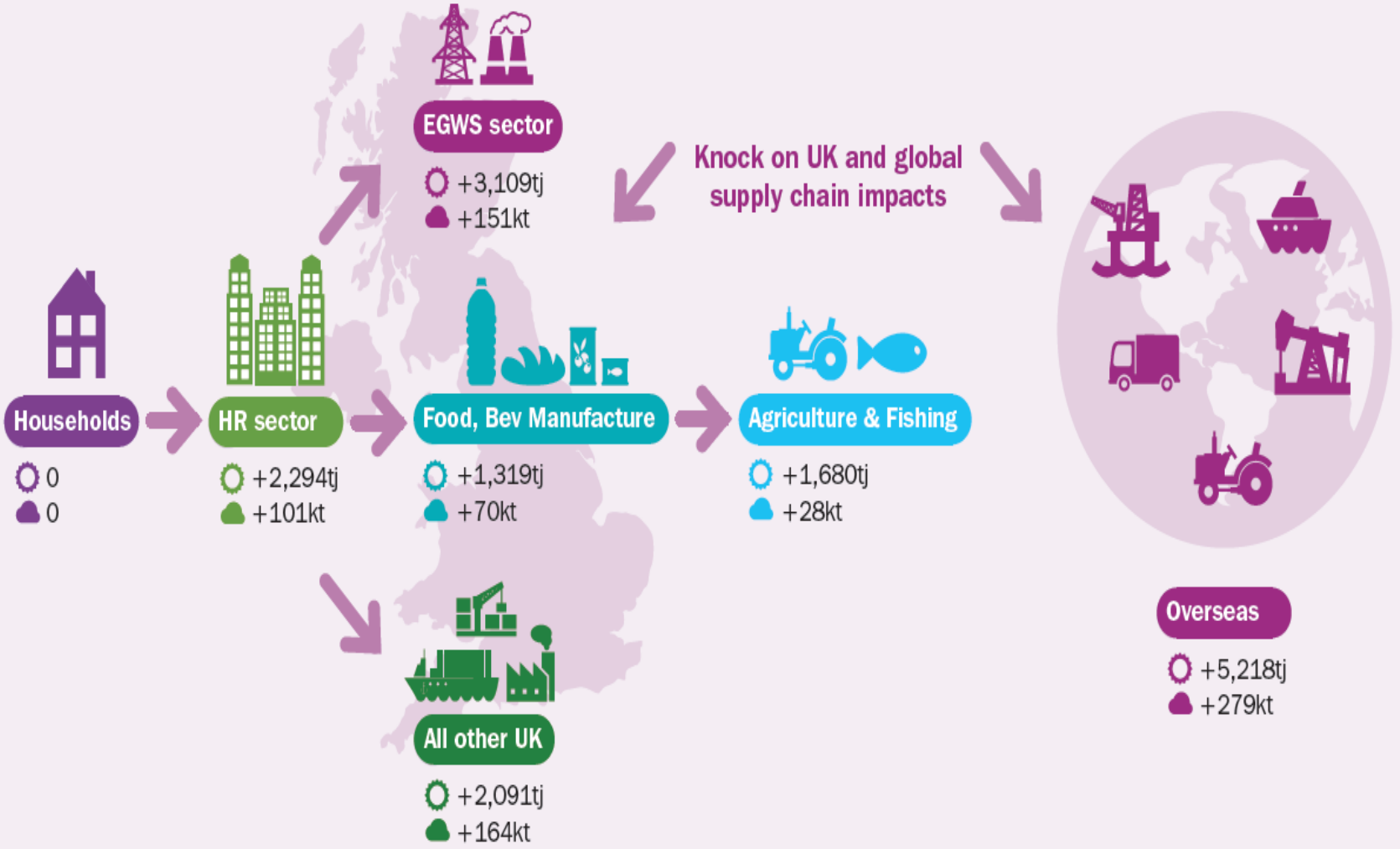
1 – MORE ENERGY EFFICIENT UK HOUSEHOLDS REDUCE SPENDING ON UK 'ELECTRICITY, GAS AND WATER SUPPLY' (EGWS) BY 10%



TOTAL UK SAVINGS -347,651tj -16,921kt

TOTAL GLOBAL SAVINGS -363,364tj -17,847kt

2A – RE-SPEND SCENARIO 1: UK HOUSEHOLDS SWITCH SPENDING TO UK 'HOTELS AND RESTAURANTS' (HR)



KEY

Energy use

Related CO_2

TOTAL UK INCREASE +10,492tj +514kt

TOTAL GLOBAL INCREASE +15,711tj +794kt

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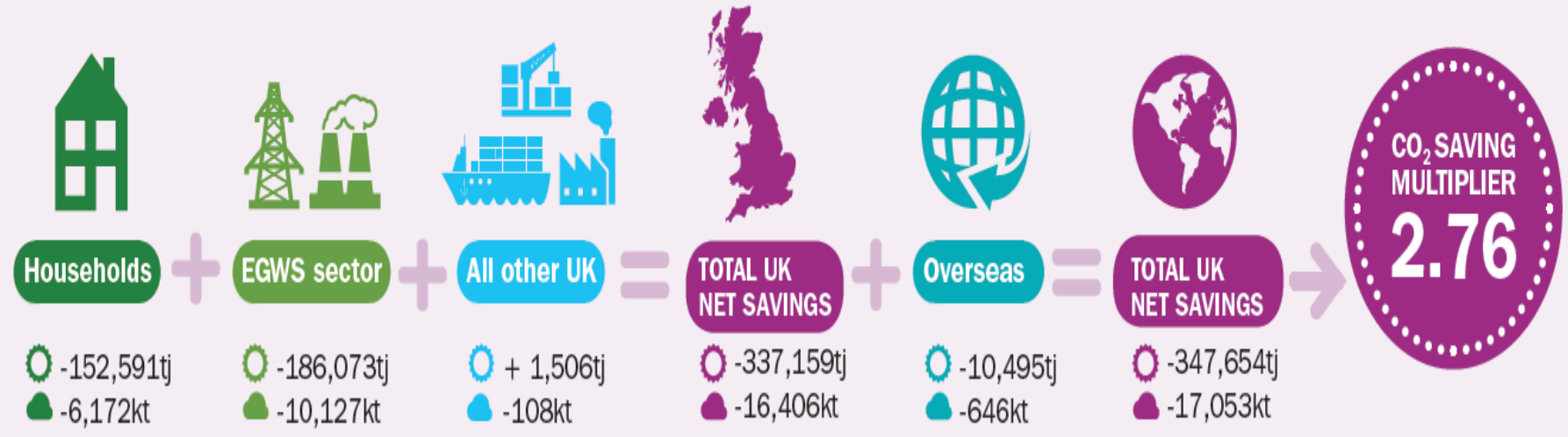
2B – NET IMPACTS ON ENERGY USE AND RELATED CO_2 FROM EGWS TO HOTELS AND RESTAURANTS REALLOCATION



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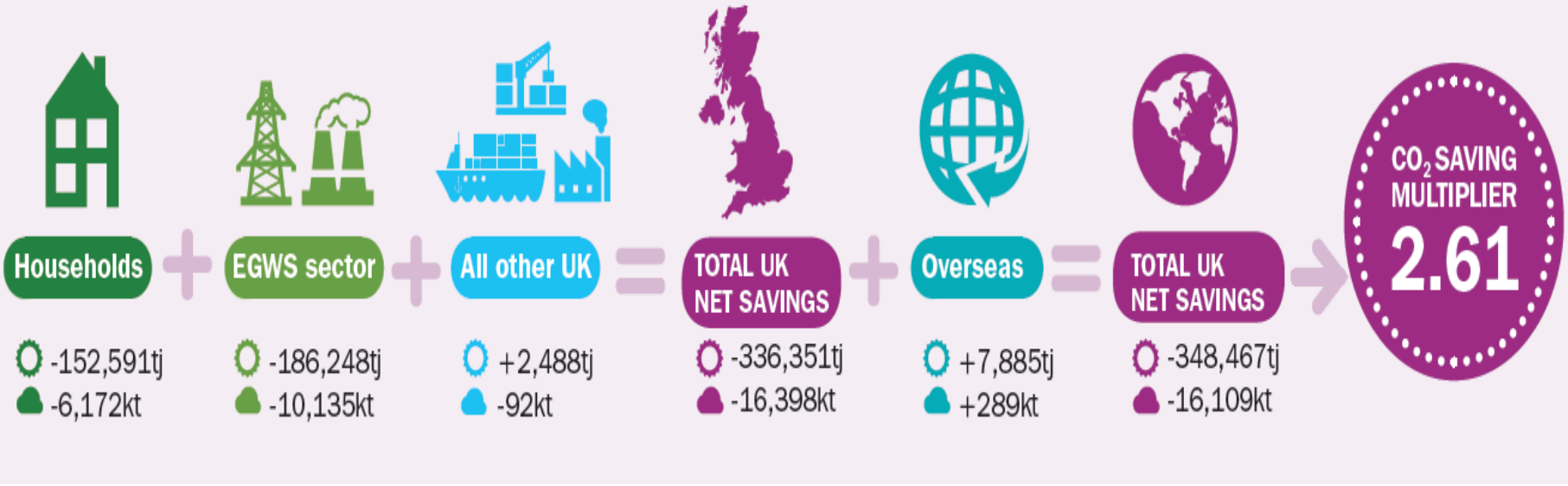
3B – NET IMPACTS ON ENERGY USE AND RELATED CO_2 FROM EGWS TO GLOBAL FBT REALLOCATION



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QUESTION 1

How useful would a multiplier tool be in considering energy/carbon impacts of different types of spending?

Introduction

Input-output multiplier analysis as a useful tool

Multiplier analysis measures the economy-wide impacts of changes in final demand for the output of specific production sectors.

➢ **Why input-output multiplier analysis?**

- Simple tool
- Policy tool (e.g. employment multipliers)
- Flexible framework or tool (e.g. Inter-country or Regional analysis)

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Applying multiplier analysis to consider different re-spending options

➢ Scottish Example

- ❖ What are the Carbon Savings Multipliers for Scotland?
- ❖ What are the GHG multiplier impacts in Scotland for different 'Eat', 'light', 'Heat' and 'Travel' domestic spending options?

➢ Data

- ❑ Scottish Input-Output (IO) Tables 2012
- ❑ UK Average Sectoral GHG Intensities

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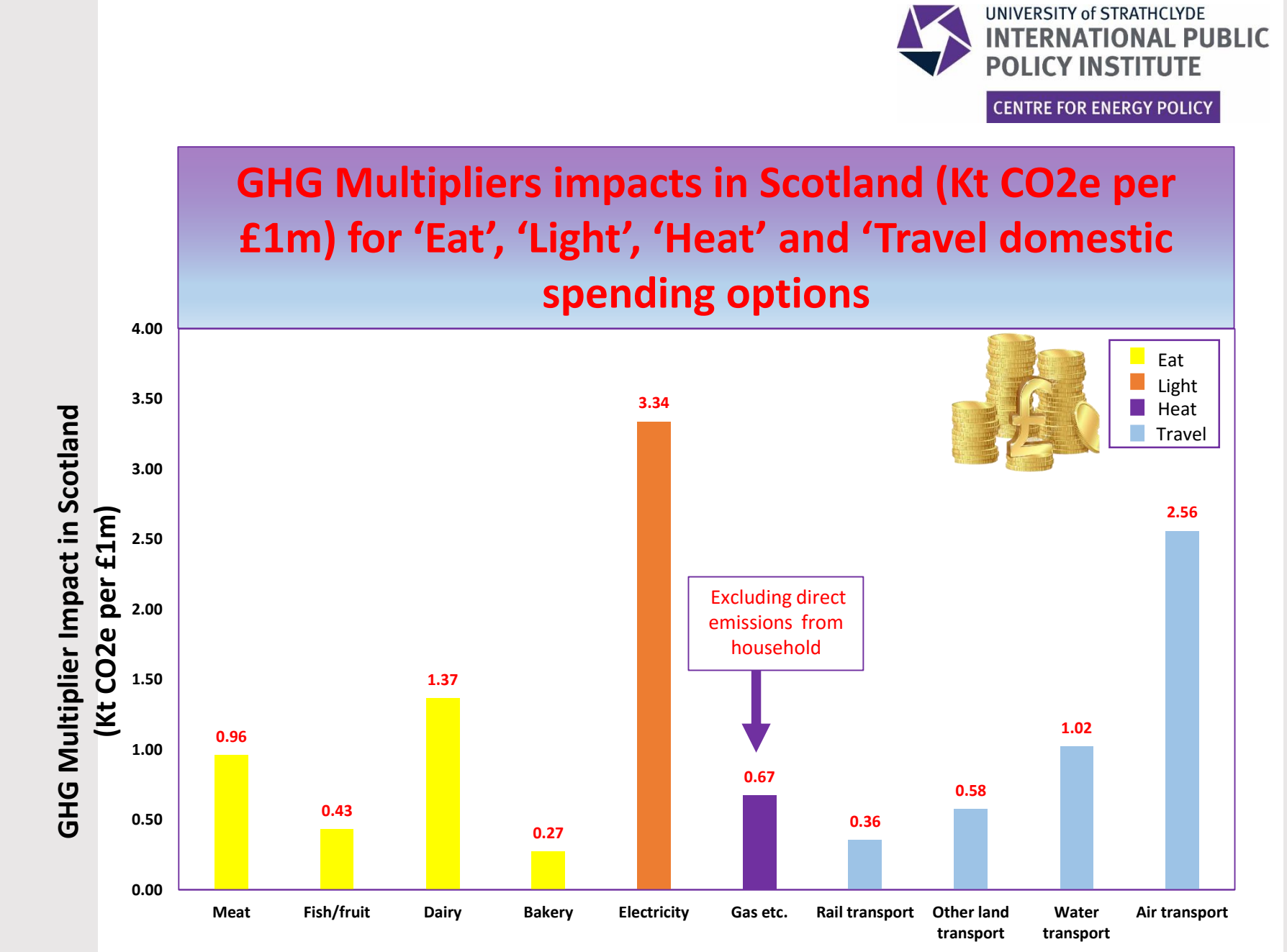
GHG Multipliers impacts in Scotland (Kt CO2e per £1m) for 'Eat', 'Light', 'Heat' and 'Travel domestic spending options



Challenge in applying input-output multiplier analysis

- **Data: Appropriate physical data is usually unavailable or difficult to obtain**

'Scotland is in an excellent position with regard to economic input-output accounting data, however a key challenge/problem is a lack of region-specific data on sectoral GHG

Further Applications:

- How GHG is distributed within Scotland's supply chain.
- Use Scottish data to replace the electricity GHG intensities to see how the multipliers change.
- Replicate similar scenarios as in the inter-country case.

Advantages of input-output multiplier analysis

- Useful tool for examining the interdependences within an economy and the interactions between the economy and the environment.
- Flexible framework or tool (e.g. Inter-country or Regional, other pollutants, waste and resource uses)
- Alternatives tool/method to Rebound measures.
- Framework to construct a regional Computable General Equilibrium (CGE) model (other analysis in project).
- Support existing economic and environmental policies or inform new policy decisions. (Answer key questions and 'What if' scenarios)

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The way forward?

Development of an IO-based tool?

- Our focus to date has been informing policy analysis
- From initial high level check to more detail for keener user
- Kenechi working over summer on basis for developing an IO-based tool aimed at public education of carbon impacts of different types of spending
- Simon sent link to the Home Energy Check tool as an example of what could ultimately be developed – could be starting point (disposable income to be reallocated)
- Could we work together to develop a tool that (a) provides user with clear answers (scores?), and (b) EST with more granular date on embodied energy/carbon impacts?

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QUESTION 2

How feasible is the development of such a tool for EST customers?

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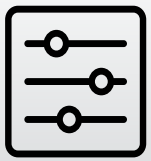
RATIONALE

STAGE 1

Based on a set of responses provided by a respondent, the tool should be able to make inferences on possible estimated savings accruable from energy efficiency measures

STAGE 2

The respondent further provides responses to questions on how (s)he is likely to spend the additional disposable income.



STAGE 3

Based on outcomes of Stages 1 and 2, embodied emission can be computed by the I-O model

STAGE 4

To stimulate further interest, carbon footprint levels of the respondents are rated and badges assigned accordingly as in a game.

QUESTIONS?

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QUESTIONS?

- Based on the model developed in the study, we can consider the carbon implications of spending choices using a simple Input-Output tool

- Presents a more accurate way of computing $C0_2$ emissions. Built around high quality input data a sound modelling

- Can be developed as a “stand alone” or can be built as an extension of such other tools as the Home Energy Checker

- Many design possibilities exist to suit the interests of both keen users and less-keen users.

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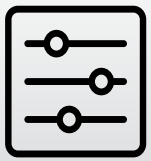

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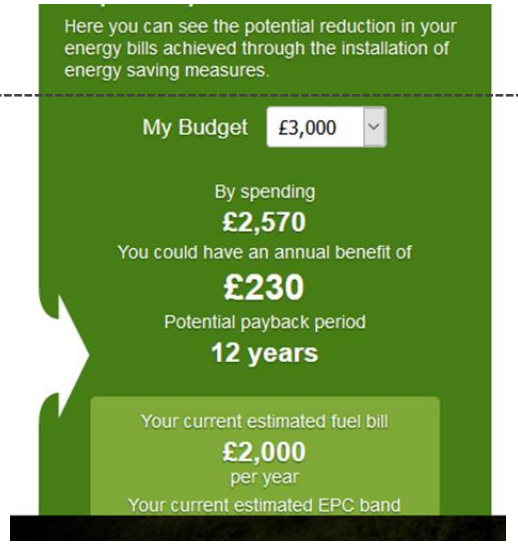
QUESTIONS?

- **Respondents provide answers to questions on household energy efficiency choices.**

- **Inference can be made by the system to estimate the £ value of savings accruing from energy efficiency.**

- **E.g Home Energy Checker**



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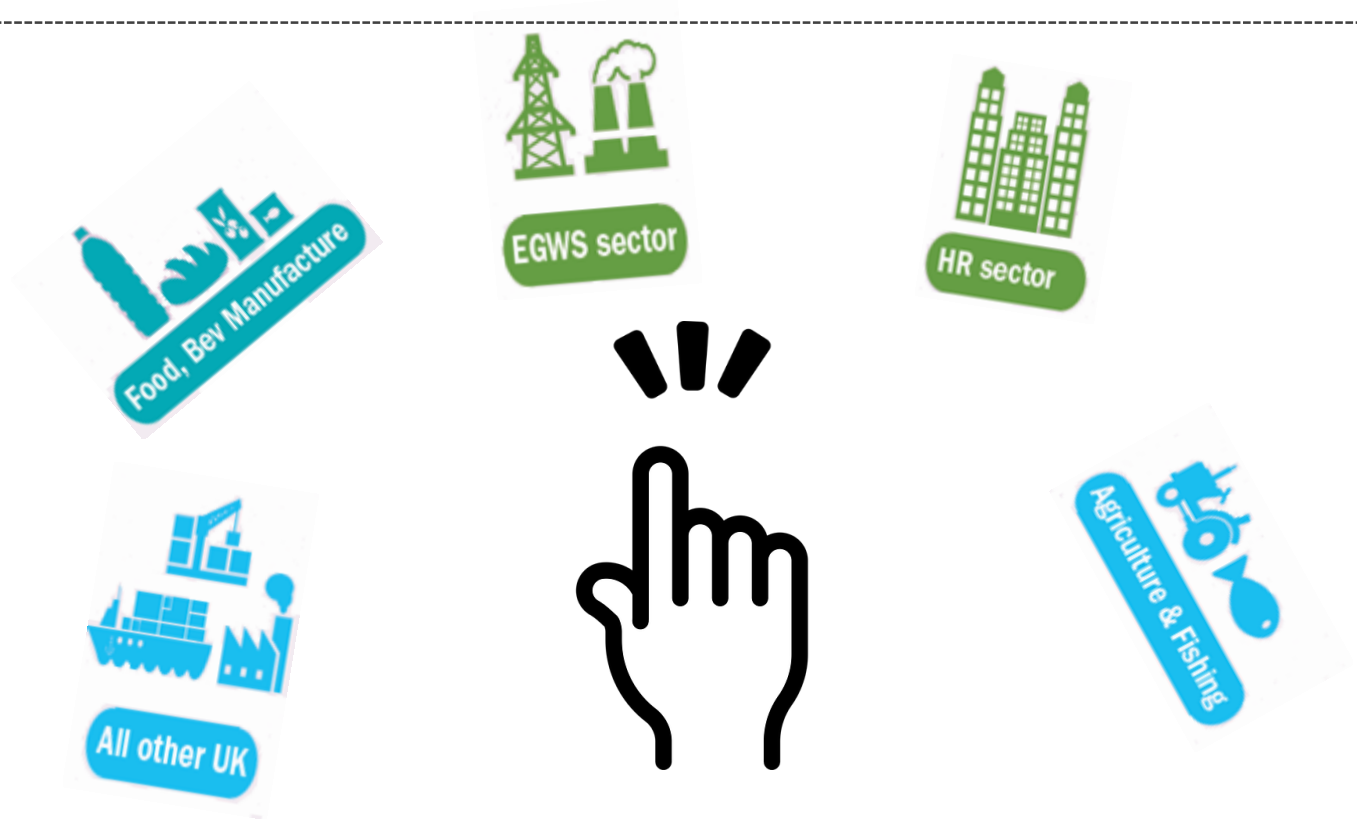
QUESTIONS?

- **Respondents further answer questions based on potential choices of spend of additional disposable income**

- **A combination of choices can be selected from a drop-down box spanning different sectors of the economy**



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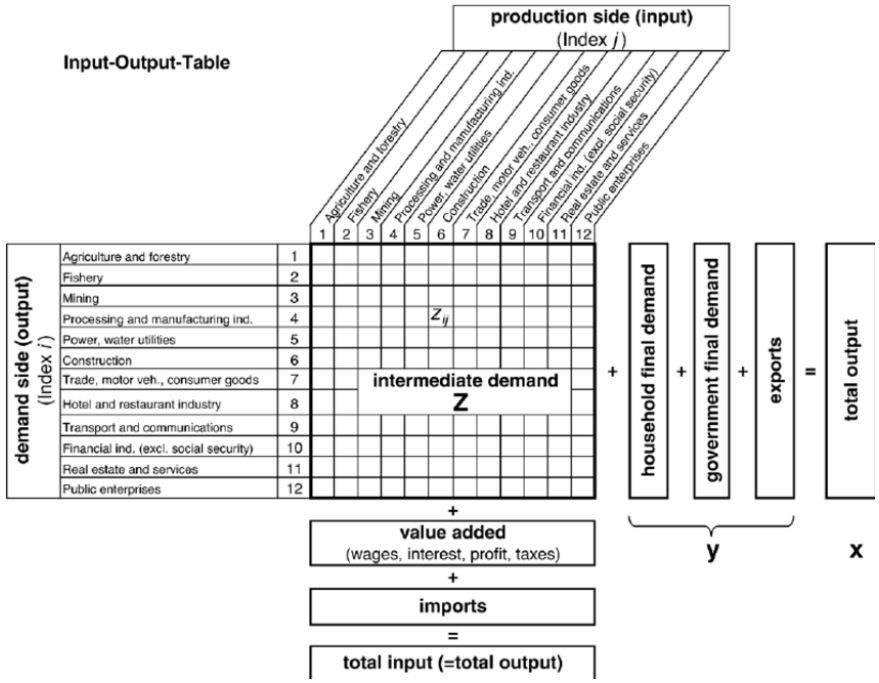
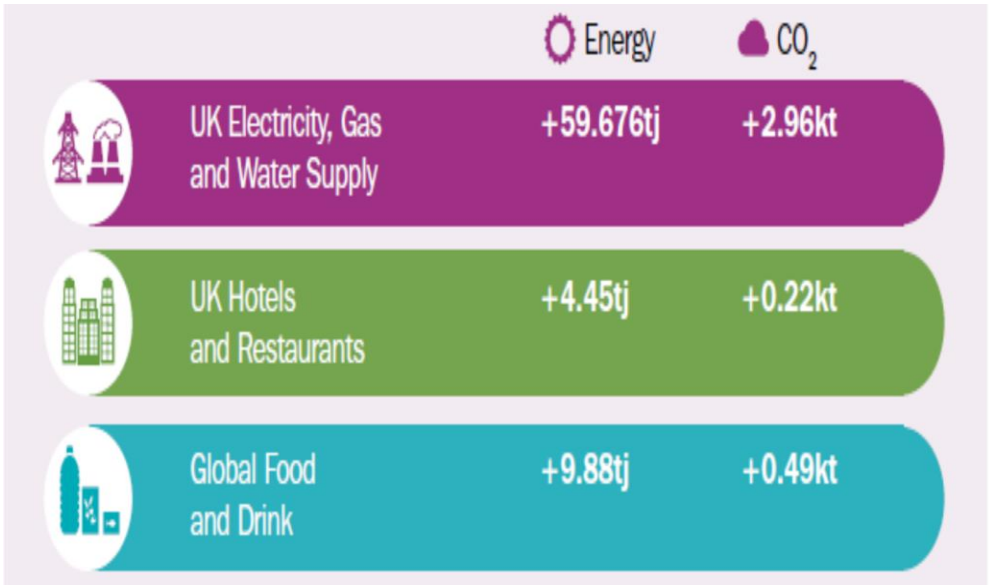
QUESTIONS?

- **Based on outcome of Stage 1 (estimated savings) and Stage 2 (choice of re-spend) I-O model can compute embodied emissions**

- **Robust data from United Kingdom I-O tables, WIOD etc**





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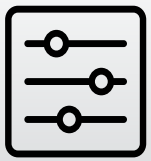

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QUESTIONS?

- **Gamification is important to promote engagement with the tool and stimulate continuous interest.**

- **Emission levels of respondents can be categorized, rated and badges assigned accordingly.**

- **How about a gold star?**

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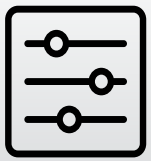

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QUESTIONS?

Research Councils UK Energy For a Low Carbon Future

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Thank you for listening!

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http://cied.ac.uk/research/impacts/energysavinginnovations

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