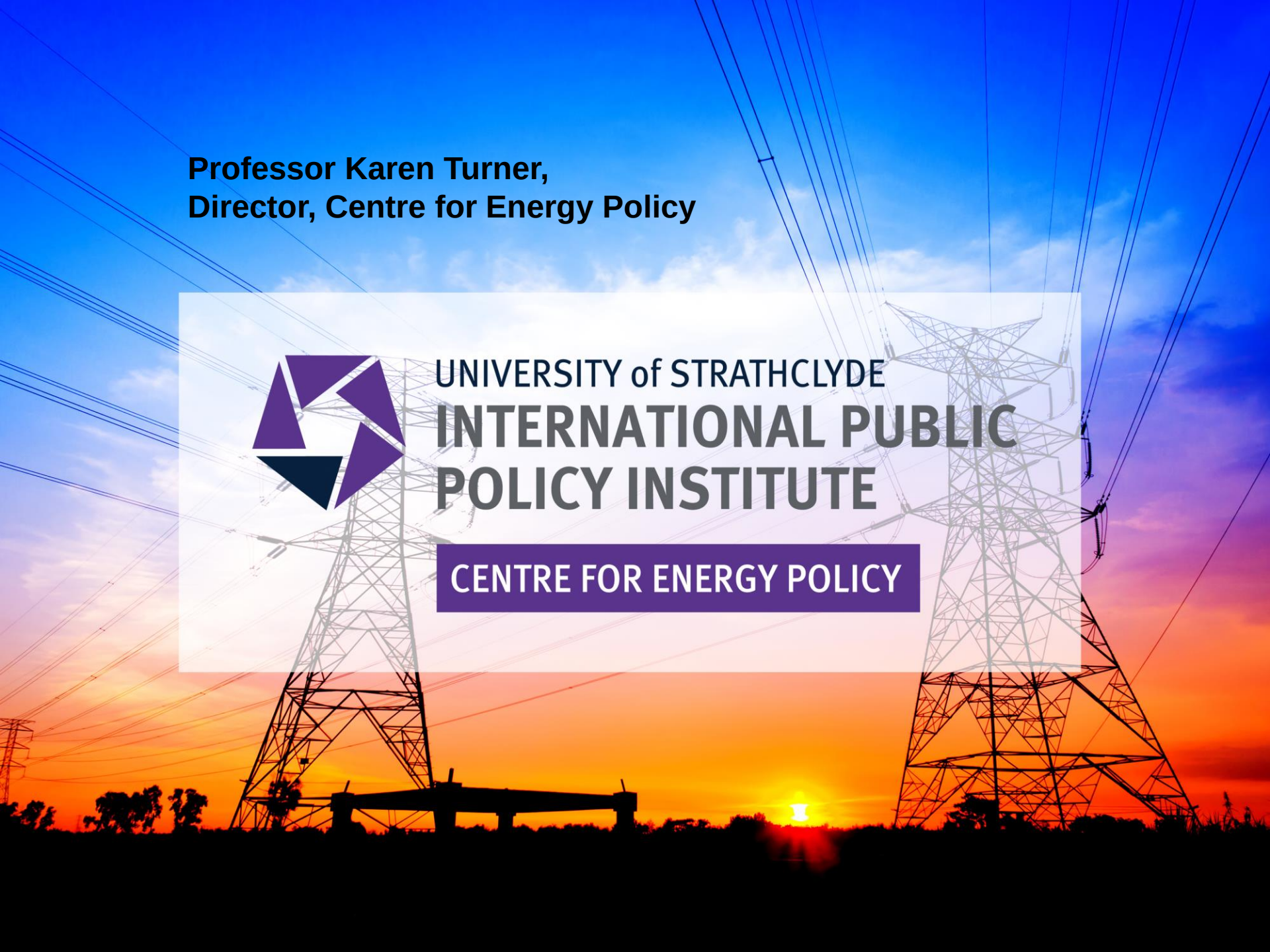
Professor Karen Turner,
Director, Centre for Energy Policy



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EPSRC project: 'Energy Saving Innovations and Economy-Wide Rebound Effects'

CEP, FAI (Strathclyde); CIED (Sussex)

INDUSTRIAL ENERGY EFFICIENCY AND PRODUCTIVITY-LED GROWTH

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A key finding from our previous research:

1. Nature of economy-wide response to increased energy efficiency differs depending on whether efficiency improves in household or industrial sectors – demand-driven vs. productivity led growth

   – In household case, impact on competitiveness and ultimate macro-level outcome depends crucially on how/if cost of living implications of energy efficiency improvements are reflected in wage demands

2. Rebound from industrial energy efficiency will be accompanied by net economic benefits: improved competitiveness, increased GDP, total employment and investment

   – Same processes as improved efficiency in any input
   – However, in the case of energy, there are two issues:
   ➢ Generally a less important/smaller scale input to production than capital or labour
   ➢ A ‘produced’ input – need to consider impact on/response of energy producers

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Example: increased efficiency in energy use in UK Drinks industry

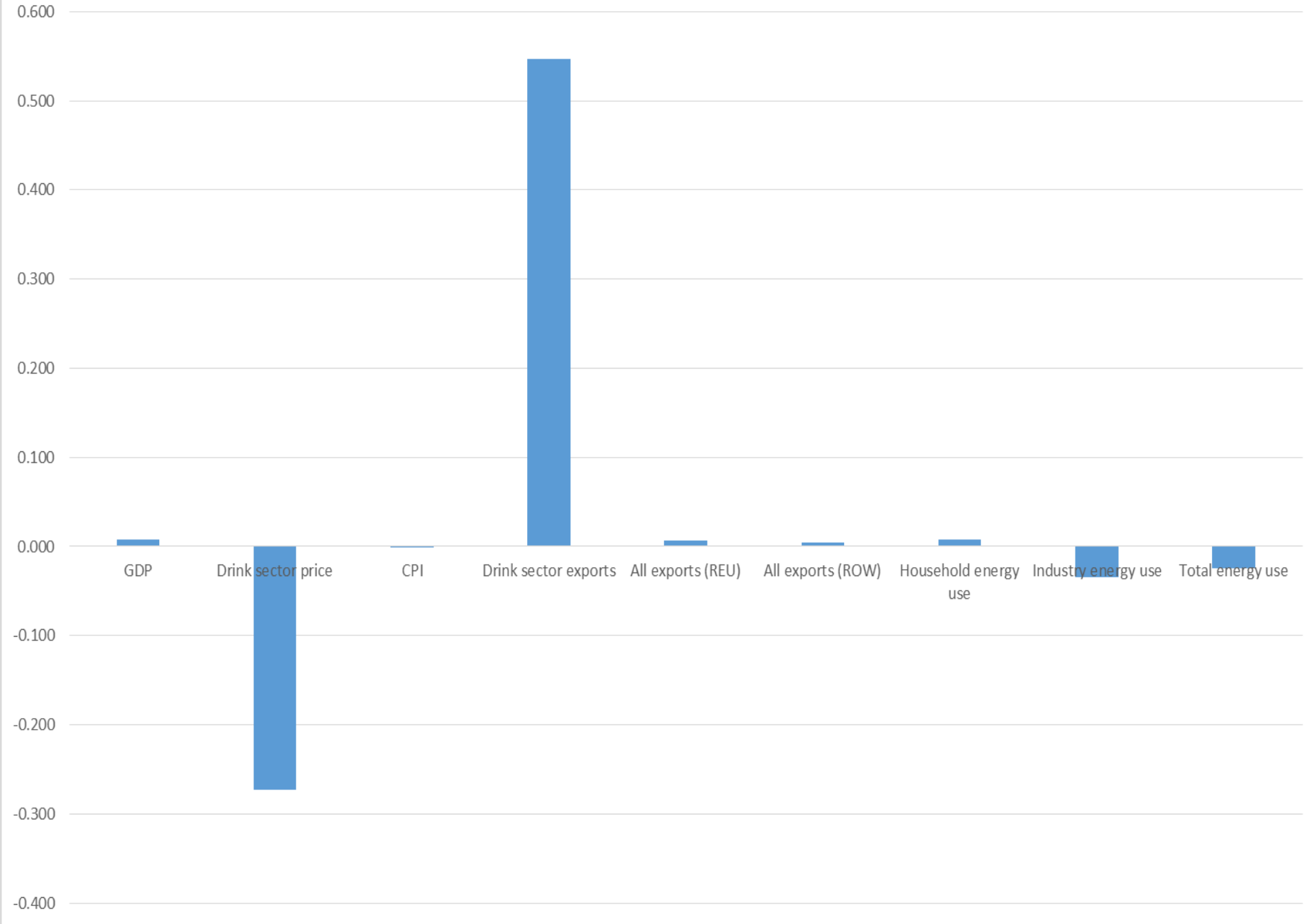
- Working with economy-wide CGE model of the UK national economy

- Initially, a very broad-brush simulation
- Introduce a 10% improvement in efficiency in all energy use in the UK Drink (alcoholic and non-alcoholic) industry
- i.e. produce the same output using 10% less physical energy input
- Reduces price of energy service delivered

- Project will involve more tailored case studies using UK and Scottish models
- e.g. Scottish Whisky production, focussed on particular types of energy use, taking account of time/dynamic issues (such as maturation process, delay between efficiency improvement and more competitive product going to market)

- **Focus here – growth processes triggered by energy efficiency improvement in a relatively energy- and export-intensive industry**

Figure 1. Impacts (%) of a 10% energy efficiency improvement in the UK Drink industry



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Example: increased efficiency in energy use in UK 'Road and Rail Commercial Transport' industry

- Road and rail passenger and freight transport, road and rail
- Again, initial simulation work with broad brush 10% improvement efficiency all energy use in the industry
- Previous work with Sam Anson (Scottish Government) focussing on Scottish road transport sector published in Energy Policy (2009)
- Focus and key findings there – how 'rebound effects' are dampened by energy supply response, particularly in refining/distribution of diesel fuel

- Here, focus on household response
- **Might improvements in energy efficiency in commercial rather than private transportation deliver comparable savings in energy use?**
- **Both in household energy use and at macro/economy-wide level?**
- ***But with positive impacts on competitiveness in productivity- rather than demand-led growth?***
- ***Does the efficiency improvement need to be in energy use?***

Figure 2. Impacts (%) of a 10% energy efficiency improvement in the UK Road and Rail Commercial Transport industry

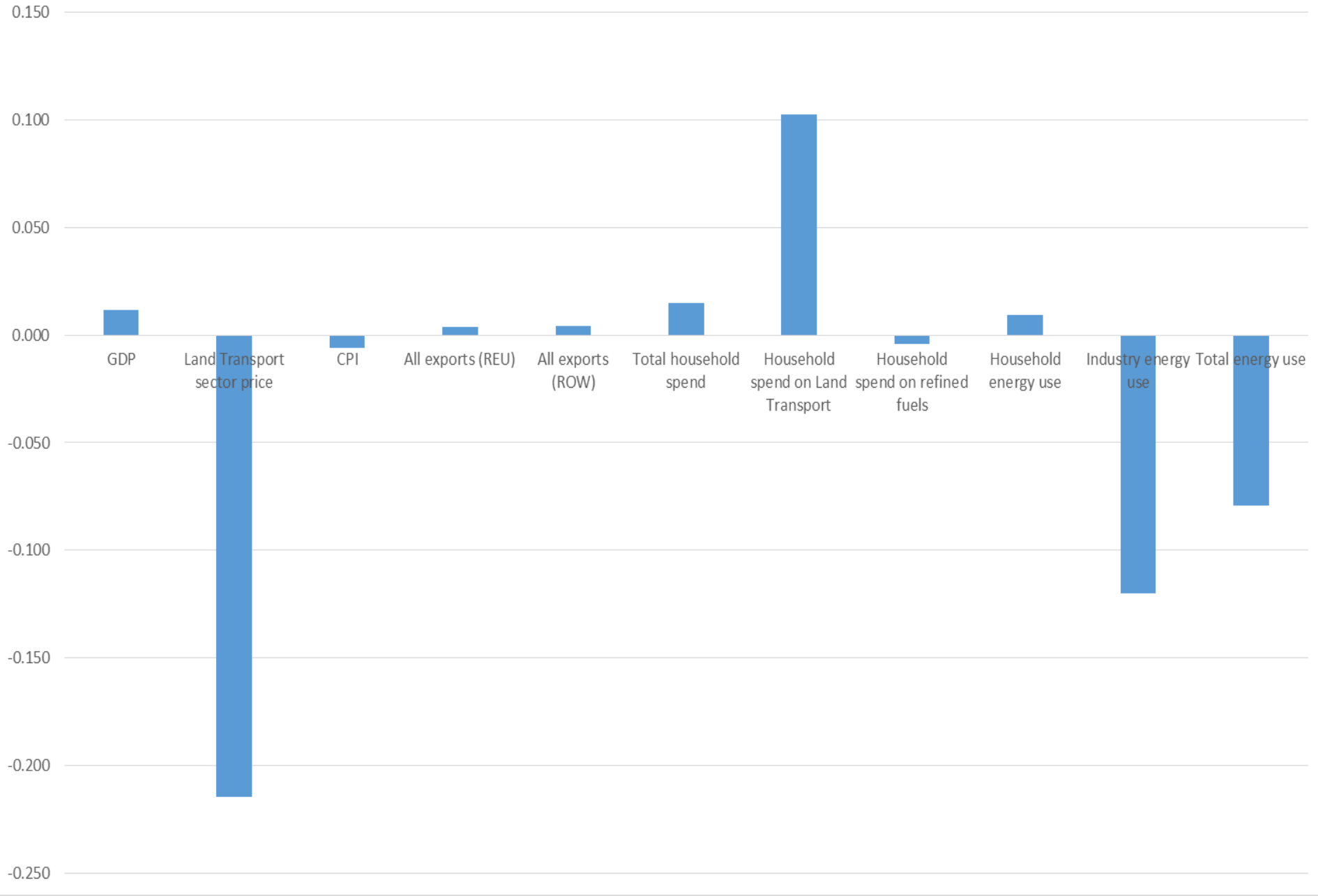


Figure 3. Impacts (%) of a 10% improvement in labour and capital efficiency in the UK Road and Rail Commercial Transport industry

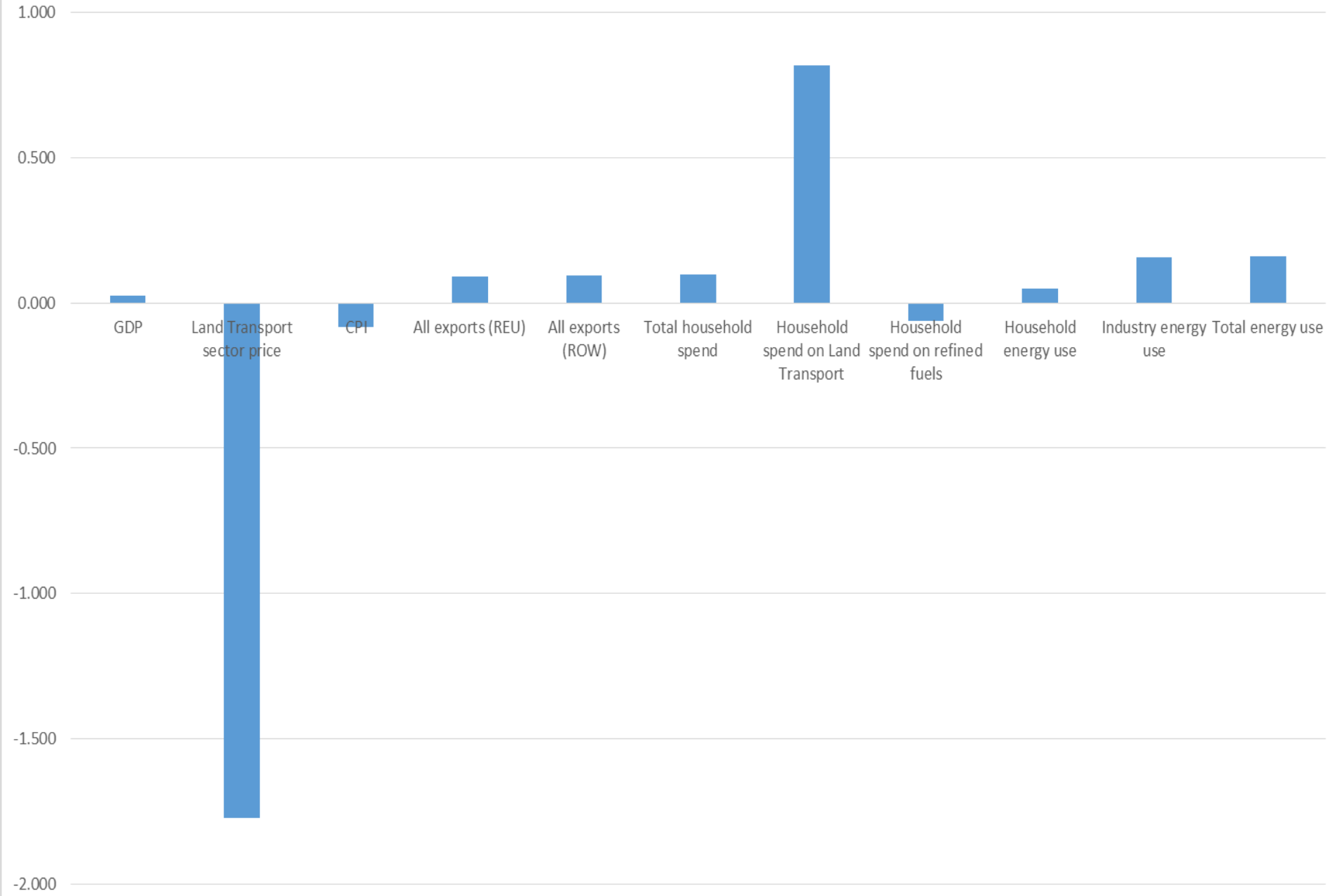


Figure 4a. Impacts (%) of a 10% efficiency improvement in UK household use of refined fuels

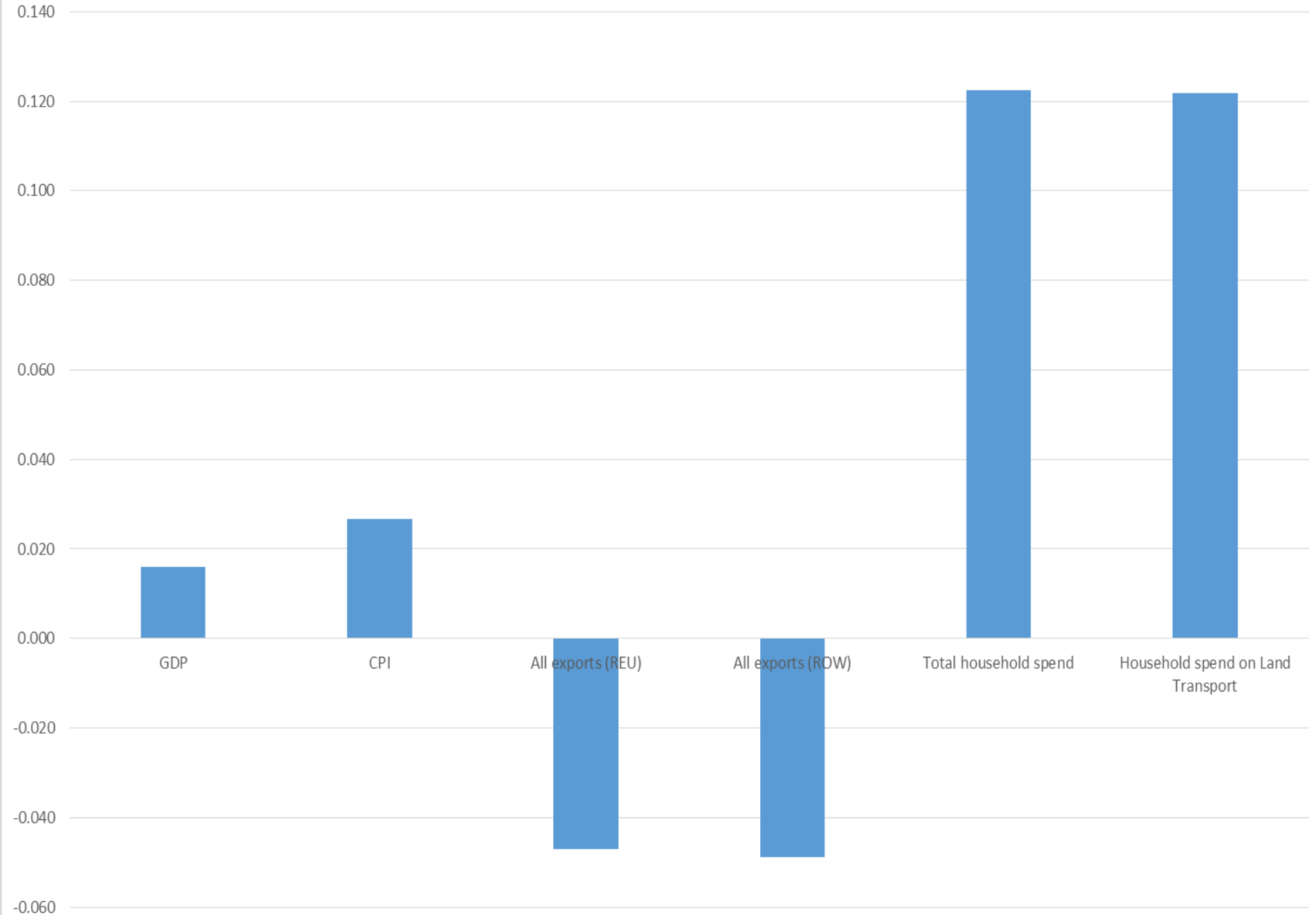
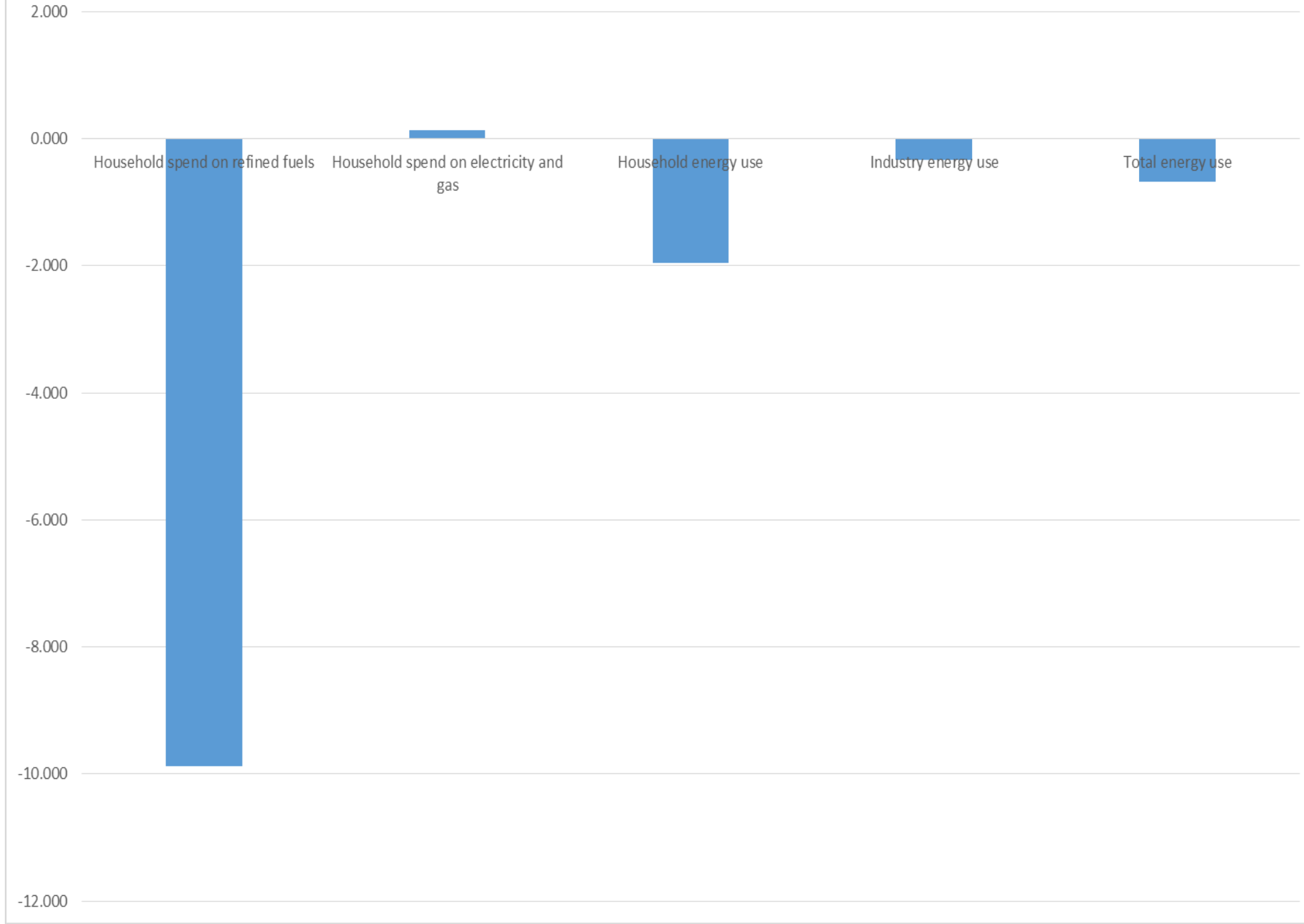


Figure 4b. Impacts (%) of a 10% efficiency improvement in UK household use of refined fuels



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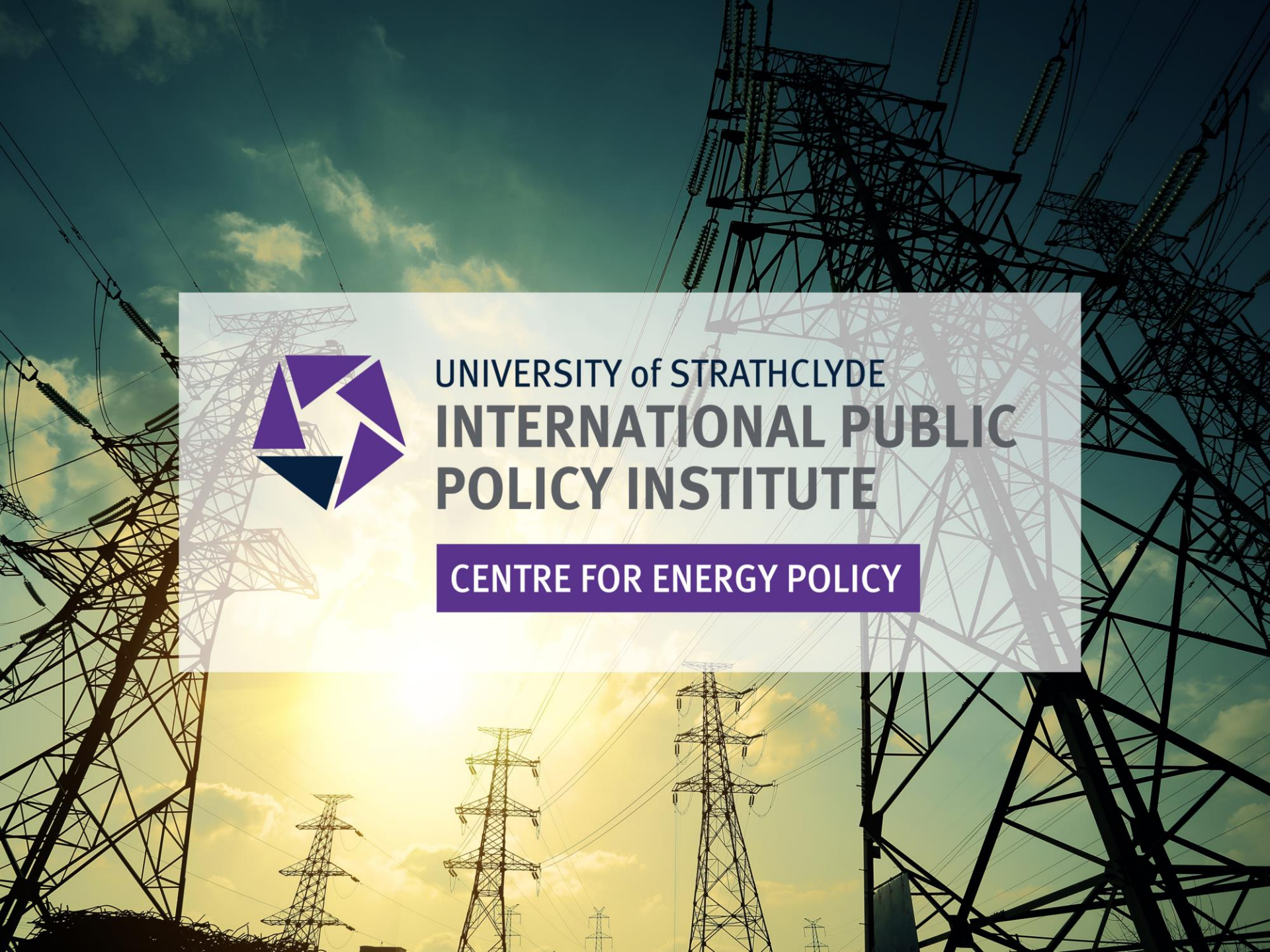
Conclusions?

- Greatest success in reducing household use of petrol/diesel is to directly target efficiency in use of these fuels
- Perhaps with trade-off in terms of nature of GDP growth
- Even here, with higher prices/CPI, the only sectors where overall activity contracts with demand-led growth are in the energy supply chain affected by the efficiency improvement
- But export contract across board (replaced with increased domestic spend)
- However, even this may not happen if households reflect reduced cost of living in wage demand
- With industrial energy efficiency on the other hand, clearer outcome of reduced total energy use, improved competitiveness and productivity led growth



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