

## **Extending the input-output framework to calculate household energy service demands: a UK case study**

Topic: IO's role in covering environmental policy needs

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There is a need to reduce global energy use in order to reduce the impacts of anthropogenic climate change, yet global energy demand continues to rise. Traditionally, improving the efficiency of the systems that deliver energy to consumers is the core strategy undertaken to reduce energy demand, however this framing does not account for the fact that household-level energy services, rather than energy itself, are demanded by consumers and are therefore the main drivers behind energy consumption. Framing analyses of energy consumption by considering the energy services desired by households, such as transport, is becoming an increasingly predominant analysis tool. Examining energy use in this way provides useful insights into consumption patterns, thus allowing opportunities to reduce energy demand beyond energy efficiency improvements to be identified. The demand-side of the energy system is poorly modelled however, while previous work examining energy system emissions neglects the potential demand-side emission reductions offered by changes to energy service provision due to the technological focus of many energy models. This paper addresses these issues through an energy-extended multiregional input-output analysis of the UK's household-level energy service demands over a twenty-year period from 1997-2016. Using this method, household demand is extended to energy services using UN COICOP data, while the input-output analysis provides an insight into the energy footprint of UK household-level energy service demands, their evolution over the examined time period and their contribution towards UK emission levels. By undertaking an analysis of energy demand in this unique way it has been possible to examine energy service consumption patterns within the UK and outline areas where opportunities for energy demand reduction through changes to service level and service provision exist.