



UNIVERSITY of STRATHCLYDE
**CENTRE FOR
ENERGY POLICY**

Research Briefing

Who Ultimately Pays for and Who Gains from the Electricity Network Upgrade for EVs to Support the UK's Net Zero Carbon Ambition?

EPSRC National Centre for Energy Systems Integration flexible fund project

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Introduction

The UK and Scottish Governments commitments to the mid-century net zero targets present a significant challenge that requires systemic changes in how we live and do business. The questions/concerns around investment in Electric Vehicles (EVs), EV rollout and the upcoming 2035 UK-wide restriction on sales of new conventional vehicles is a key focus of net zero priorities and futures. In this context, a central and crucial question focuses on how and to what extent the level and timing of investment to support the projected EV rollout not only enables targeted emission reduction, but also affects the pathways and nature of economic expansion and economic wellbeing. In that, the decarbonisation transportation needs to be achieved in a way that is sustainable and in line with the 'just transition' focus of internationally agreed emission reduction.

Project overview

This project uses an economic system modelling approach, soft-linked with an energy system model to investigate questions around **who ultimately pays for the costs of upgrading the power network to facilitate an EV rollout consistent with the UK's 2050 net zero carbon ambitions**. We consider how the timing of the EVs rollout and manufacturer ability to keep up with the increasing demand for EVs, may affect the nature and magnitude of the impacts driven by the electrification of transportation. We also consider the critical question of how low income UK households may be affected where their uptake of/access to EVs is likely to be restricted, and how this issue may be assessed in public policy decision making.

Research questions

The project focusses on four interacting research questions.

1. How will a more rapid rollout of EVs in different timeframes impact the economy-wide picture of who ultimately pays and gains from the EV rollout?

Who is this research of interest to?

Our research questions translate to key areas of interest for a range of key stakeholders. In particular, public policy and regulatory authorities who face the challenge of delivering a 'just transition' to a net zero future, while ensuring that this is done in a way that does not dampen economic prosperity/sustainability.

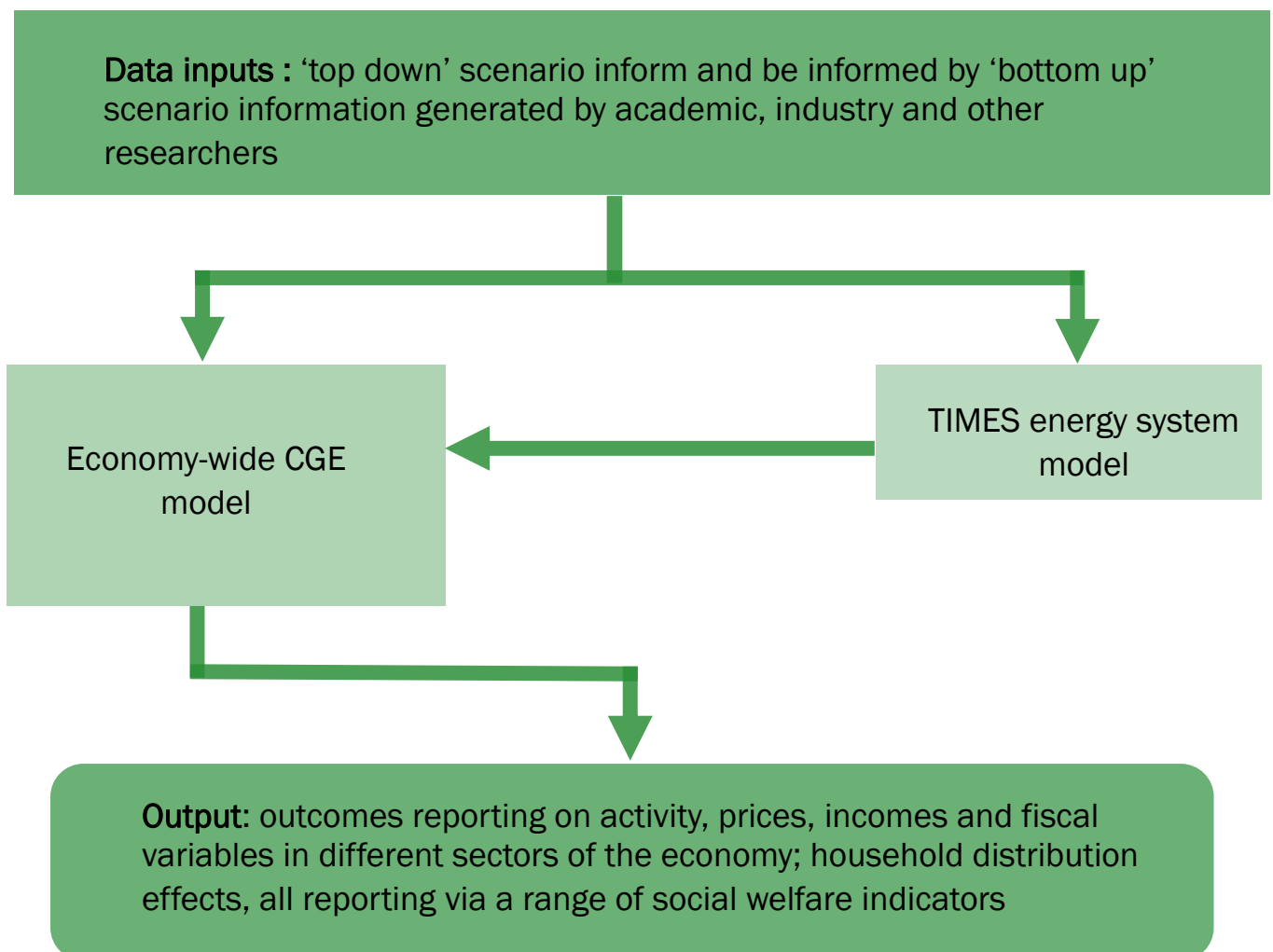
Our results will be of particular interest to:

- Policy makers in the Scottish Government, BEIS, DfT and HM Treasury;
- SPEN as our project partner, as well as wider energy industry actors, and in particular other electricity distribution network companies;
- Research communities, institutional think tanks and NGOs working on transport decarbonisation, energy consumer issues and climate justice;
- local government stakeholders involved in decision-making about EV charging planning.

2. How will the picture in (1) change if the manufacture of EVs (at UK and global levels) cannot meet the demand implied by the projected rollout, in different interim timeframes and overall?
3. How will the extent and distribution of wider economy impacts vary dependent on how EV uptake differs across different household income groups?
4. To what extent can the ‘top down’ scenario information used to inform our energy system (TIMES) model (built around National Grid’s FES scenarios) and, both in turn and indirectly, our economic system model, inform and be informed by ‘bottom up’ scenario information generated by academic, industry and other researchers?

Research strategy

Our approach involves collaborative scenario design, simulation, model interaction, applied policy-facing political economy analysis and reporting. We innovate here in how we collaborate to design and develop the scenarios simulated in our soft-linked energy and economic system models, and in refining the subsequent political economy analyses. Our core method involves using two models, Centre for Energy Policy’s economy-wide computable general equilibrium (CGE) model and the TIMES energy systems model, but where the first of these is our core novel approach in addressing the research questions posed. The following diagram illustrates how the two models work together in our project, and points at which information from other sources could inform, help further integrate or bypass the TIMES energy system model in informing the core economy-wide model :



Using the economy-wide CGE model

We use the CGE to analyse a further round of economic scenarios where we consider how the time path and distribution of investment spending and EV uptake impacts macroeconomic, socio-economic and sectoral levels. By introducing new information generated from other ‘bottom-up’ research, we can consider how the timing of the EVs rollout and the industry’s ability to keep up with the increasing demand for EVs, may affect the nature and magnitude of the impacts driven by the electrification of transportation. These scenarios also incorporate consideration of the evolving political economy landscape, with particular attention to the conditions that may prevail in key individual markets (e.g. labour markets) and the wider economy (e.g. public budget and trading conditions).

Using the TIMES whole energy system model

We are setting up a range of scenarios to analyse in the TIMES whole energy system model that will constitute a base/core soft-link to inform the economy-wide CGE model that can proceed and deliver regardless of the extent to which new information flows and links emerge. These will link to existing scenarios identified by, for example, Ofgem and National Grid, and allow us to consider different levels of EV penetration on the network and the impact of ‘smart’ versus ‘dumb’ charging on projected system costs. We will take outputs from the TIMES model relating to (a) the costs of upgrading and running the network; and, (b) transport system costs and feed those into our economy-wide CGE model as information to inform economy-wide model simulation.

Informing the economy-wide CGE model and TIMES whole energy system model

One of the aims of this project is to extend and refine the information informing our core political economy analyses. At different stages of the project, there will be collaboration and consultation with both research community (CESI colleagues) and industry partners (SPEN colleagues), in order to better refine our work in addressing the four core questions above, and set foundations for future net zero focussed work that involves interacting scenario based approaches. This set in the context of addressing our fourth research question : to what extent can the ‘top-down’ scenario information used to inform our energy system (TIMES) model (built around National Grid’s FES scenarios) and, both in turn and indirectly, our economic system model be informed by ‘bottom-up’ scenario information, generated by academic, industry and other researches?

Research outputs

Throughout the project, we will engage with a broad range of stakeholders to inform our scenarios and to ensure our project outputs are as useful and insightful as possible. Anyone interested in engaging directly with the project should contact cep@strath.ac.uk.

We will also make outputs available on-line. Two briefing papers setting out initial findings (in November 2020) and final conclusions (March 2021) will be available on the CEP website <https://www.strath.ac.uk/humanities/centreforenergypolicy/>. We will also produce at least one academic paper for submission to a peer-reviewed journal(s) that will also be made available on an open access basis



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