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Data Article

Techno-economic data for a multi-model approach to decarbonisation of the Irish private car sector

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ABSTRACT

These data and analyses support the research article "From technology pathways to policy roadmaps to enabling measures – A multi-model approach" Mulholland et al. (2017) [1]. This article uses 3 models – an optimization model of the Irish energy system (Irish TIMES), a simulation model of the Irish private transport sector (CarSTOCK), and a market share algorithm used to provide a behavior rich representation into the multi-modelling process. Each of these models are linked to provide a technology pathway, policy roadmap, and finally identify the enabling measures of the private transport sector in a low-carbon Ireland moving toward 2050. The article is organized in the same order, firstly providing the key modelling assumptions and operability of Irish TIMES, secondly for CarSTOCK, and finally for the market share algorithm. All data is supplied within this article.

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Specifications Table

Subject area	*Energy Modelling*
More specific subject area	*Multi-modelling approach of the private transport sector*
Type of data	*Text-file fitted with supplementary graphs and tables*
How data was acquired	*Irish TIMES data was acquired from the Pan European TIMES (PET) model, the Economic and Social Research Institution (ESRI), and a wide ranging body of literature reviews.* *CarSTOCK data was acquired from the Sustainable Energy Authority of Ireland (SEAI), ESRI, the National Car Test (NCT), the Vehicle Registration Unit (VRU), and a range of data taken from literature reviews.* *Data for the Market Share Algorithm was populated with data from the Irish TIMES model, and the CarSTOCK model.*
Data format	*Raw model input data*
Experimental factors	*N/A*
Experimental features	*N/A*
Data source location	*PET data related to the EU27, Iceland, Switzerland, Norway, and Balkan Countries.* *The remainder of the data was made specific to Irish TIMES.*
Data accessibility	*All data is provided within this article*

Value of the data

- This data provides transparency behind the modelling assumptions and methodology used for a multi-modelling approach used to decarbonize the private transport energy sector in Ireland.
- While the data is Ireland specific, it serves as a guideline for the scientific community to ways to replicate similar modelling methods designed for other regions at a local, national, or international level.
- It provides valuable insights into the sources available at a national level which most European member states have freely available, and which can be used to replicate the modelling methods provided in the accompanying Energy article.

1. Data

The dataset within this article provides information on the cost, fuel economy and mileages for the private car sector in Ireland (Table 1, Table 7, and Table 10). Furthermore, data pertaining to the key assumptions used by the Irish TIMES linear optimisation model are included, such as wind energy capacities (Table 4), Irish biofuel energy potential (Table 5), Irish biofuel costs (Table 6).

2. Experimental design, materials and methods

2.1. Irish TIMES model operation and input assumptions

The Irish TIMES model is a linear optimisation model with an objective function to minimise total system cost (maximizes the total discounted surplus) subject to imposed constraints. Mathematical equations describe the relationships and interaction between the many technologies, drivers and commodities in Irish TIMES. While it is tempting to think of Irish TIMES as a simple 'merit type' model that chooses technologies simply from the least expensive to the most expensive to meet certain

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