A TRADITION OF INDEPENDENT THINKING

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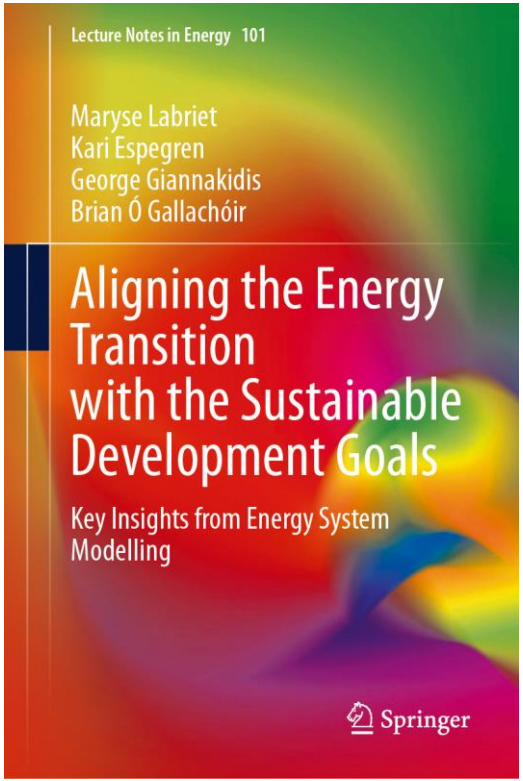
How do we successfully transform energy analysis into Government policy?

Professor Brian Ó Gallachóir
Associate Vice President of Sustainability, UCC

12th MaREI Climate & Energy Research Seminar, June 6th 2024

Presentation drawn from …

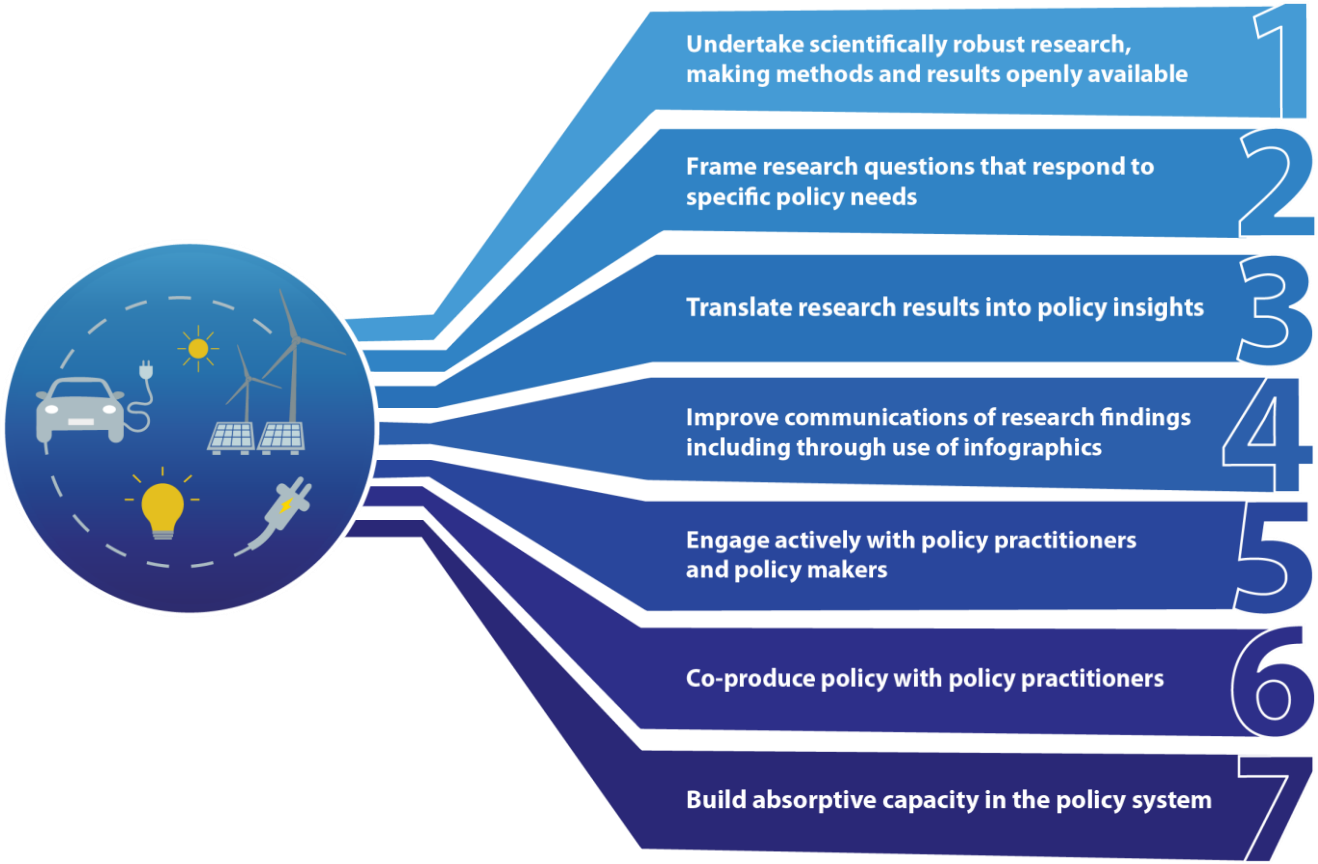


Ó Gallachóir B., Deane P. and Rogan F. 2024 *Translating Research Results into Policy Insights to Underpin Climate Action in Ireland.*

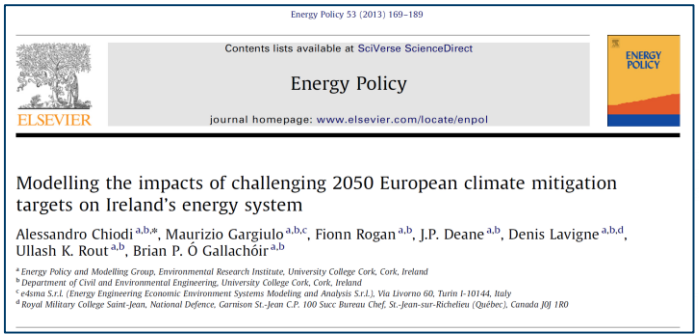
In: Labriet M., Espegren K., Giannakidis G. and Ó Gallachóir B. (eds) Aligning the Energy Transition with the Sustainable Development Goals: Key Insights from Energy Systems Modelling. Lecture Notes in Energy, Vol 101. Springer.

Available from https://link.springer.com/book/9783031588969

Analysis -> Policy in Seven Stages



Stage 1: Undertake robust, open research



Energy Policy 53 (2013) 169–189

Contents lists available at SciVerse ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Modelling the impacts of challenging 2050 European climate mitigation targets on Ireland's energy system

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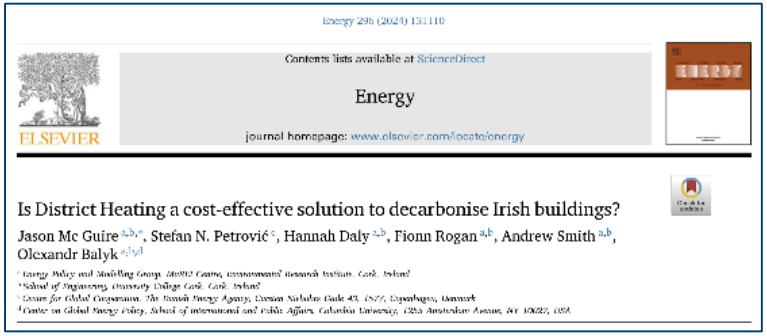

Energy 296 (2024) 131110

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Is District Heating a cost-effective solution to decarbonise Irish buildings?

Jason Mc Guire [a,b,*], Stefan N. Petrović [c], Hannah Daly [a,b], Fionn Rogan [a,b], Andrew Smith [a,b], Olexandr Balyk [a,b,1]

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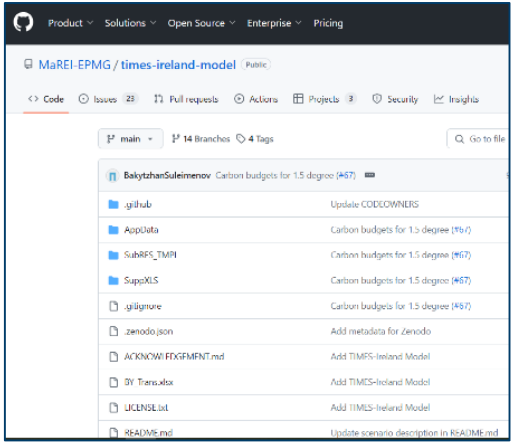

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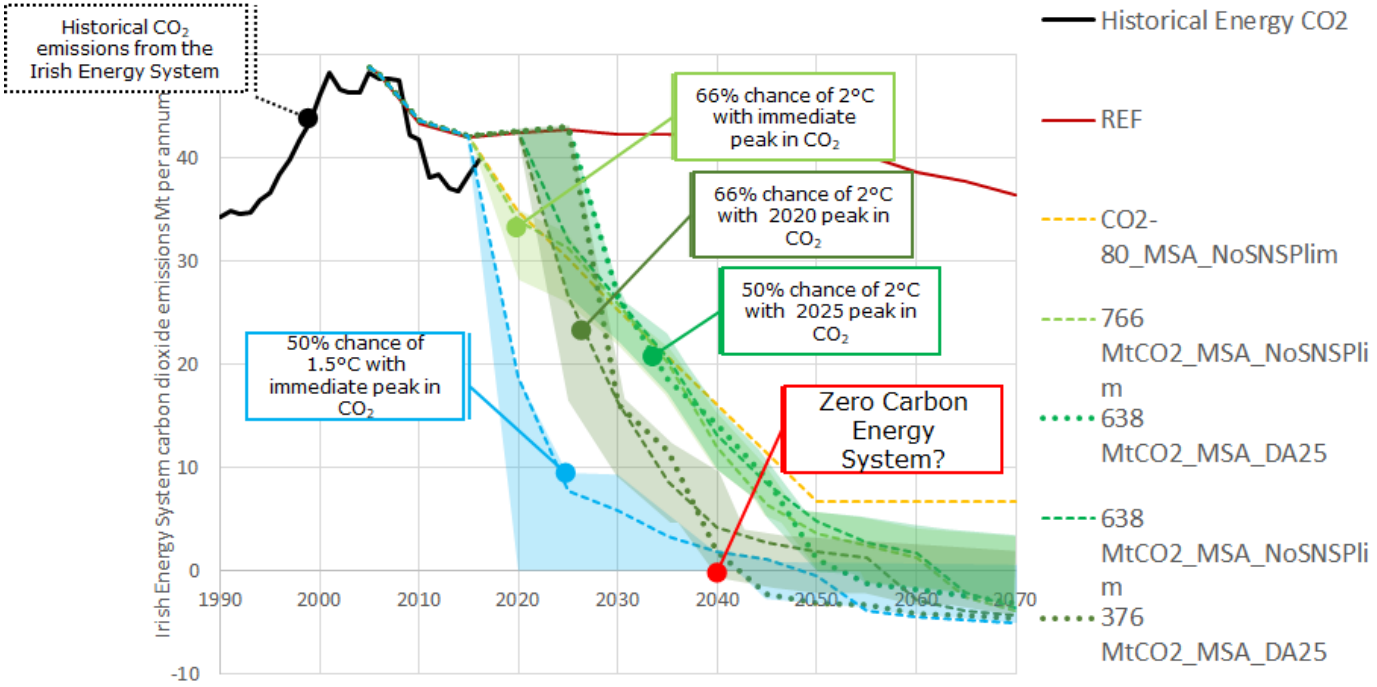
Stage 2: Frame research to policy needs



Glynn, J., Gargiulo, M., Chiodi, A., Deane, P., Rogan F., Ó Gallachóir, B., 2019. *Zero carbon energy system pathways for Ireland consistent with the Paris Agreement*. **Climate Policy** 19:1, 30-42. Available from here

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Stage 3: Translate results into insights

Policy Brief

Identifying technology opportunities in the low carbon energy transition

Our 2050

This is one of a series of policy briefs to summarize ongoing findings related to the research project, 'Our 2050 – Opportunities for Ireland in a Low Carbon Economy', which is on the economic and societal opportunities arising from the transition to a low carbon economy and the policies needed to achieve this transition

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Deriving MACCs from energy systems model

Using the Irish TIMES model, the MACC is derived by imposing increasingly more stringent mitigation targets and run the model multiple times. The MACC contains over 100 scenarios, from the REF scenario where no climate policy is imposed to 100% with a 1% step change in 2050 emission level (relative to 1990 level). Intermediate climate targets in 2020, 2030 and 2040 are linearly interpolated.

Key Policy Insights

MACC

The system-wide MACC (Fig. 1) demonstrates the tradeoff between decarbonization ambitions and economic feasibility. The upward shape of the MACC reflects the increased marginal efforts when aiming for more ambitious carbon mitigation targets. Compared to the MACC, the total system cost does not increase tremendously. The impact of 80% reduction target on the total energy system cost represents less than 1% of total GDP in 2050.

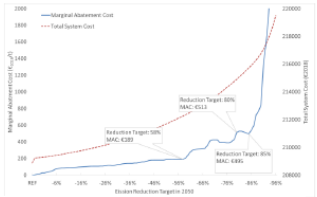

Figure 1. Marginal abatement cost in 2050 and overall total system cost. Tipping points can be identified at 58% and 85% CO_2 reduction levels

Tipping points can be identified on the MACC. At cost levels with steady and low rate of increase, the model is able to deploy and expand the capacities of many cost-effective mitigation options. As these cheaper sets of technologies reach their maximum potential, more expensive options need to be deployed. This causes tipping points where marginal abatement cost increase drastically.

Certain technologies have limited mitigation options in the model (such as passenger trains and cement production) and some mitigation technologies (such as plug-in hybrid vehicles and gas CCS) are not completely carbon free. It is impossible to reach carbon neutrality without negative emission technologies such as BECCS

Energy Systems

Analysis on the scenario ensembles that form the MACC shows the sectoral energy system patterns in response to the change in decarbonization ambitions. Each sector requires different levels of economic efforts for mitigation and may not decarbonize at the same rate with increased emission stringency. For example, the the first half of CO2 in power sector (Fig. 2) can be mitigated by switching from coal/peat to gas with low cost. The rest of CO2 decarbonization requries CCS and biomass technologies.

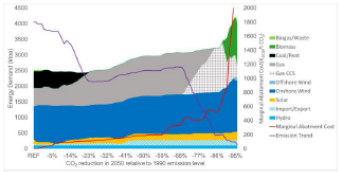

Figure 2. Electricity generation energy demand, emission trends and system-wide MACC in 2050.

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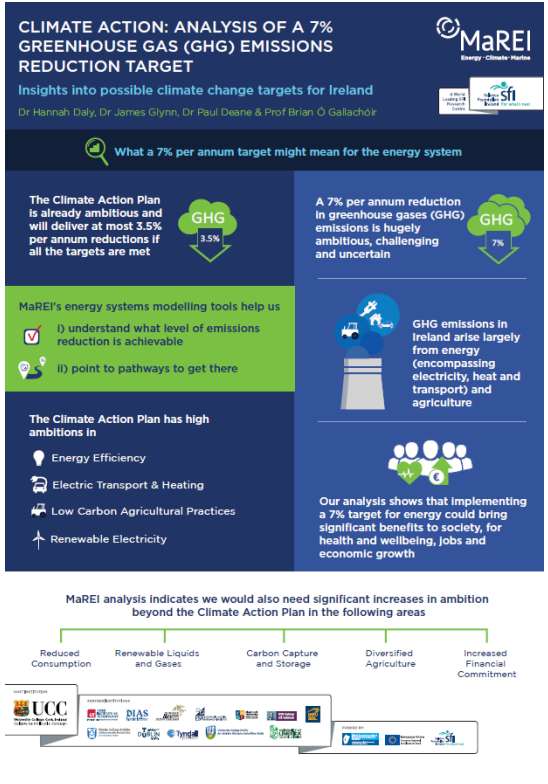
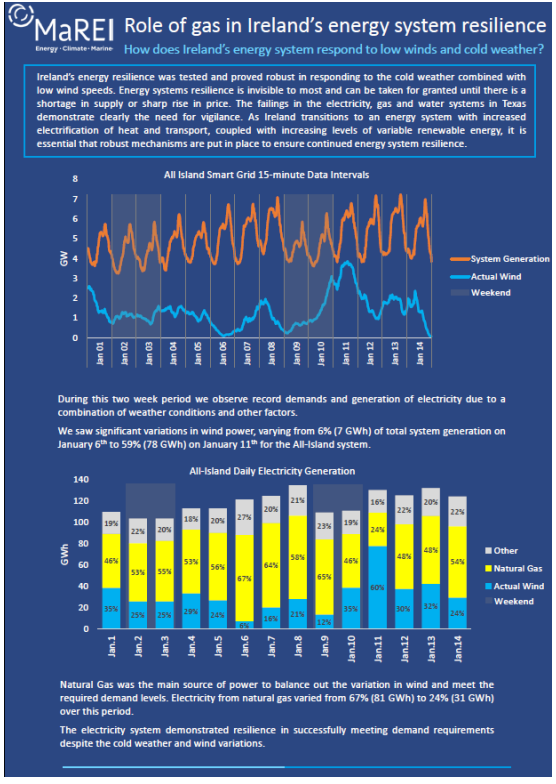
Stage 4: Improve comms (infographics)





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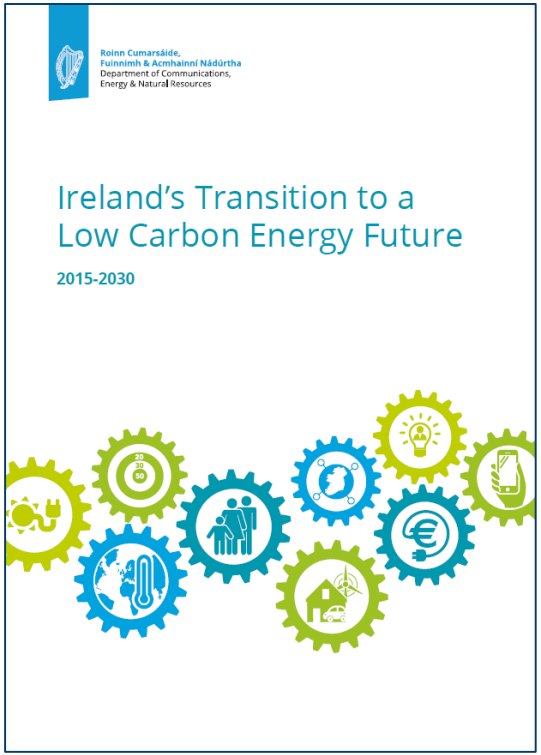
Stage 5: Engage with policy makers



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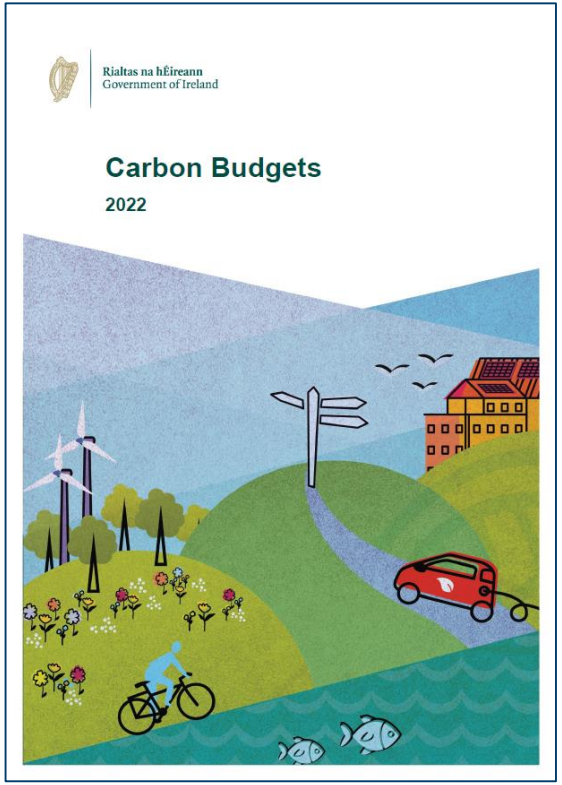
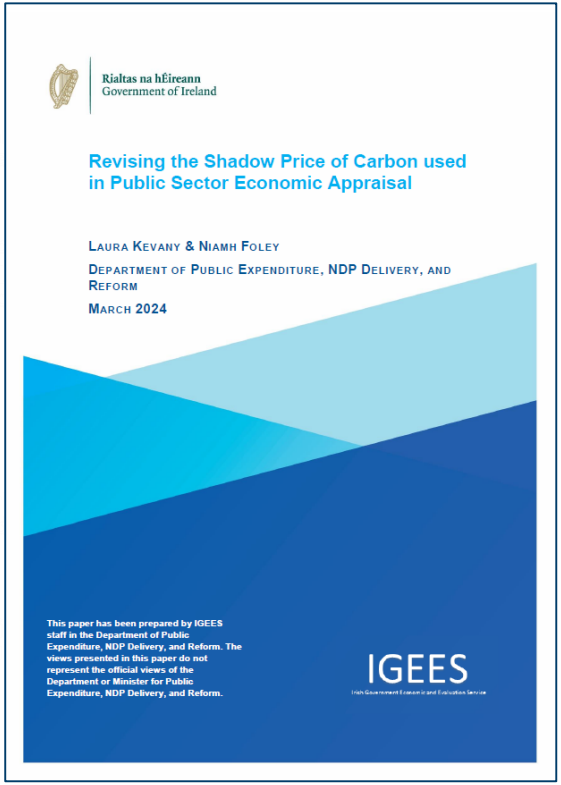
Stage 6: Co-produce Policy





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Stage 7: Build absorptive capacity

zenodo Search Upload Communities

March 31, 2021 Dataset Open Access

Irish Car Stock Model V 2.4

Daly, Hannah; O'Riordan, Vera; Mulholland, Eamonn; Rogan, Fionn; Ó Gallachóir, Brian

Latest release of the Irish Car Stock Model Version 2.4

The Irish Car Stock Model was first developed by Daly and Ó Gallachoir (2011a), entitled "Modelling private car energy demand using a technological car stock model". It is available at: https://doi.org/10.1016/j.trd.2010.08.009.

Future scenarios were explored in Daly and Ó Gallachoir (2011b) entitled "Modelling future private car energy demand in Ireland", and is available at: https://doi.org/10.1016/j.enpol.2011.09.027

Further updates to the Irish Car Stock Model were developed by Mulholland et al. (2017), the article entitled "Techno-economic data for a multi-model approach to decarbonisation of the Irish private car sector" is available at: https://doi.org/10.1016/j.dib.2017.10.006.

Latest update is led by Vera O'Riordan, Hannah Daly, Fionn Rogan and Brian Ó Gallachóir.

Included in this repository is the latest version of the Irish Car Stock Model 2.4, current updates to the Irish Car Stock Model V 2.5 are ongoing.

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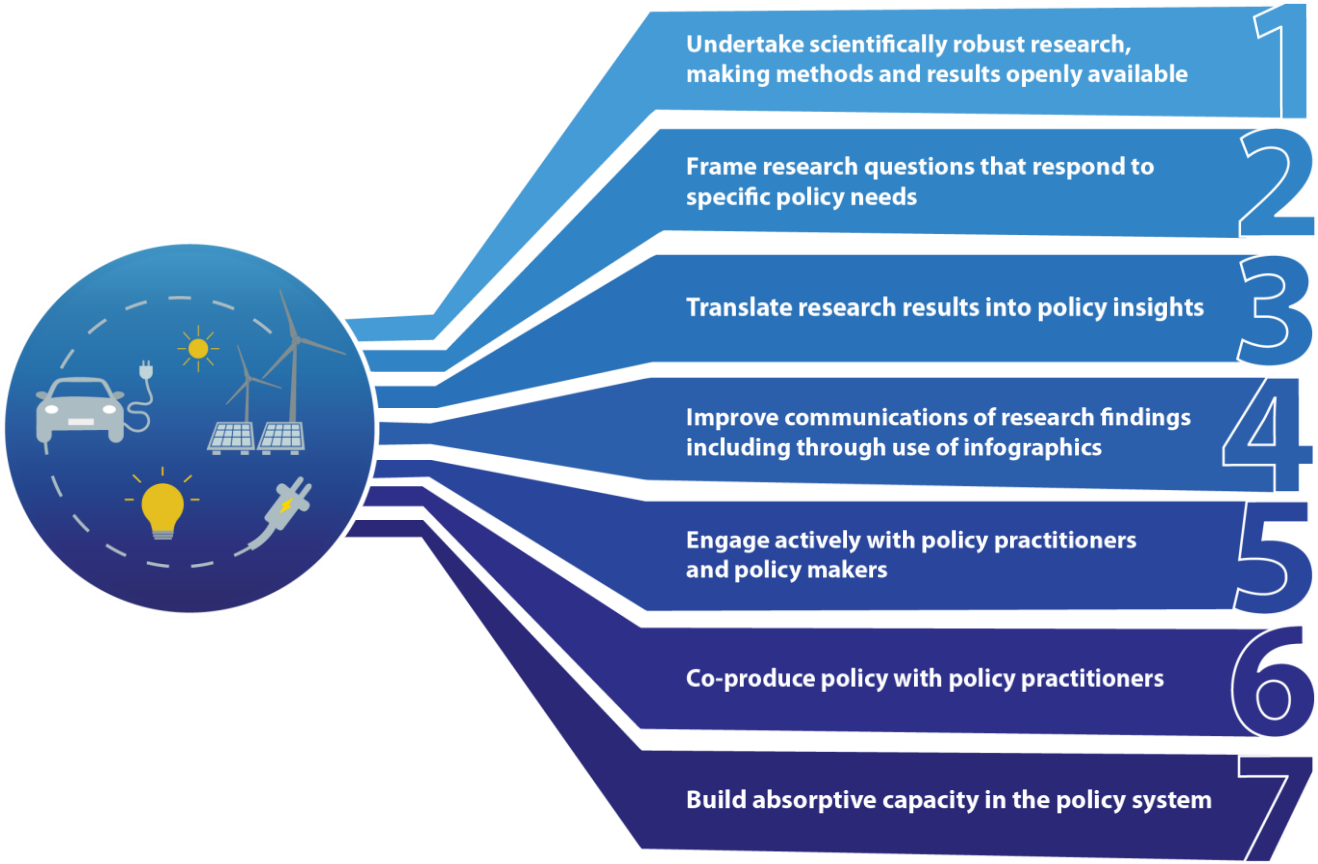

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