



How do we successfully transform energy analysis into Government policy?

Professor Brian Ó Gallachóir

Associate Vice President of Sustainability, UCC

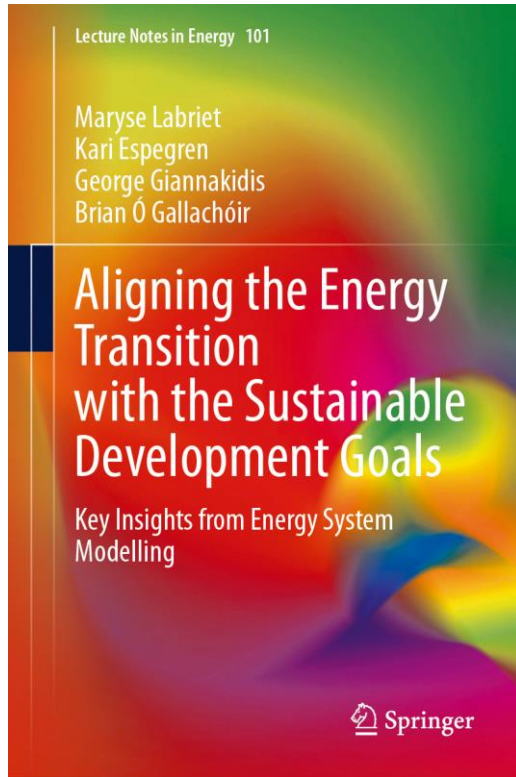
12th MaREI Climate & Energy Research Seminar, June 6th 2024

A TRADITION OF
INDEPENDENT
THINKING



University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Presentation drawn from ...



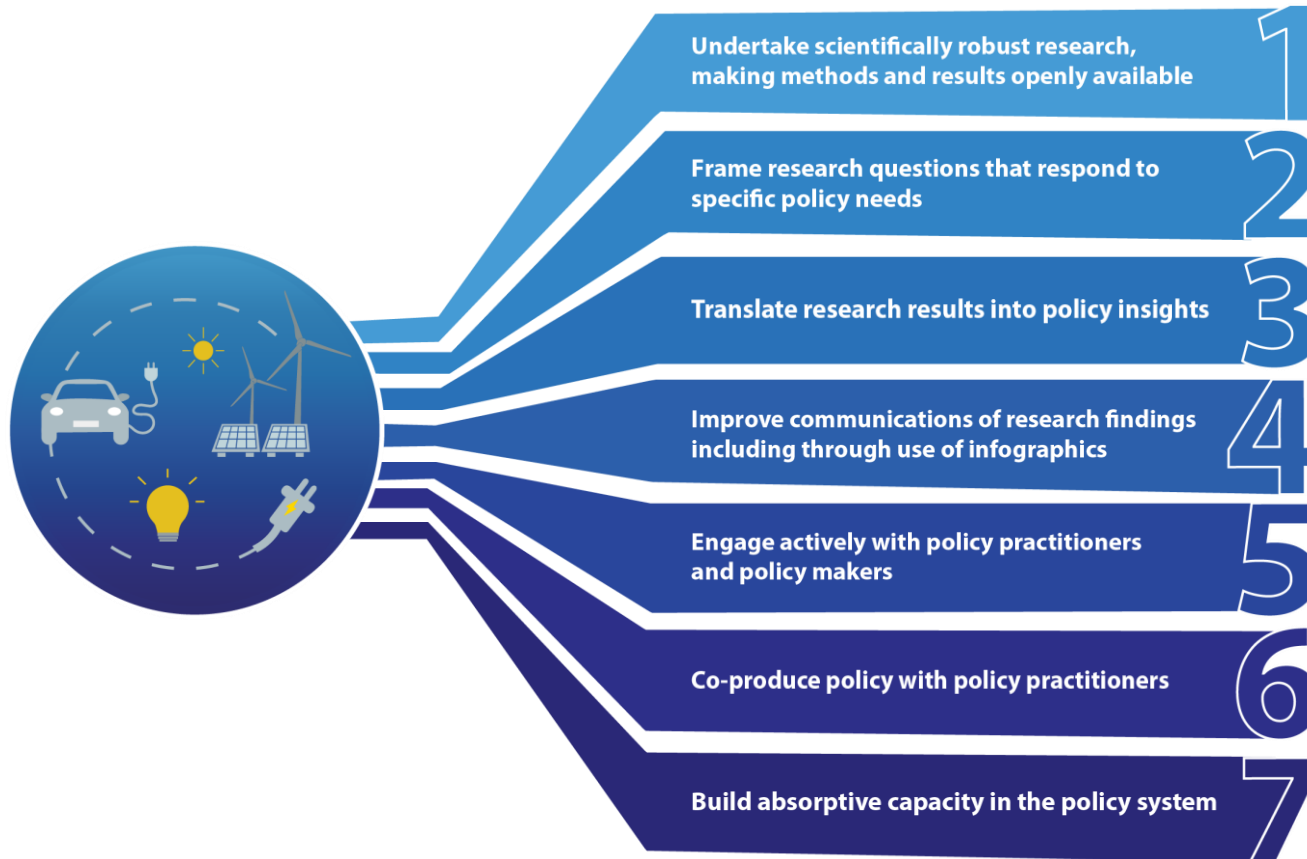
Ó Gallachóir B., Deane P. and Rogan F. 2024
*Translating Research Results into Policy
Insights to Underpin Climate Action in
Ireland.*

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/97830315889
69](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 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

Alessandro Chiodi^{a,b,*}, Maurizio Gargiulo^{a,b,c}, Fionn Rogan^{a,b}, J.P. Deane^{a,b}, Denis Lavigne^{a,b,d}, Ullash K. Rout^{a,b}, Brian P. Ó Gallachóir^{a,b}

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^d Royal Military College Saint-Jean, National Defence, Garrison St-Jean C.P. 100 Succ. Barrueau Ch. St-Jean-sur-Richelieu (Québec), Canada J0R 1R0

Energy 296 (2024) 131110

Contents lists available at ScienceDirect

Energy

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

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

Jason Mc Guire^{a,b,c}, Stefan N. Petrović^c, Hannah Daly^{a,b}, Fionn Rogan^{a,b}, Andrew Smith^{a,b}, Olexandr Balyk^{d,e,f,g}

^a Energy Policy and Modelling Group, Environmental Research Institute, University College Cork, Ireland
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^d Centre for Global Energy Policy, School of International and Public Affairs, Columbia University, 620 Amsterdam Avenue, NY 10027, USA

Product Solutions Open Source Enterprise Pricing

MaREI-EPMG / times-ireland-model Public

Code Issues 23 Pull requests 0 Actions 11 Projects 3 Security Insights

main 14 branches 4 tags

BalykzhanSuleimenov Carbon budgets for 1.5 degree (#47)

- .github Update CODEOWNERS
- AppData Carbon budgets for 1.5 degree (#97)
- SubREFS_TMP Carbon budgets for 1.5 degree (#67)
- SuppXLS Carbon budgets for 1.5 degree (#67)
- .githubignore Carbon budgets for 1.5 degree (#97)
- zenodo.json Add metadata for Zenodo
- ACKNOWLEDGEMENT.md Add TIMES-Ireland Model
- BY Trans.xlsx Add TIMES-Ireland Model
- UCLNSLS.txt Add TIMES-Ireland Model
- README.md Update scenario description in README.md

EPMG About Scenarios Documentation Results Archive

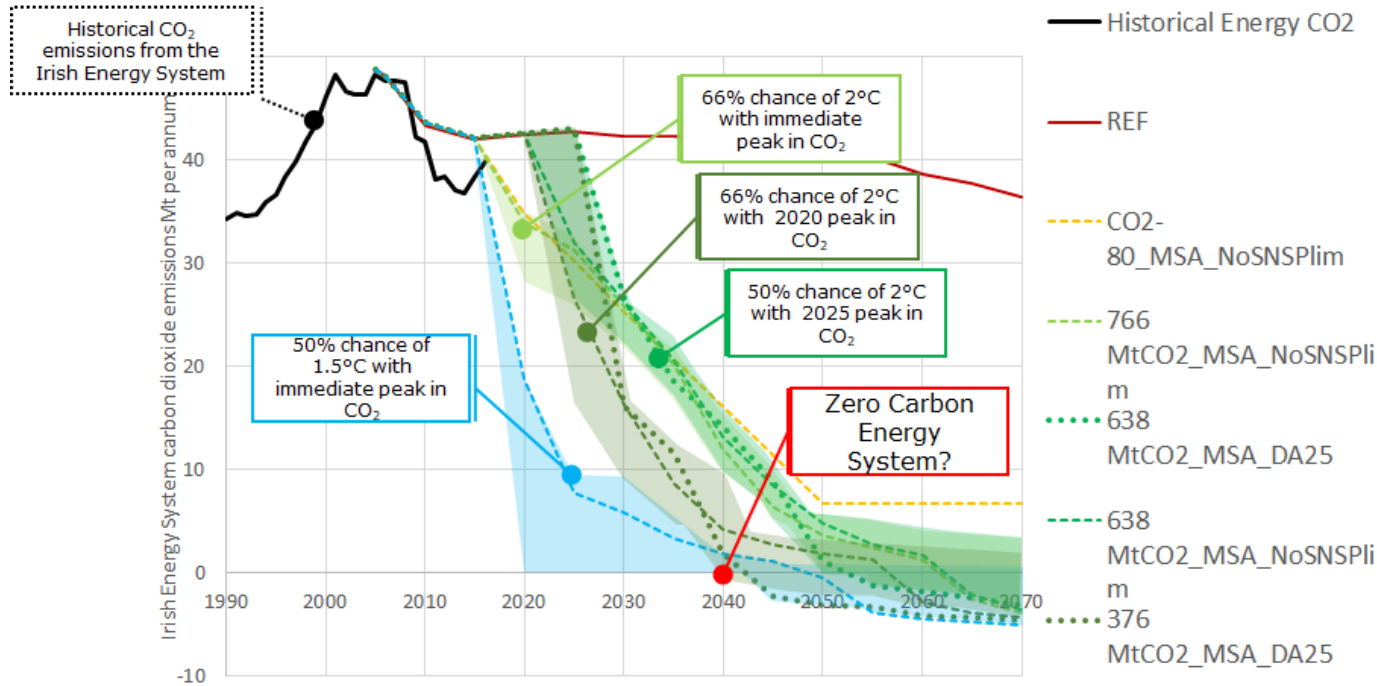
Scenarios

- A25-E65
- A25-E65 Early Action
- A25-E65 Late Action**
- A25-E65 LED
- A25-E65 Tech-Optimism
- A33-E61
- A33-E61 Early Action
- A33-E61 Late Action
- A33-E61 LED
- A33-E61 Tech-Optimism
- A40-E57
- A40-E57 Early Action
- A40-E57 Late Action
- A40-E57 LED
- A40-E57 Tech-Optimism

Installed Capacity

New Capacity

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](#)

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



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.

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 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 requires CCS and biomass technologies.

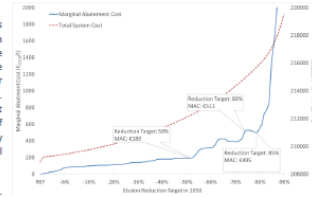


Figure 1. Marginal abatement cost in 2050 and overall total system cost. Tipping points can be identified at 80% and 85% CO₂ reduction levels.

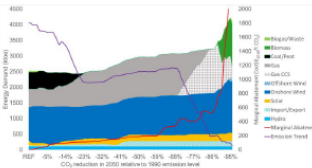
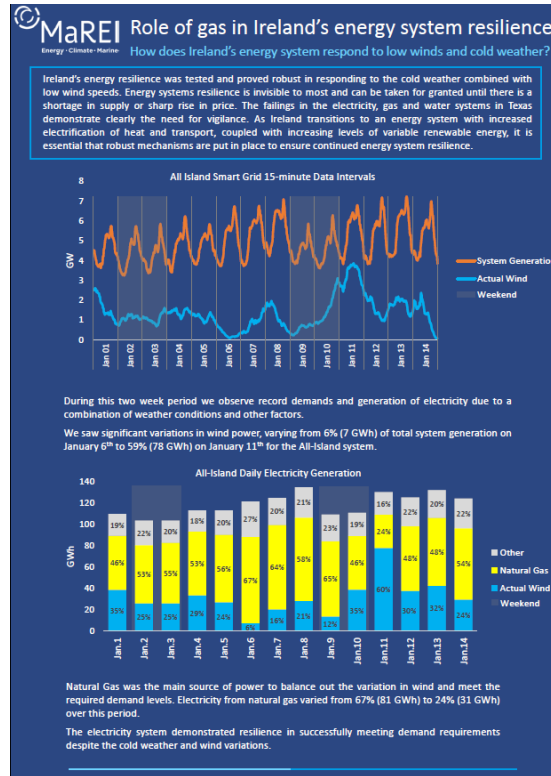
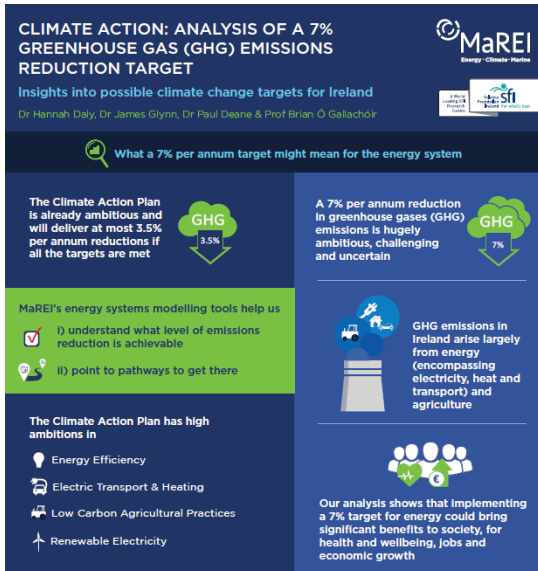



Figure 2. Electricity generation energy demand, emission trends and system-wide MACC in 2050.

Stage 4: Improve comms (infographics)




Stage 5: Engage with policy makers

 **Róinn Cumarsáide, Faisnéis & Acmhainní Náidártha**
Department of Communications,
Energy & Natural Resources

Ireland's Transition to a Low Carbon Energy Future

2015-2030



CAPACITY

Informing Policymakers & Impacting The Clean Energy Transition


“ MaREI is one of the standout success stories in Ireland's efforts to achieve excellence and impact in research. It is positioned at an important intersection in the vital effort that is needed to address Ireland's climate and energy challenges. Through building talented, diverse and multi-disciplinary research teams MaREI has generated a high-quality research output and a European and global reputation amongst the research community. Perhaps most impressively, MaREI has implemented a sophisticated and persistent engagement strategy to ensure the policy relevance and impact of this research. As a result, MaREI is highly respected and trusted by policy makers and is providing crucial expertise to successfully guide Ireland's transition to net zero. ”

Jim Breslin, Former Secretary General, Department of Further and Higher Education, Research, Innovation and Science

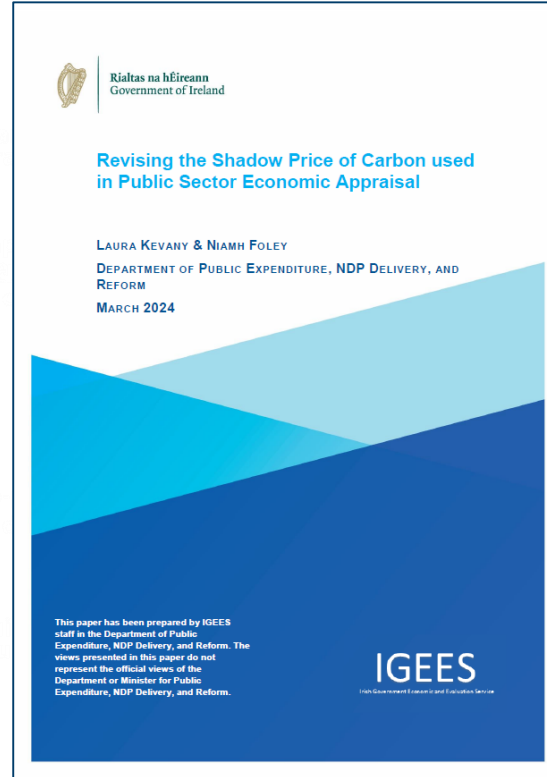
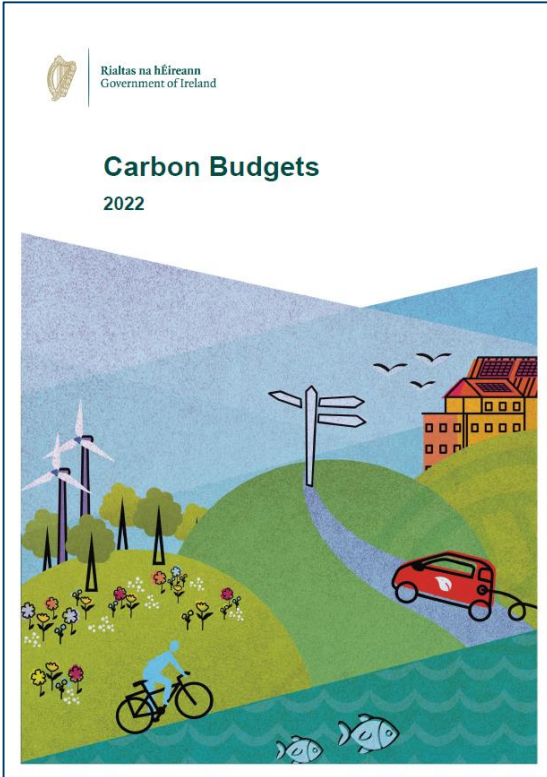
Research from UCC's Energy Policy & Modelling Group has provided evidence for Ireland's clean energy policy and climate strategy

Valuing Greenhouse Gas Emissions in the Public Spending Code	Climate Action Plan 2021 Securing Our Future
Climate Change Advisory Council Carbon Budget Technical Report	Technical Analysis of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems
A Review of Requirements and Constraints on Biofuels in Ireland	Summary of Analysis to Support Preparation of the Sectoral Emissions Ceilings
Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction	What climate change means for Ireland's public finances
National Energy Demand Strategy Consultation Paper	National Hydrogen Strategy
Securing Ireland's Gas Supplies	Climate Action Plan 2023 (CAP23) Charging Ireland for the Better
Climate Action Plan 2024	Joint Committee on Environment and Climate Action Proposed Carbon Budgets

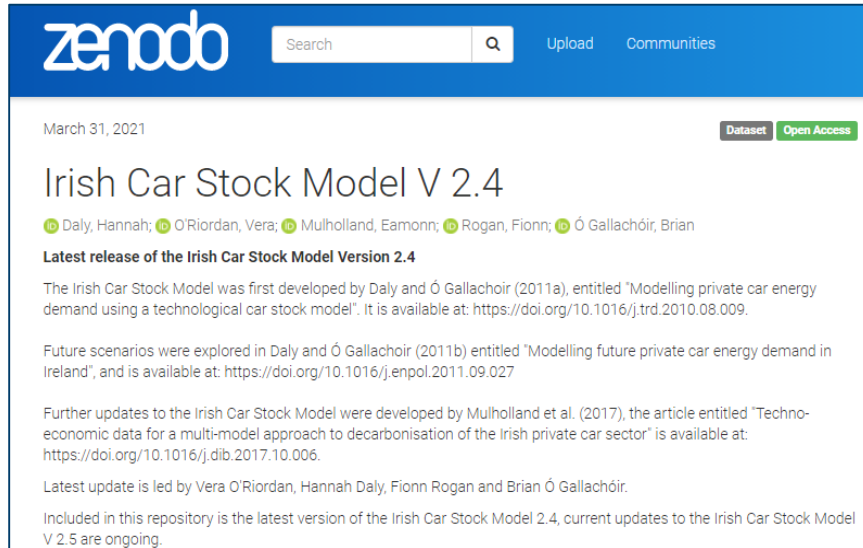
CAPACITY is funded by Department of the Environment, Climate and Communications



Stage 6: Co-produce Policy



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 Gallachóir (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 Gallachóir (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.

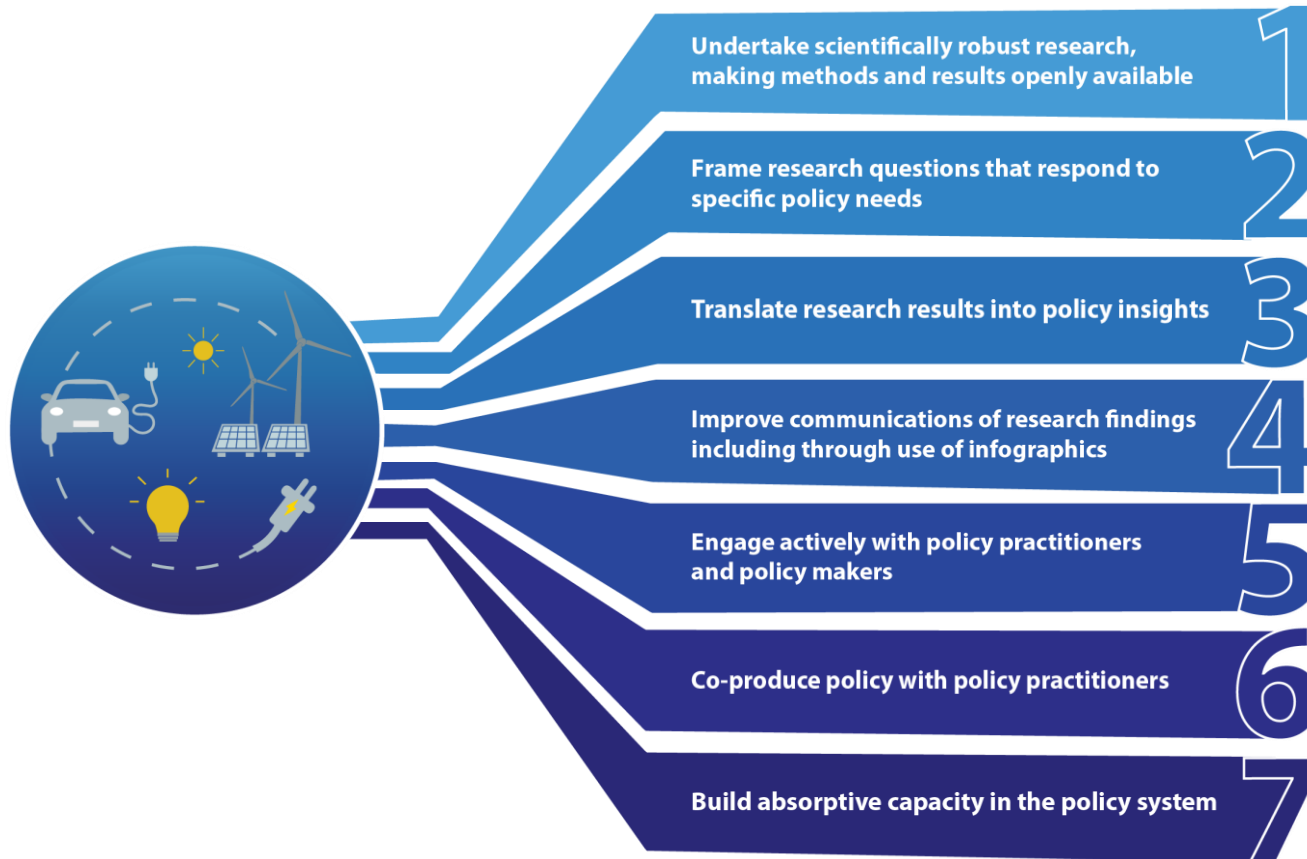
Included in this repository is the latest version of the Irish Car Stock Model 2.4, current updates to the Irish Car Stock Model V 2.5 are ongoing.



DIIS
Deep Institutional Innovation for
Sustainability and Human Development

Translating Imagination into
Action for Transformative
Change

Analysis -> Policy in Seven Stages





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