Science Talks 5 (2023) 100130

Contents lists available at ScienceDirect

Science Talks

journal homepage: www.elsevier.es/sctalk

Doing things differently: Bridging community concerns and energy system modelling with a transdisciplinary approach in rural Ireland

Connor McGookin [a,b,*], Tomás Mac Uidhir [a,b], Brian Ó Gallachóir [a,b], Edmond Byrne [a,b]

[a] School of Engineering, University College Cork, Ireland
[b] MaREI Centre, Environmental Research Institute, University College Cork, Ireland

ARTICLE INFO

Keywords:
Transdisciplinary
Energy system modelling
Co-production
Rural development
Community wellbeing
Participatory action research

ABSTRACT

This presentation offers reflections on the experience of co-producing energy strategies on the Dingle peninsula, a rural peripheral region in Ireland's South West. For the past three years, researchers from sociology, community development, and energy engineering have worked in partnership with Ireland's electricity distribution system operator and local non-profit organisations supporting enterprise and community development in the region. The initial research focus was to incorporate stakeholder preferences into energy scenarios using a simulation modelling tool (Low Emissions Analysis Platform, LEAP). This was revised in favour of support for local development effort to prepare a strategic plan for the area across social, economic, and environmental domains. Widening the scope in this manner posed a serious methodological challenge but was necessary to respond to local needs and foster local impact. The results highlight the imperative of understanding the messy reality within which energy systems operate, and the need to align rural development with climate action policies via authentic engagement. A key contribution from this novel approach is to shine a critical light on the limitations of energy system models. This research serves to highlight the need for co-production/action research efforts that can support real-world transition processes and provide a better understanding of local contexts as an alternative to efforts that would seek to simply improve societal representations within energy system models.

Video to this article can be found online at https://doi.org/10.1016/j.sctalk.2023.100130.

Figures and tables

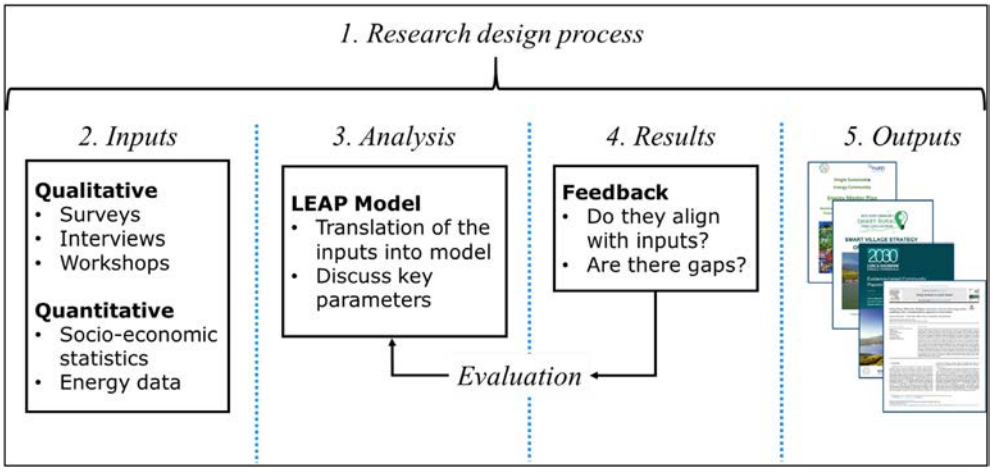

Fig. 1. Five stages when stakeholder can be involved in the energy system modelling process adopted from [1,2].

* Corresponding author.
E-mail address: connor.mcgookin@ucc.ie (C. McGookin).

http://dx.doi.org/10.1016/j.sctalk.2023.100130
Received 31 October 2022; Received in revised form 11 January 2023; Accepted 12 January 2023

Table 1
Summary of energy system scenarios modelled.

Scenarios	Description
REF	Business as usual reference scenario with COVID-19 impact in 2020/21 and then stagnation out to 2030
REFPOL1	Downscaling national 2030 targets for key measures like electric vehicles and home retrofitting based on the 2019 Climate Action Plan [54]
REFPOL2	More carefully planning the targets from previous scenario (REFPOL1), e.g. targeting homes with the lowest energy efficiency
REFCOPROD	Additional measures based on stakeholder inputs
BFB	COVID-19 impact in 2020/21 followed by a period of growth out to 2030
BFBPOL2	Mitigation measures from REFPOL2
BFBCOPROD	Mitigation measures from REFCOPROD, along with additional considerations to deal with the rebound in emissions in post-pandemic recovery

Wellbeing Indicators	Community								CD	KE	IRE
	1	2	3	4	5	6	7	8			
share of low energy rated homes	18%	19%	15%	19%	23%	16%	21%	19%	18%	14%	12%
solid fuel share of primary heating	8%	8%	7%	8%	9%	7%	9%	8%	8%	7%	6%
cars per capita	0.57	0.57	0.60	0.53	0.75	0.45	0.63	0.60	0.55	0.52	0.48
share of households with broadband	51%	51%	63%	59%	60%	57%	49%	56%	51%	61%	71%
gross median income per household	74%	70%	97%	76%	85%	78%	80%	85%	80%	83%	100%
share of permanently occupied homes	68%	51%	77%	59%	48%	62%	66%	72%	62%	74%	85%
growth in homes from 2011 - 2019	4%	4%	2%	2%	4%	4%	6%	3%	4%	5%	6%
single occupancy households	31%	35%	23%	30%	34%	34%	31%	24%	31%	28%	24%
change in population 2006 - 2016	8%	-2%	-3%	9%	-11%	5%	-7%	4%	2%	6%	12%
share of population over 65	17%	18%	18%	19%	17%	15%	15%	16%	17%	15%	12%
share of population between 50 - 65	19%	27%	24%	19%	32%	22%	24%	21%	23%	20%	17%
share of young family households	27%	22%	21%	28%	17%	26%	27%	26%	25%	26%	31%

Fig. 2. Wellbeing indicators identified in the 8 communities that make up the case study region compared to county and national figures (CSO data 2016).

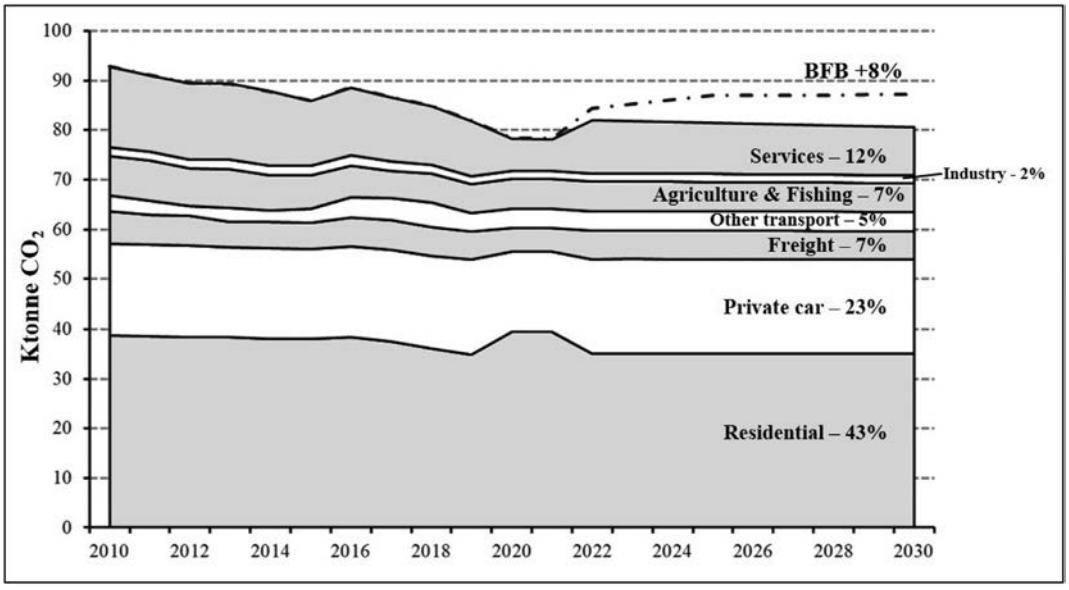

Fig. 3. CO2 by sector 2010–2030 in reference scenarios.

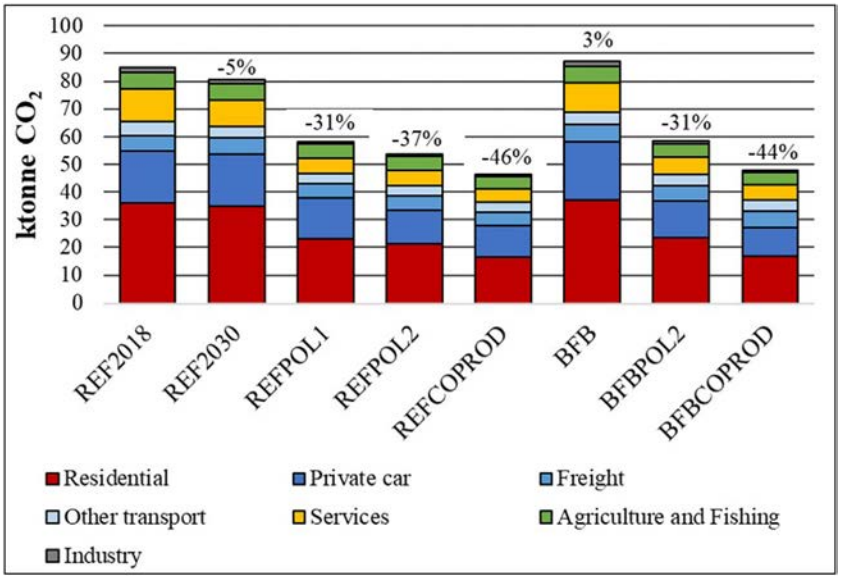

Fig. 4. Energy-related CO2 by sector in 2030 relative to 2018.

CRediT authorship contribution statement

Connor McGookin: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization. **Tomás Mac Uidhir:** Methodology, Formal analysis, Writing – review & editing. **Brian Ó Gallachóir:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Edmond Byrne:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Data availability

Data is published in supplementary material and on GitHub: https://github.com/MaREI-EPMG/LEAP_Dingle_Peninsula.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This research was funded by the Science Foundation Ireland MaREI centre and ESB Networks under grant number 12/RC/2302/P2 and was also supported by the US-Ireland R, D & D Partnership Programme funded by Science Foundation Ireland (SFI) together with the National Science Foundation under grant number 16/US-C2C/3290. The work was made possible as part of the Dingle Peninsula 2030 partnership. Special thanks to Seamus O'Hara (NEWKD) who coordinated the community meetings, the 400 attendees are a testimony to his fantastic work on the ground. Breandán Ó Caoimh provided useful insights into the demographic and socio-economic profile of area, and importantly was able to facilitate the community meetings bilingually. Last but certainly not least, the countless conversations with my fellow PhD Student, Evan Boyle, greatly assisted the development of the approach taken in this study.

References

[1] F. Li, E. Trutnevyte, N. Strachan, A review of socio-technical energy transition (STET) models, Technological Forecasting and Social Change 100 (2015) 290–305.
[2] G. Holtz, F. Alkemade, F. de Haan, J. Köhler, E. Trutnevyte, T. Luthe, J. Halbe, G. Papachristos, E. Chappin, J. Kwakkel, S. Ruutu, Prospects of modelling societal transitions: Position paper of an emerging community, Environmental Innovation and Societal Transitions 17 (2015) 41–58.

Further reading

[1] C. McGookin, T. Mac Uidhir, B. Ó Gallachóir, E. Byrne, Doing things differently: Bridging community concerns and energy system modelling with a transdisciplinary approach in rural Ireland, Energy Research & Social Science 89 (2022) 102658.
[2] W. McDowall, F.W. Geels, Ten challenges for computer models in transitions research: Commentary on Holtz et al, Environmental Innovation and Societal Transitions 22 (2017) 41–49.
[3] F.W. Geels, F. Berkhout, D.P. van Vuuren, Bridging analytical approaches for low-carbon transitions, Nature Climate Change 6 (2016) 576.
[4] E. Trutnevyte, L.F. Hirt, N. Bauer, A. Cherp, A. Hawkes, O.Y. Edelenbosch, S. Pedde, D.P. van Vuuren, Societal transformations in models for energy and climate policy: the ambitious next step, One Earth 1 (4) (2019) 423–433.
[5] L. Hirt, G. Schell, M. Sahakian, E. Trutnevyte, A review of linking models and socio-technical transitions theories for energy and climate solutions, Environmental Innovation and Societal Transitions 35 (2020) 162–179.
[6] C. McGookin, B. Ó Gallachóir, E. Byrne, Participatory methods in energy system modelling and planning – a review, Renewable & Sustainable Energy Reviews 151 (2021) 111504.
[7] P. Fortes, A. Alvarenga, J. Seixas, S. Rodrigues, Long-term energy scenarios: Bridging the gap between socio-economic storylines and energy modeling, Technological Forecasting and Social Change 91 (2015) 161–178.
[8] E. Boyle, C. Watson, C. McGookin, A. Deane, D. de Bhailís, C. McElligott, S. O'Hara, B. Tuohy, B. Ó Gallachóir, G. Mullally, Reflecting on a collaborative approach to a regional sustainability transition: Dingle Peninsula 2030, Reflective Practice 22 (3) (2021) 416–430.

Connor McGookin, BE and PhD in Energy Engineering, University College Cork, Ireland. Connor completed his doctoral thesis "Developing participatory methods in energy system modelling and planning", while a member of the award-winning Dingle Peninsula 2030 and Imagining2050 projects. His main research focus was to explore ways of working across social/technical disciplines and with a diverse range of stakeholders to collaboratively form energy and climate scenarios. Following his PhD, Connor briefly supported the development of a Case Study Paper with the Office of the Planning Regulator "Climate Action and the Local Authority Development Plan". Connor now leads the writing of Ireland's first Five-Year Assessment of Climate Change Research (5-YAR), Volume 2: Achieving Climate Neutrality by 2050.

Tomás Mac Uidhir is a postdoctoral researcher in MaREI and is located in the Environmental Research Institute in UCC. Tomás is an expert developer of the Low Emissions Analysis Platform (LEAP) energy system model for Ireland. He is interested in developing simulation models that provide insights into policy implementation pathways. Currently, Tomás is supporting the development of the LEAP Ireland energy system model as part of the CAPACITY project.

Brian Ó Gallachóir is Professor of Energy Engineering in University College Cork and Director Director of MaREI, Ireland's Research Centre for Energy Climate and Marine, comprising 220 researchers in 13 research institutes collaborating with 107 industry partners. Brian has published extensively in energy systems modelling and has directly informed energy and climate policy decisions. He is the elected Chair of the International Energy Agency Technology Collaboration Programme on energy systems modelling (IEA-ETSAP). Brian has also championed engaged research within MaREI, where he leads the multi-award-winning Dingle Peninsula 2030 flagship project.

Edmond Byrne is Professor of Process and Chemical Engineering at University College Cork. His research interests lie in transdisciplinary approaches to sustainability, engineering education for sustainable development (EESD), chemical engineering education, and sustainable systems engineering. He chaired the 10th EESD conference at UCC (EESD2021) and was a co-principal investigator on the award winning Imaging2050 and Dingle Peninsula 2030 projects. He has co-edited (alongside G. Mullally & C. Sage) the books: *'Transdisciplinary Perspectives on Transitions to Sustainability'* (Routledge, 2017)) and (alongside I. Hughes, G. Mullally & C. Sage) '*Metaphor, Sustainability, Transformation; Transdisciplinary Perspectives'* (Routledge, 2022).