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Public engagement practice for electricity grid system change

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ABSTRACT

This paper explores practitioner reflections on engaging the public in grid infrastructure development focusing on policy development and knowledge transfer for energy system change. We overlay literature review insights and practitioner reflections by drawing on two collaborative workshops held with public engagement officers from EirGrid, the transmission system operator (TSO) in Ireland. The research uses the concept of reflective practice as a tool to bridge the gap between academic research and practitioner insights. As such, the paper aims to enrich the understanding of engagement strategies and policy implementation for grid energy system change by drawing insights from practical, operational contexts and practitioner reflections on engagement. The results illustrate the difficulty of transposing research insights into practice-based policy implementation in the fast-evolving context of transmission energy system change. Four critical themes emerge in this context: the need to scale effective practices while considering socio-cultural differences, the growing relevance and use of digital tools to enhance public engagement, the imperatives of timely and iterative research, and the valuable contributions of shared reflections among practitioners to further inform policy. Addressing these issues will require reinforcing interdisciplinary research approaches, applying cross-case methodologies, and promoting practitioner peer knowledge development of public engagement within energy policy arenas.

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practitioner reflections;
energy transitions;
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knowledge transfer; Ireland

1. Introduction

The journey to reshaping the energy landscape toward renewable sources is highly ambitious and crosscutting, essentially seeking to transform how energy is produced, transported, stored, and consumed. Across the globe, various energy transition roadmaps now include a public engagement strategy to meet the challenges of large energy infrastructural change (IEA, 2023). In the European Union (EU), emission reduction targets to accelerate the phase-out of fossil fuels has increased dramatically; aspirational pledges have been replaced with binding emission targets. Public participation is highlighted as a critical mechanism to facilitate a more comprehensive approach (Oberthür & Von Homeyer, 2023). It reflects the growing realisation that rapid change requires democratic innovation to equip institutions to handle growing scrutiny and social and political turmoil (Fischer, 2017; Ringholm, 2022). Institutional innovation and experimentation are called on

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to provide practice-based solutions to emerging political struggles associated with the energy transition and climate change in ways that adhere to core democratic values (Fischer, 2017; Huitema et al., 2018). Cooperation and deeper forms of engagement are increasingly leveraged in this context as the need to disrupt and accelerate change tests the limits of more siloed solutions and pushes agencies to develop new partnerships that replace traditional hierarchical systems of authority with more diffuse and complex sharing arrangements (Aoki et al., 2022; De Laurentis & Cowell, 2022).

Emerging conceptual and methodological innovations are aimed at creating more impactful, effective, and empowering participatory processes (Chilvers & Kearnes, 2016). The engagement landscape surrounding energy system change is extensive and includes deliberative democracy, co-ownership of renewable energy, co-design, smart participation, financial participation, and consultation (Boyle et al., 2025). However, while participation is generally recognised as necessary, there remains a degree of ambiguity concerning who gets to participate and what mechanisms should be employed to facilitate this (Arnstein, 2019; Cornwall, 2008). Taking a relational perspective on public engagement allows for broader recognition that specific public behaviours are produced by unique interactive and value co-creative experiences with organisations and other stakeholders within specific contexts (Brodie et al., 2011). Furthermore, taking stock and monitoring evolving spaces and manifestations of engagement is crucial, as there is no one single model, tool or collective that delivers an ideal form of participation (Cornwall, 2008). Foundational typologies, such as Arnstein's 'ladder of participation' (Arnstein, 2019), provide opportunities to distinguish between various forms of participation and levels of empowerment. Highlighting the fact that participation may exist on a spectrum, from 'empty rituals' with no decision-making authority to engaged processes that allow for meaningful input (ibid).

Other key studies have emphasised the need to capture the complexity of the societal processes involved in energy system change, which has led to a broader vocabulary and frameworks to understand this dynamic and fluid area. Highlighting the significance of institutional, structural and political processes in shaping societal interactions with energy production, distribution and consumption (Knauf & Wüstenhagen, 2023). The concept of social acceptance has gained prominence in both policy and practice discussions (Ellis et al., 2023). Wüstenhagen et al.'s (2007) dynamic framework of social acceptance highlights the often neglected interaction among three dimensions: socio-political acceptance, community acceptance, and market acceptance, illustrating this complexity effectively. Emphasis on dynamic processes of social acceptance helps counter simple NYMByism (Not-In-My-BackYard) explanations as to why people might object or resist energy system change locally (Komendantova & Battaglini, 2016; Susskind et al., 2022).

A central aspect of the energy transition involves the development of new infrastructure, including the expansion of renewable energy sources and the necessary upgrades to electricity transmission and distribution networks. This area is rapidly evolving and fundamentally altering the role of energy in society. The energy transition is transforming both the social and organisational frameworks of existing power transmission systems. Such innovation calls for new patterns of social practices, engagement and ways of thinking (Wolsink, 2018).

Electricity transmission systems often embody the conceptual framework of national grids, serving as arteries that connect regions and communities. Despite there being significant variability in the way transmission systems operate across Europe, the social perceptions of these electricity networks are intricately linked to broader themes of national and cultural identity, (Devine-Wright & Devine-Wright, 2009; Högselius, 2018). As a result, the exchange of electricity within and between nations is not merely a technical process; it relies heavily on agreements, which are typically

bolstered by national-level governmental and institutional support. This interplay between energy infrastructure and national identity highlights the importance of cooperative frameworks in fostering a more interconnected and sustainable future for energy systems (Lagendijk, 2008). Yet, comparatively little attention has been given to this part of the energy system (Devine-Wright & Devine-Wright, 2009; Flachsbarth et al., 2021; Keegan & Torres, 2014), and this is concerning as typically acceptance of transmission grid developments is lower than for other large energy infrastructure developments such as wind (Hyland & Bertsch, 2018). Solutions to low acceptance appear complex and point to a complementary arrangement. Hyland and Bertsch (2018) explore community benefit schemes, equity involvements, joint ventures, and energy cooperatives. They find that different demographic groups prefer different options, highlighting the varied suitability of technologies. The study emphasises both distributional justice and the importance of participation in the procedural aspects of renewable energy infrastructure development. Equally relevant is the issue of imagery. Although transmission system technology has advanced substantially, negative images of high voltage pylons still permeate much of the public's thinking, with low awareness of other technologies such as subsea level interconnectors (Escribano et al., 2023).

How we measure success and transfer good practice in terms of programmes to engage the public in debates about electricity grid system change is an opportunity to bring into conversation both theory and practice. It is also an ideal moment to reach beyond academic research and engage with other key stakeholders, such as public engagement practitioners, who deliver new approaches to meet highly ambitious targets. In this paper, we explore emerging innovations to engage the public in the electricity grid system change and its links to grid transmission practitioners working with communities to deliver a new generation of grid projects to interconnect emerging utility-scale electricity from renewable sources in Ireland.

The paper progresses in three steps. First, we trace the changing context of public engagement in grid development in Ireland, paying close attention to experimental and innovative practices in this context. In step two, the paper outlines the various methods used in an experimental collaboration involving desk research and reflections on everyday engagement from a practitioner's perspective. Specifically, we describe how international academic insights and practitioner reflections are juxtaposed in this collaborative experiment. These contrasting approaches are seldom drawn together, and participatory evaluation is employed to gauge the perceived impact of this approach. Finally, in step three, we conclude with a discussion that emphasises the value and the challenges of integrating practice-based and academic knowledge in ways that can enrich and complement a shared ambition for climate mitigation and deep decarbonisation policy. Emerging climate governance approaches highlight the need for institutional transformation to overcome the institutional trap often implicated in slow change processes. The stereotypical characterisation of state institutions as 'insular', 'unreflective' and 'parochial' is increasingly challenged by innovative practices seeking to deliver public goods and services in new, more interconnected ways (Aoki et al., 2022). We have seen new ways to improve the connection between science, policy, and climate action. Engaged scholarship and action research are examples of these methods. They focus on working together to create knowledge (Norström et al., 2020).

2. Innovations in public participation in the energy transition: tracing engagement practices with grid system change in Ireland

The Irish electricity system is in considerable flux. Tracing innovations in democratic participation in grid developments in Ireland reveals that highly ambitious targets have been challenging to

deliver. It also shows that new public engagement strategies have emerged mainly in the context of an implementation crisis, stressing the need to co-develop a shared narrative of decarbonisation that aligns with local community values and concerns (Boyle et al., 2024; Escribano et al., 2023).

The energy transition in Ireland, as in the EU, is associated with ambitious targets, including a plan to deliver 80% renewable energy by 2030 and reach net zero carbon emissions by 2050, as set out by the Irish Government's 2023 Climate Action Plan (DECC, 2023a). The growth in renewable energy penetration and plans to substantially increase capacity through offshore wind farms across Ireland will reshape the energy system but also bring challenges in connecting new delivery and receipt points. Furthermore, as argued by Roux et al. (2022), this is not the first time Ireland has set ambitious targets around energy system change. In the past, the ability to deliver large energy infrastructural projects has been unsuccessful. A notable example is the controversy and protest linked to the Grid25 programme published in 2008 with a strategy to upgrade the country's electricity grid by 2025. Protests against Grid25 gained considerable momentum and caused various delays in the implementation of projects. One such project is the North–South Interconnector (Mullally & Byrne, 2016), which is ongoing and has a history of 15 years of setbacks and delays.

EirGrid plc. is state-owned and was established in 2006; it is the single Transmission System Operator in Ireland. In addition to managing the power flow on the electricity grid and moving high-voltage electricity around the country, EirGrid manages the East–West Interconnector (connecting the Irish grid to the UK). Recently, the Irish government designated EirGrid as the Transmission Asset Owner for Ireland's offshore electricity grid. They are also tasked with developing the Celtic Interconnector linking Ireland's electricity grid to France (a joint initiative with the French Transmission System Operator Réseau de Transport d'Électricité). These latest developments significantly expand the role of EirGrid in delivering energy system change. As part of *Shaping Our Offshore Energy Future* (EirGrid, 2023), EirGrid plans to develop offshore electricity substations and associated undersea electricity cables. The most recently approved *National Policy Statement: Electricity Interconnection* (DECC, 2023b) seeks to develop additional opportunities to connect and manage Ireland's energy system interconnections with other EU countries.

In the latest *Stakeholder Engagement Plan 2024* (EirGrid, 2024) growth in engagement interventions looks to provide a strategy commensurate with the unprecedented changes required in the grid. EirGrid's six-step process is now adopted for every new project, and various engagements with the public, local communities and landowners are identified for each step following a project development lifecycle (See Figure 1). For instance, engagement with landowners and local communities typically takes place during steps 3 and 4 (EirGrid, 2024). This new strategy includes ideas such as early-stage engagement, richer consultation platforms, establishing a community forum, and the community benefit fund.

EirGrid also began the Energy Citizen Roadshow initiative following the publication of *Shaping Our Electricity Future* in 2022. This is an ongoing series of events held around the country which act as a discussion space for public engagement in energy citizenship.

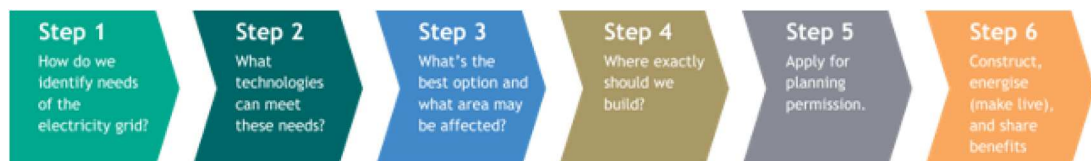


Figure 1. EirGrid's six step process, Source: EirGrid (EirGrid, 2024).

In summary, EirGrid's innovations in public engagement have been substantial and varied. Faced with an implementation crisis, costly delays, and ambitious climate policy targets, delivering deeper forms of public engagement in implementing grid projects has become central to EirGrid's strategy. For new projects like the Celtic Interconnector, there is an opportunity for a fresh start, where innovations such as the six-step strategy and the efforts of a dedicated public engagement team can be implemented from the outset. In contrast, for existing projects like the North–South Interconnector, which has a long history of community issues, some of these innovations, particularly early engagement, cannot be applied retrospectively. However, the establishment of two Community Forums and a Community Benefit Fund will be introduced for this project. It will be interesting to observe how these processes unfold, especially given the project's history of protests and community disputes. In the next section of the paper, we describe a collaborative experiment for connecting the literature on engagement with grid infrastructure and practitioner-led reflections. On the one hand, drawing from the literature around engagement innovations with energy grid infrastructure across Europe, we seek to provide a baseline of practices within this arena, and we then combine these with everyday engagement insights in Ireland using practitioner reflection as a lens.

3. Experimental research design and methods

3.1. Study design

We developed this collaborative experiment as an analytical tool and a means of offering a multi-level perspective. This study considers learnings from European research, captured and synthesised through a scoping literature review process. Subsequently, we explore their perceived relevance and expected implications for the practice of engagement in grid developments in the Irish context. We engage with reflective practice captured in two workshops with the engagement team working within EirGrid, the Transmission System Operators (TSO) in Ireland.

Literature reviews are a core academic method to build and advance knowledge. As a stand-alone method, they are often utilised to take stock of fast-evolving areas of research, identify adoption of new practices, find answers or evidence around a specific research question, or they can be used to provide a new reading or perspective around an existing body of knowledge (Mullen & Ramírez, 2006). Reflective practice can go beyond 'textbook' sources of knowledge and tap into the rich body of practice-based know-how drawn from engagement professionals' views, experiences and reflections (Schön, 2017). We stress the importance of bringing to the fore the carrying out of 'real practice' to understand the changing role of practitioners and their challenges within energy system change. This perspective remains largely unexplored, and we hope to provide rich insights not commonly considered in the literature. We emphasise the productive aspects of practitioner-led reflections as 'theories-in-the-making' arising from the everyday application of concepts, learning by doing and situated views on future outlooks (Chang et al., 2011; Deering, 2016; Revez et al., 2023; Schön, 2017).

The desk-based literature review and the two workshops focused on models of engagement and resources used for deepening participation in energy grid contexts. The collaborative experiment evolved in three distinct stages. First, we carried out the literature review and then integrated some of these results into two reflective practice workshops. We offer a selection of findings in this paper that bring out the synergies and contrasts emerging from this - multilevel perspective design. Finally, participatory evaluation was used to assess the relevance of the experiment. Table 1 shows the sequencing of the various methods used.

Table 1. Stages of collaborative experiment.

STAGE	FOCUS	METHOD
1	Review of the literature providing a baseline of public engagement with the energy grid	Literature review
2	Practitioner reflections on ten selected use cases from the literature	Two reflective practice workshops
3	Assessment of collaborative experiment from a participant perspective	Participatory Evaluation Survey

3.2. Participant profile

Seven participants with a role in public engagement in the Irish TSO participated in the reflective practice workshops. The practitioners were recruited in March 2023, including four females and three males. All participants have a role in EirGrid's public engagement, working locally to deliver engagement across various projects. Contact and recruitment were facilitated through EirGrid channels, and a briefing session was held before the workshops to facilitate an initial exchange between the researchers and the practitioners. Four researchers led this work from the STEPS Project: two females and two males. Two of these researchers facilitated the workshop discussion and captured reflections through note-taking and a short participant evaluation survey. The research team obtained ethics approval.

3.3. Scoping literature review

3.3.1. Guiding question

The following research question guided the scoping literature review:

What are the key features (frameworks, stakeholders, formats, and geographical distribution) of public participation in energy grid research?

3.3.2. Data/information sources and analysis

Several steps were taken to carry out the scoping review; these included a scoping process of literature search, screening and analysis, drawing from the steps outlined by Arksey and O'Malley (2005). The scoping review is not exhaustive compared to more in-depth processes such as systematic reviews. Still, they provide a structured set of steps to capture a representative sample of research. The process included developing search terms and inclusion and exclusion criteria to screen through materials, and inform the inclusion of borderline articles (see Table 2). Search terms or 'keywords' were used to retrieve materials, and we included some diversity in the search to allow for differences in the way concepts are described. In some instances, we used different combinations to maximise data retrieval. The keywords were: 'electricity grid'; 'energy grid'; 'citizen'; 'community'; 'participation'; 'engagement'; 'deliberation'.

Table 2. Inclusion and exclusion criteria applied in the review.

INCLUSION	EXCLUSION
• Literature limits between 2000 –2022 • Any study design. • Global geographical review • Any urban, rural or peri-urban setting • All articles directly related to the theme of this study and some borderline articles.	• Focused on articles related to electricity grids. • Focused exclusively on articles related to public participation. • Non-English language. • Articles loosely related to the theme of study. • Grey literature and articles not published in the databases used for retrieval

We used Scopus, Academic Search Complete (ASC/EBSCO host), and Google Scholar databases to search for available literature. A total of 79 articles were retrieved through this process.

Materials were initially analysed thematically, drawing from an adapted version of the Common Questions Framework – CQF (i.e. Who, How, What, and Where). These interdependent categories highlight some key features of public engagement with grid research. We provide a short synopsis of these findings in the results section.

3.4. Reflective practice workshops

Two workshops were held with practitioners. One workshop was conducted in person and attended by seven practitioners; the second was held online and attended by six practitioners. Two researchers facilitated the two sessions. On both occasions, the workshop process started with a brief presentation of pre-selected studies identified through the literature review process, followed by an open discussion on the challenges, opportunities, and general implications these papers bring from a practitioner standpoint. Ten pre-selected research papers/case studies were showcased.

Qualitative data was captured during the two workshops through observation sheets filled by the participants for each use case, and this was complemented by notes taken by the workshop facilitators on key points/themes of discussion among the participants. The depth of observations provided by participants using the sheets was varied, with some adding considerable comments while others were sparsely completed. This is a limitation in the study, and the notes taken by the workshop facilitators somewhat mitigate this unevenness.

3.5. Data analysis

We used thematic analysis to process, analyse and structure our findings. Thematic analysis is a technique which enables the researcher to identify patterns and themes in the data set. It subsequently provides categories for analysing and reporting this information (Braun & Clarke, 2006). One researcher performed the initial analysis, and an independent exploratory analysis was carried out with no predefined structure. Themes were identified and coded as they emerged in the data. This was then refined with the feedback of the wider research team. We used NVivo software to support the process. NVivo allows for open coding and for refining the thematic process by identifying relevant sub-themes and exploring relationships between themes (Creswell & Creswell, 2017; Min et al., 2017).

3.6. Participatory evaluation

Integrating participatory evaluation into the experimental research design further realised our commitment to collaborative and practice-led knowledge. The emergence of participatory evaluation as a form of programme evaluation exemplifies a practical shift towards experimental methods that are more inclusive (Chouinard, 2013). It has a clear goal to align programme delivery assessments with the participant's needs (Chouinard, 2013). It aims to improve learning in organisations by using evaluation methods that focus on reflexive learning and iterative improvements rather than just using evaluation in more narrow terms for proving the success or failure of interventions (Cooper & Ord, 2012). Participatory evaluation values the role of participants in identifying and designing the terms of reference to interpret findings and use the resulting information to drive improvements. The collaborative experiment process incorporates these values, from reviewing workshop outcomes to input into the findings.

A short online evaluation survey with closed- and open-ended questions was circulated to all practitioners involved in the workshop. Five practitioners completed the survey, and the results are included in the findings section.

4. Findings: juxtaposing literature and reflective practice insights

We begin the findings section with a characterisation of the literature using the CQF structure to present findings and outline key trends. The CQF framework was adapted from work in the Information Systems field (Cordeiro, 2014), and leveraged ideas from work mapping engagement with energy, see Pallett et al. (2019). It also follows Cornwall's (2008) lead on the value of exploring some of the meaning and practices of participation by mapping who and what participation means in different contexts. The CQF structure includes the following core categories: Who, What, How, and Where. The 'Who' category aims to capture the various manifestations of public engagement related to research on grid infrastructure, and how they are represented as actors or subjects in this space. The 'What' category explores the functional targets and objects of energy grid participation, namely what interests, motivations and drivers frame participation. The 'How' category maps out the various models and spaces of engagement in grid research, querying how opportunities to participate are made available. Finally, the 'Where' category outlines the locations of research, providing a geographical breakdown of literature on public engagement with the energy grid.

4.1. Characterisation of scoping literature using the CQF framework

Following a staged scoping review process, 79 articles were retrieved. Overall, the process reveals that public engagement with grid system change is a diverse and evolving field of research and practice. Various manifestations of the 'public' emerge from the body of literature and approaches to characterise, mobilise and engage emerging actors, including energy citizens, energy consumers, prosumers, stakeholders, and energy communities.

The expressions of public engagement outlined in Figure 2 are varied, as are the number of other stakeholders with whom they interact, including transmission system operators, energy distributors, local authorities, and planners.

As the findings in Figure 3 demonstrate, the targets and objects of participation reveal some clear patterns in the current energy grid internationally. It shows, for instance, that the Smart Grid is a dominant issue, which has come to permeate the conversation around energy grid system change and public engagement. Information and Communication Technology (ICT) integration into the

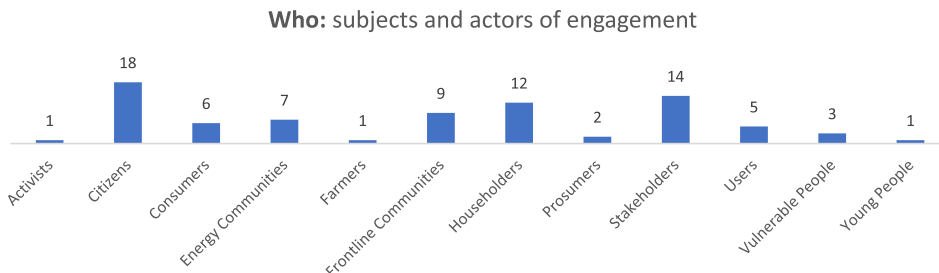


Figure 2. Breakdown of emerging expressions of public engagement.

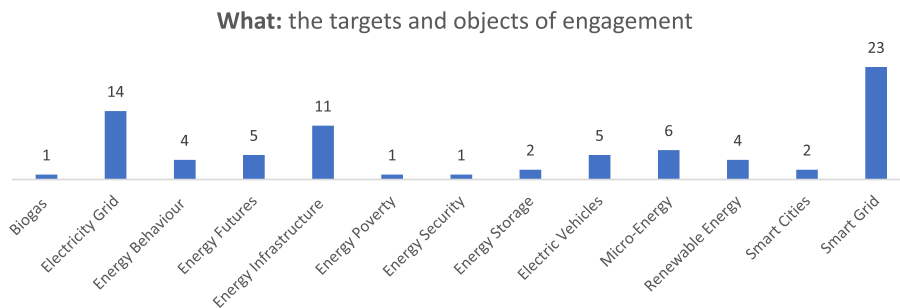


Figure 3. Breakdown of targets and objects of public engagement.

grid is a concern in this context. Other emerging themes consider grid expansion, grid flexibility, demand response, and the planning process.

As indicated in Figure 4, the three most common forms of public engagement with grid development are public acceptance, engagement innovations, and digital engagement. Many of these forms consider citizen activation and elicitation as technologies for mobilising the public. Public acceptance and public engagement solutions are discussed in various ways, some drawing on a deficit of engagement model framed around knowledge deficits or moral deficits that can be countered through innovative participation based on information-giving interventions. Others bring a more nuanced understanding of the variety of motivations and drivers for the public acceptability of grid infrastructure.

As shown in Figure 5, Ireland is poorly represented in the literature sample compared to more dominant countries, including the UK, Germany, Denmark, and Norway, as a focus for research on public engagement with energy grid system changes. Furthermore, few articles provide comparative insights across various national and international scales.

4.2. Selection of use cases

The ten cases outlined below, published between 2011 and 2020, offer a distilled version of research articles retrieved through the scoping process. They examine participatory practices and showcase specific models and resources employed. Prominent themes were quantified, and articles were shortlisted from these top categories (i.e. the how: emerging forms of participation) and the top researched countries (i.e. the where: geographical breakdown of countries). These include public acceptance, engagement, and digital engagement. The following practitioner reflection findings are based on this selection (Table 3).

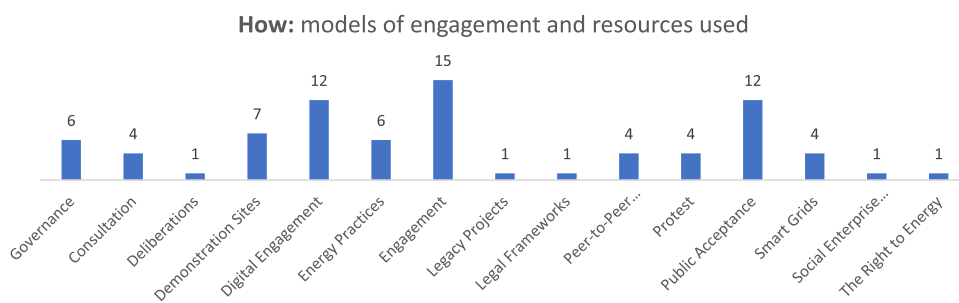


Figure 4. Breakdown of emerging forms of public engagement.

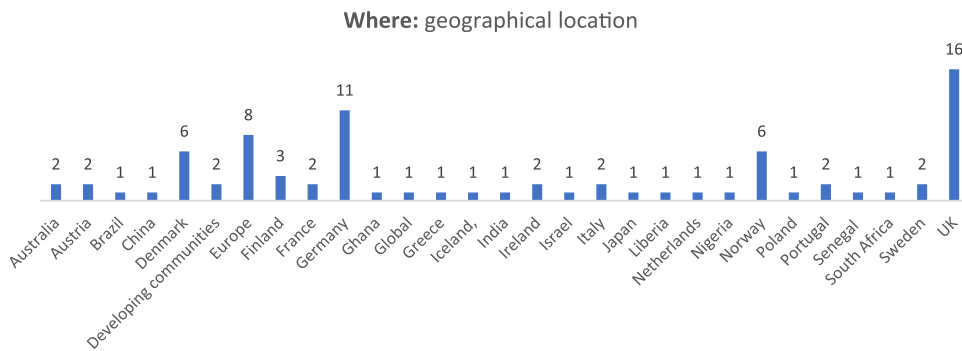


Figure 5. Geographical breakdown of literature on public engagement.

The studies were presented at the workshops using a vignette format (see [Table 4](#)). The vignettes followed a pre-defined structure and were designed to showcase each paper's background, methods, findings, and recommendations concisely and using visual materials and tables where relevant.

4.3. Findings from reflective practice workshops

We analysed the main themes across the reflective practice workshops framed around the use cases outlined in [Table 3](#). We focused on how learnings from these use cases can be applied to EirGrid's ongoing public engagement practices. These findings are based on qualitative and participatory survey data recorded at the workshops. We identified four key themes: scaling good practices and accounting for socio-cultural differences, using digital tools for public engagement, the time-liness of research, and the value of peer knowledge.

4.3.1. Scaling practice and accounting for socio-cultural differences

An overarching concern that emerged from practitioners' reflections on the use cases relates to the transfer and scaling of practices and recommendations from various other countries, across

Table 3. Selection of ten use cases for practitioner reflection workshops.

CASE	FORM OF PARTICIPATION	SOURCE ARTICLE
1. Resident participation in high-voltage transmission line planning procedures in Germany	Engagement	Mueller, 2020
2. The planning regulation of major renewable energy infrastructure in England and Wales	Engagement	Rydin, 2020
3. Acceptance of infrastructure development under different involvement schemes in Ireland	Public Acceptance	Hyland & Bertsch, 2018
4. Sensemaking and public acceptance of energy infrastructure project: insights from Denmark	Public Acceptance	Aaen et al., 2016
5. AI-powered communication and engagement framework for energy projects.	Digital Engagement	Buah et al., 2020
6. The use of participatory Web GIS in electricity grid expansion and the siting of renewable energy plants	Digital Engagement	Maran & Stella, 2020
7. Living-labs and micro smart-grid imaginaries: the urban innovation campus in Germany	Demonstration Sites	Engels & Munch, 2015
8. Cross-border electricity infrastructure: illustrations from the German-Polish border	Cross Border	Puka & Szulecki, 2014
9. Local opposition to new electricity grid developments and compensation along the spectrum of weak to strong sustainability options	Protest	Tobiasson & Jamsab, 2016
10. Electricity Transmission Line Siting in the UK	Consultation	Cotton & Devine-Wright, 2011

Table 4. Case study vignette components are structured in a single slide using text and visual elements to communicate learnings.

ELEMENT	DESCRIPTION
Case study title	The title of the case study
Background	Details concerning the aims and objectives of the study, the challenges or gaps it seeks to work on and context-relevant information.
Methodology	Overview of the scope and methods used in the study, including timelines, sampling strategies, data collection and data analysis approaches.
Key findings	Digested summary of case-study results, with concise information using tables, bullet points or charts to highlight core findings.
Recommendations	Outline the key implications and policy recommendations identified in the case study, focusing on practice-led insights where available.
Insights	Side-bar section of the vignette using visuals to communicate surprising ideas and insights from the study
Map	Simple visual map identifying the focus location of the case study

Europe. As noted in the characterisation of the scoping review, we found a limited number of articles focusing on Ireland and only one of the use cases discussed related to the Irish context. This presented difficulties for the practitioners. Concrete examples of public engagement with grid expansion were generally well-received by practitioners. However, the transfer and applicability of such practices to the Irish context were questioned, as illustrated below.

The findings run contrary to the Irish experience. Useful that participation is being looked at. May reinforce localised nature of responses and hence the inability for generalisation and comparison.

(PR1, Online Workshop)

Accounting for socio-cultural differences was a key concern regarding the transferability of learning and practice. Irish-specific views on land ownership, sense of place, and equity permeate many public practice engagements. Like other countries, a strong cultural-historical dimension influences engagement practices, such as the Irish famine and post-colonial history.

Cultural differences between Germans and Irish aren't specifically provided for in the case study. It would be interesting to explore the Irish culture / Irish-isms specifically in relation to participation and engagement.

(PR2, Online Workshop)

The findings also indicate that navigating engagement across cultural differences is further complicated by challenges in accounting for the socio-demographic dimensions of public participation. The demographic profile of communities was noted as very important, and notably, age, socio-economic background, and educational attainment were seen to inform choice to participate (younger people were notably more disengaged) and ways of engaging with issues associated with the energy grid (i.e. 'working with the willing', those who already have an interest around energy issues as opposed to those who are disengaged for instance). While this difference was acknowledged as applicable across different national contexts, the practitioners stressed that there were relevant nuances that are deeply linked to Irish culture.

4.3.2. Digital tools and public engagement

The increased shift to digital technology in communications and engagement raises questions about changing participation and public engagement dynamics. Digitisation also brings new working practices and opportunities to support energy transitions. The scoping literature shows that

digital tools for public engagement with grid infrastructure are becoming more relevant. Technologies such as smart metres, the Internet of Things, Artificial Intelligence (AI), smartphones, social media, smart infrastructure, and Geographical Information Systems (GIS) are prevalent in this context. We presented two use cases leveraging digital engagement around GIS and AI. From reflections on these, we gauge that practitioners have a high confidence level in using GIS but display much lower confidence in AI as a tool for engagement. The following quotes illustrate these points.

The number one thing people want to see- Where is the map?

(PR3, In-person Workshop)

Agree that AI is helpful and has its place and will be developed. However, the essence of the engagement process re. electricity infrastructure is humanising the energy system, heretofore automated and distant from people. Hence people and human understanding and contact has to be at the core. It's a reverse scenario to other areas where the trajectory is from humans to robots. Energy and electrical grid is moving from robot/automation towards increase human intervention. Perhaps AI can replace more elementary roles as the engagement role develops to more complex issues ...

(PR4, Online Workshop)

All participants expressed strong support for continued innovations and advancements in using GIS as a public engagement tool, which is currently used at various stages by EirGrid along their Six-Step process. Best practices and insights into the benefits of GIS were welcome. However, in this context, there were concerns about potential digital literacy issues that could lead to the exclusion of certain groups. In contrast, there was no consensus regarding using AI to enhance engagement with the energy grid. One practitioner believes that AI is an eventuality and will play a part; they see current perspectives as complacent and underestimating the potential of AI to enhance engagement.

Overall, the consensus is that AI will have no significant role in moderating, facilitating, or driving public engagement with grid infrastructure in the short term. AI is primarily perceived as a futuristic technology with immediate opportunities that are not easy to grasp, in contrast with GIS, where the experience and benefits are more palpable.

4.3.3. The timeliness of research

A vignette was presented outlining each study's focus, rationale, methods, findings, and recommendations. This presentation raised questions about the timeliness of the studies and the fast-changing context of practice regarding energy system change. The publications ranged from 2011 to 2020. Some of the reflections are offered below.

Outdated [use case], which may impact what is presented.

(PR5, In-person Workshop)

The development environment has changed so significantly that the reasons for delays highlighted [in the use case], while relevant, are joined by more regular issues such as supply chain constraints, expertise and resource constraints, etc ...

(PR6, Online Workshop)

These reflections are based on two key specific considerations. The first relates to the time-constrained nature of the grid infrastructure system, whereby information is largely demand-driven and designed to address immediate needs for quick results. The discussions show that access to

real-time simple solutions and innovations is prioritised over distilled knowledge from past experiences. Secondly, we can also see that the accelerated pace of climate change policy makes it challenging for practitioners to find the right balance between long-term plans and short-term actions to bring about societal change. Delivering projects on time and quickly while ensuring climate targets are met is a challenging context for delivering meaningful engagement. Policies and research in this area have seldom addressed these obstacles.

4.3.4. Peer knowledge

The peer knowledge theme relates to the collective dynamic facilitated by the reflective practice exercise, which enabled a constructive dialogue among the practitioners. We observed considerable exchange between the different projects and areas of engagement, reflecting EirGrid's wide national range of ongoing projects across Ireland, which now include cross-border projects such as the Celtic Interconnector and the North South Interconnector. Working on the ground across various locations in Ireland, some practitioners often need more time and space to collectively reflect on ongoing work and compare outcomes as implemented on the ground. This reflective learning process emerges as a key point beyond more direct engagement with recommendations from use cases developed elsewhere, providing the means to frame and facilitate these reflective learning moments that are conducive to consolidating practical working knowledge in a peer environment.

4.4. Participatory evaluation findings

In this final subsection of the findings, we focus on the participatory evaluation of the reflective practice workshops, indicating, as per [Figure 6](#), the results of how practitioners think the workshops helped with their everyday work as public engagement practitioners with energy grid system change. The survey question results show that sharing experiences and opinions with peers was the most valued option. We also asked practitioners to rate the relevance of the workshops to their day-to-day work, and the results, as per [Figure 7](#), show that the average rating was 3.4 stars.

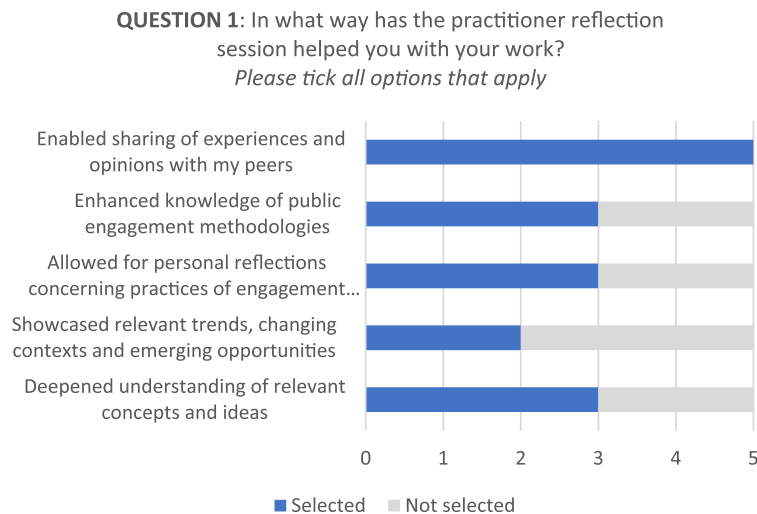


Figure 6. Results of participatory survey question 1. A total of 5 respondents.

QUESTION 2: Overall, how relevant do you feel the research insights and reflections are, relative to your day-to-day work?
One option only

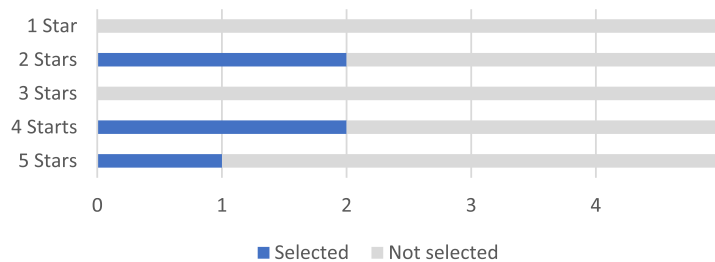


Figure 7. Results of participatory survey question 2, average rating of 3.4 stars. A total of 5 respondents.

Finally, in Table 5, we provide final comments that the practitioners offered relative to their experience with the workshop and how to improve similar activities in the future. The observations confirm some of the findings regarding the need to account for cultural diversity and find use cases relevant to everyday practice. Another issue outlined relates to delivering these workshops and capturing learnings. One participant notes that this form of discussion is often missing, highlighting its value as an opportunity to consider different perspectives.

Further recommendations to mitigate some of the issues highlighted can be found in the discussion and conclusions section.

5. Discussion & concluding remarks

In this paper, we explored reflections on evolving public engagement strategies and the day-to-day practices of energy grid practitioners in Ireland. We stressed the value of bringing to the fore the carrying out of ‘real practice’ to understand the changing role of practitioners working with local communities and stakeholders to deliver timely energy system change. We sought to provide new insights that complement existing literature, particularly in the transfer of research knowledge into practice. We believe this can be a fruitful avenue for research, and we propose the practitioner-

Table 5. Results of participatory survey question 3. A total of 5 respondents. Q3 is aligned with star ratings in Question 2.

QUESTION 3: Please add any other comments or ideas to improve future sessions.	
STAR RATING	COMMENTS
1 Stars	N/A
2 Stars	• ‘Need more relevant case studies. Felt they weren’t truly or even partly reflective of the Irish context’. • ‘Perhaps more time would allow for more open discussion – however, not sure that would be helpful to your work on these paper/these papers’.
3 Stars	N/A
4 Stars	• ‘Offers great insight. Communication and discussion around same always bring up perspectives and topics that wouldn’t be discussed normally within the group. Some of the team wouldn’t have experience of these topics coming up at all in general conversation with stakeholders’. • ‘I think in person sessions built around a world café style approach to collecting data is worthwhile exploring’.
5 Stars	• ‘Could investigate how to get more out of participants. Maybe through questions, statements, polling. Enjoyable exercise though’

reflective approach as a more dynamic and integrated view of people and institutions within change processes. Making a difference to energy transition theories and concepts through more engaged and practice-focused methodologies has led to the emergence of participatory approaches, which invite deeper forms of collaboration and bring about a shift in how research and participants relate to each other, often in 'messy' processes (McGookin et al., 2024). Juxtaposing insights from the literature with reflective practice, we mixed methods from different theoretical and methodological contexts to highlight opportunities and challenges in bringing together research and practice in relation to public engagement with energy grid system change. This is premised on the understanding that mixing methods is an ideal way to address gaps and silences not recognised or addressed elsewhere (Nightingale, 2003). The methodology proved to be engaging, and the participants generally perceived the exercises as relevant. Overall, the literature review process and the use of vignettes to showcase case-study findings were useful and provided context for deeper discussions. As such, it proved to be a fruitful process to elicit practitioner reflections and look to bridge literature and practice-based insights.

The steps involved in juxtaposing literature and practitioner reflections were designed to deliver a baseline understanding of evolving public engagement theories and strategies concerning the energy grid infrastructure. Nevertheless, the process led to more in-depth considerations around knowledge transfer and the value of peer-led discussion for deepening and scaling new public engagement practices. The findings suggest that practitioners have very specific requirements when it comes to incorporating new expertise in their work, ultimately showing how public engagement practices and knowledge are highly contextualised and contingent.

Our paper also shows that there has been an escalating interest in public engagement in the energy grid system, which literature insights show have led to innovative concepts and practices in this space. This aligns with Ireland's fast-changing context of public engagement with grid infrastructure. Like other TSO institutions, EirGrid is increasingly confronted with challenges, including the climate crisis, costly delays, controversies, a growing plurality of 'publics' (Koelman et al., 2023) and the need to meet ambitious climate policy targets. This has resulted in an implementation crisis brought about by increased public scrutiny and contestation. In response, EirGrid has recognised the critical importance of enhancing public engagement through various innovative channels to enable the implementation of grid projects. This strategic shift acknowledges the significance of involving the community in shaping and executing initiatives related to the grid, reflecting a commitment to fostering deeper forms of participation and cooperation in addressing energy and environmental concerns. However, grasping the dynamics of 'good' public engagement practices continues to be an elusive issue requiring new multilevel approaches and methodologies (Kirch Kirkegaard et al., 2021; Koelman et al., 2023).

The study reveals the role of context-specific factors, such as nuances around time and the rich diversity of cultural differences, in shaping decision-making approaches to public engagement and participation. These complexities create significant challenges in transferring knowledge and methodologies, highlighting the necessity for tailored strategies. Indeed, Ringholm (2022) points out that participation and energy citizenship are likely to 'remain a practice in the making' and that 'allocating categories based on empirical observations is an exercise in hitting a moving target' (p.5). We demonstrated the value of juxtaposing traditional literature review insights with practice-based reflections to understand the transferability of learning into practical contexts. Our analysis revealed four critical themes that warrant attention. These include the need to scale good practices while accounting for socio-cultural differences, the effective use of digital tools for public engagement, the importance of conducting timely research, and the valuable contributions of peer

knowledge. We believe addressing these issues would require strengthening interdisciplinarity, cross-use case methodologies and peer knowledge development.

Peer-led knowledge is an emergent point. Given the long-standing tradition of peer-led knowledge in science and public administration, its role in energy transitions should be highlighted. The OECD and the EU have developed trademark working methods underpinned by a peer-review process whereby the criteria to evaluate, assess and refine professional practices are drawn from the members of the profession and their quality criteria (Meadowcroft & Steurer, 2018). Similar processes could be transposed into the energy transition space. Typically, recommendations formulated using peer reviews outperform those of external consultants and researchers as practical limitations are accounted for. However, we note that there are some limitations to over-reliance on peer reviews, which include the fact that they are usually less critical than those generated externally and, in isolation, less likely to lead to the adoption of alternative and innovative frames or approaches (Meadowcroft & Steurer, 2018). In line with this, we believe some articles could have been selected to explore recommendations from an insider and outsider perspective regarding public engagement practice. This is a clear step to improve the application of this approach in future work.

5.1. Research limitations.

A methodological limitation of the study is that the practitioners' willingness and ability to examine their work heavily influence our results. Although the practitioners we worked with were open and cooperative during the research process, there may still be limitations or biases in how they evaluate their performance and what they choose to disclose about the process of reflection and their views of the literature. Moreover, the innovative nature of the approach poses some limitations, hindering our ability to draw comparisons with previous work and evaluate our results more effectively. Finally, we note that the range of public engagement innovations and the extended cycle of activities stemming from EirGrid's six-step process means that most practitioners are not experienced across the entire life cycle of activities and their implementation on the ground. It is likely, therefore, that the lower-to-higher relevance results obtained in the participatory evaluation can, to some extent, be explained by limitations in experience over the cycle of activities within the EirGrid engagement process.

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