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Halfway up the ladder: Developer practices and perspectives on community engagement for utility-scale renewable energy in the United States

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ABSTRACT

Community engagement is a key pathway for incorporating social considerations into the development of utility-scale renewable energy facilities. Prior literature recommends meaningful, early community engagement to both improve siting outcomes and empower the public to participate in decision-making, but there is no recent nor comprehensive understanding of industry experiences with engagement. This study provides a critical contribution by revealing the practices and perspectives of project developers. We draw upon a survey of 123 professionals employed at 62 unique companies across the United States. We demonstrate that developers are highly concerned about the impact of community opposition on project deployment, and that they already use a variety of engagement strategies and adjust project designs in response to community feedback. However, the public is generally not made aware of project proposals until after land for the project is secured, and industry expenditures on engagement activities pale in comparison to other project development costs. We draw upon Arnstein's ladder of citizen participation to operationalize the engagement preferences of developers, and find that the majority of developers prefer that members of the public provide input but not recommend or make decisions. We characterize this preference as 'halfway up the ladder', compared to the idealized vision of full citizen empowerment envisioned in narratives of just transition. These findings contribute to discussion of the role and potential for community engagement to attend to justice in the energy transition.

1. Introduction

Industry, academic, and policy communities generally consider community engagement in renewable energy siting decisions to be valuable, although important tradeoffs are also recognized. Various researchers have called for increased public engagement early in the siting process based on the expectation that this will lead to more positive outcomes, help avoid conflicts, increase perceptions of fairness, and even improve attitudes once projects become operational [1–4]. Furthermore, there is increasing recognition that the process through which renewable energy projects are planned and sited is a critical component of ensuring a just and democratic transition to a decarbonized energy system [5,6]. Quality community engagement can be a promising pathway for procedural justice – one of the core tenets of energy justice [7] – but it can also be at odds with other goals of decarbonization policy, such as certainty and speed [8,9]. Meaningful community engagement often necessitates time to build trust with communities [5], which may conflict with the desire to deploy renewable energy at a swift pace.

This study makes a critical contribution to our understanding of the role and potential of community engagement in renewable energy development by documenting current industry practices and focusing on the perspectives and experiences of industry stakeholders. Our first research objective is to demonstrate industry concern with the impact of community opposition on project development, and then to better understand what practices developers currently use to engage communities. We then uncover what elements of project design are most often adjusted in response to community feedback. Finally, we reveal developers' perceptions of the most appropriate way to engage communities, and discuss factors and experiences that have contributed to these perspectives.

The majority of existing research focused on these community engagement processes is based upon the experiences and perspectives of the general public, project neighbors, or key local stakeholders such as local government officials and staff. There has been very minimal attention in the literature on a pivotal, yet often hard to reach group in the community engagement process – the industry. Focusing on this group is important for two reasons: First, given their on-site experience

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planning and carrying-out engagement activities, these individuals have critical insights and experiences as to the barriers, challenges, and potential of public involvement in the siting and permitting process. As well, unlike the general public or local officials, these individuals often have experience working on a portfolio of projects across different communities, states, and the associated policy contexts. They also understand the role of community engagement within the larger context of all the various procedures, costs and other requirements for project development.

Second, project developers offer insight into the otherwise-opaque implementation dimensions of community engagement. Developers can take varying approaches, and have varying motivations, for engaging communities even within state- or locally-prescribed structures of public participation. For instance, some prior research has suggested that many developers think community engagement is good business practice, but may also have a precautionary view that engagement can sometimes threaten the likelihood of project approval, and therefore they strategically decide when to first announce projects based on their expectation of the public reception [10]. But to our knowledge, these perspectives and behaviors have not been systematically examined. Developers' experiences and reported practices help us better understand a key gap in the literature around the existing parameters and goals of public engagement [11], such as which project aspects are subject to adjustment based on community input.

In the next section, we discuss existing literature on the current practices of industry and how these relate to concepts of just transition, energy democracy, procedural justice, and public attitudes. We then describe Arnstein's ladder of citizen participation, which is utilized here as a framework to help assess the degree to which communities are currently engaged, and what preferences developers have for public involvement moving forward. Then, we share the methodology and results of our survey which establish developer practices and perspectives. We conclude by situating these results within a broader discussion of the role and potential of community engagement as a tool for attending to justice in the energy transition.

2. Literature review

2.1. Current development practice: decide-announce-defend and private participation

The traditional and most widely-used model of developing utility-scale renewable energy projects (and indeed, many other forms of development) has been described as the 'decide-announce-defend' (DAD) model, in which "initial decisions are made by developers, announced to the public and then defended against public criticism [12]." What is currently understood, though has not been explicitly measured, is that many developers may adjust when they first announce a project based on how they expect the public will respond, and in cases where opposition is expected, may attempt to 'sneak projects thru' to minimize opportunities for intervention [10].

Importantly, while the general public is not often involved in the initial step of the DAD model, private landowners in the project vicinity certainly are. Project design relies upon site control: the process by which developers acquire the land needed for development, either thru lease or purchase. Large-scale wind and solar projects require large contiguous areas of land, generally not all owned by the same landowner. Representatives of developers, sometimes referred to as 'landmen', interact and negotiate with landowners to purchase or acquire leases for the development of facilities, often visiting landowners in person to initiate these discussions [13,14]. Given the necessity of large swathes of land for renewable energy development, these private landowners can have a considerable role in shaping the planning and design of projects in what has been described as an "intimate and private forum for 'participation' in the planning and siting" of energy developments [14]. The increased level of participation in decision-making afforded to

private landowners over the general public in renewable energy development raises concern about perpetuation of existing inequalities between landowning and non-landowning community members.

2.2. Just transition, energy democracy and procedural justice

Public involvement and inclusion in energy decision-making are generally considered in line with concepts of just transition [15–17] and energy democracy [18,19]. Both of these concepts advocate for a transition away from fossil fuel reliance to renewable-energy based systems while at the same time attending to social justice. Both recognize that the uneven exposure to environmental harms for particular social groups (i.e. residents of the Global South, people of color, and low-income communities) produced by the current energy system is not accidental, but rather a consequence of the existing socio-economic and political systems, and that developing renewable energy through those same systems could perpetuate or reproduce similar inequities [17,18,20]. Along with the procedural considerations with which this paper engages, just transition and energy democracy literature also confronts the political economy of renewable energy development, considering the roles and limitations of existing regulatory and corporate approaches in furthering a just energy system [17,21,22].

As numerous scholars have advocated, in order to prevent the continuation of injustice in the energy system, the transition should attend to the principles of procedural justice or fairness in the decision-making processes [7,8,15,19,23–26]. These include consideration of adequate access to transparent information, inclusion of local knowledge in decision-making, the ability of participants to have meaningful impact on decisions, the absence of bias among those with power, and appropriate legal avenues to address grievances [7,27].

In line with these considerations, many who support a democratic and just energy transition often reject the DAD model in favor of earlier public announcement so that the broader public may be involved in initial decisions [6]. And while some research has suggested that renewable energy projects can be deployed more quickly and at lower cost if projects are planned and designed to address the concerns and meet the needs of the hosting community [28], there is also recognition that increased public involvement can, at least temporarily, slow down renewable energy deployment rates. As Jami and Walsh [29] note, "inevitably, consensus building or collaborative decision-making takes time."

In addition, recent research has pointed out that procedural justice encompasses both the *structure* of planning processes (i.e., the firm policies that regulate processes and mandatory public participation opportunities), as well as the *implementation* of planning by project developers (i.e., developers' engagement and actions within a particular planning structure or regulatory framework) [24]. While state or local jurisdictions may mandate certain forms of participation in the planning of a renewable energy project, developers may take varying approaches in navigating these events or in introducing new forums for engagement with the public. For instance, both Kirkegaard et al. [30] and Clausen et al. [31] describe public events in Denmark wherein developers mobilize groups of residents to speak in support of wind energy projects – given secured leases for turbines, the developers in these cases approach participation opportunities primarily as a venue to secure project approval rather than to solicit and respond to public input. Thus, what may be structurally designed as a vehicle for public input, like a public comment period or a public meeting, can, in practice, achieve multiple ends for different stakeholders – particularly developers, who have a vested interest in ensuring a project is approved. Additionally, developers may choose to introduce additional opportunities for public engagement, like setting up a local office. By surveying project developers to establish if and how developers engage with planning structures or introduce engagement opportunities, we can better understand the utility, function, and motivation of community engagement in large-scale renewable development.

Still, exactly how just transition principles should be applied to the context of renewable energy siting remains opaque [32], and at times contested [16], with some scholars emphasizing that the negative consequences of renewable siting “pale in comparison” to those of the fossil fuel system [33], implying that there should be some limitations to local democratic participation if that participation comes at the expense of developing renewables to replace fossil fuels [16]. Similarly, others conceptualize local opposition as a privilege that slows down the transition for communities disproportionately impacted by fossil fuel generation [34]. These debates highlight the need for increased attention to the relationship between community engagement and justice.

2.3. Fair process and public attitudes

Amid growing recognition of the substantial role of community acceptance in blocking or slowing renewable development [3,35], meaningful and early community engagement is frequently recommended by community acceptance scholars [8]. This perspective has been justified by existing research that suggests that people care not just about outcomes of renewable energy projects, but also about the fairness of the processes through which decisions projects are made [25,36]. Both qualitative [25,37–40] and quantitative studies [4,41–44] demonstrate that perceptions of fair process are correlated with positive attitudes or support of wind and solar energy projects. For example, Mills et al. [44] used longitudinal research with two surveys of the same group of wind project neighbors ($n = 520$) at different time periods to show that initial perceptions of fair process shape subsequent perceptions of project benefits. Perceived procedural justice was more important than direct financial benefits to leaseholders in determining this trajectory of project perceptions. Similarly, Nilson and Stedman [43] show that perceived procedural fairness is positively correlated with support for utility-scale solar facilities in one’s community.

On the qualitative side, Saglie et al. [38] conducted interviews with government and other key actors to understand why Norwegian municipalities agree to host wind projects. They found perceived procedural fairness – in particular direct influence in project planning – to play an important role in agreement to host projects. Similarly, Bessette et al. [40] conducted interviews across seven cases of large-scale solar facilities, and found concerns associated with development processes, such as the community’s level of influence over project design, to be highly relevant to community support for the facilities.

Admittedly, increased community engagement is only one potential response to the growing prevalence of local opposition. Alternatively, the impact of community opposition may be mitigated by reforming the potential modes of public intervention in the siting process. In North America, several provinces (Canada) and states (US) have preempted local policy authority [45–47] over the siting and permitting of large-scale renewables, shifting to more top-down or centralized processes to standardize and ‘streamline’ permitting [11,16,48], which can effectively reduce the relevance of local public opinion in siting decisions [16,24] and relatedly reduce the incentive for developers to conduct quality local engagement [16]. There is also substantial discussion of permitting reform at the federal level in the US that would essentially amount to deregulation of requirements under the National Environmental Policy Act, despite the recognition by others that increased planning and coordination may be a better alternative to deregulation [49]. These potential and realized policy reforms make this a critical time to improve our understanding of current industry practices, experiences, and preferences regarding community engagement [9].

2.4. Moral versus instrumental motivations for engagement

Community engagement may be practiced and promoted for a variety of reasons. Prior research has categorized these motivations into two distinct categories, the instrumental and the moral [8]. The instrumental

motivation primarily recognizes the practical potential of engagement as a way to increase project deployment: engagement is a means to an end with a predetermined goal of project deployment. This motivation implies that project opposition is a barrier to deployment, and engagement is an activity to dismantle, minimize, or overcome that barrier [5,8]. This may mean that successful engagement equates to achieving passive public acceptance of a project, in which social conflict has been suppressed – not necessarily resolved – in order for the project to move forward [50]. Instrumentally driven engagement has fallen under criticism for not placing enough emphasis on opportunities for public access to decision-making and even shared control or ownership models [5]. Instrumentally motivated community engagement does not necessarily seek to attend to broader social justice considerations.

Alternatively, the moral justification views community engagement as component of a fundamental human right to democratic participation in land-use and environmental decision-making: community engagement should occur because it is the right thing to do. The moral justification often demands more systemic change because the idea of democratic decision-making means one must be open to the possibility that project approval is not the only possible outcome of a successful engagement process. In other words, for those operating under the moral justification, a successful engagement process does not necessarily equate to successful deployment of any and all proposed projects [5,8]. Rather than promoting engagement or the sake of getting every possible project constructed, the moral justification emphasizes that there is a greater possibility of long term societal benefits when the public has not just access to – but shared control over—project decisions [5]. This concern is supported by evidence that policies which do not follow best practices for engagement can lead to resentment and increased opposition among individuals that might have supported the technology under different circumstances [1,43,51].

2.5. Operationalizing engagement: Arnstein’s ladder

Arnstein’s ladder [52], originally published in 1969, is one of the most established and widely used typologies of community engagement in the planning and community development literature [53–56]. Importantly, Arnstein advanced the idea that reaching the top rungs of the ladder is both critical to democracy and important for social justice. Arnstein envisioned that this would enable significant social reform. This is aligned with the social justice aims, and the focus on procedural justice, in both the energy democracy and just transition concepts mentioned above. But importantly, Arnstein’s work, and the majority of researchers that have applied it since, have focused on informing the efforts of planners and other public servants, not necessarily private industry [56]. Additionally, given the importance of context and nuance in the examination of the relationship between engagement and power, the ladder is simplistic [54]. Despite these limitations, the ladder still provides a clear starting point for thinking about what community engagement is and what the various forms of engagement can accomplish [54,56].

As shown on the left side of Fig. 1, Arnstein’s ladder has eight rungs grouped into three categories. At the bottom of the ladder are activities of manipulation and therapy, which ultimately amount to an empty ritual, or checking of the boxes, with no real opportunity to affect outcomes. Each vertical move up the ladder affords more and more power to the public to impact the outcomes of a process. Still, Arnstein describes activities of informing, consultation and placation as degrees of tokenism. At these levels, the views and preferences of the public can be voiced and heard, but there is a lack of assurance that they will be heeded by those with decision-making power. Placation includes specifically the right to advise, but not the right to decide. The top rungs represent types of engagement in which the public is empowered to make decisions. In partnership, there may be the ability to negotiate and engage in trade-offs with traditional power-holders. Delegated power refers to achieving dominant decision making, but perhaps only over a

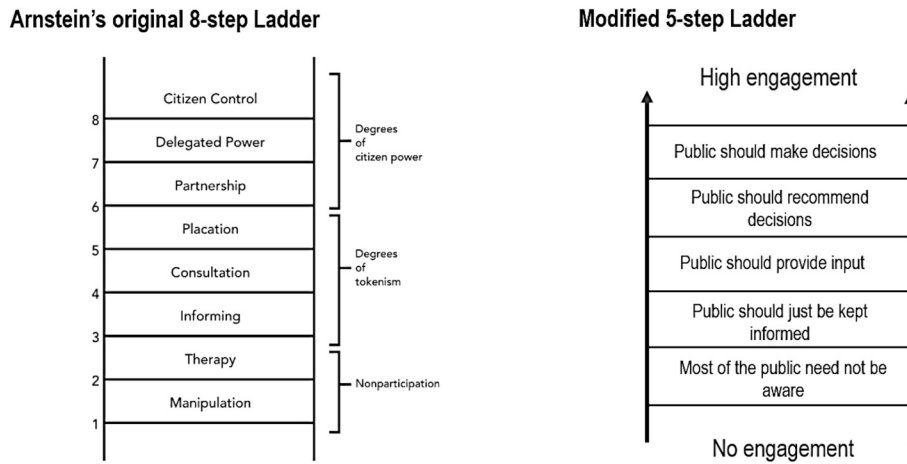


Fig. 1. Ladders of engagement: Arnstein’s original eight rung ladder (left) and our modified five rung ladder (right).

particular plan or program, while citizen control refers to full management power.

Arnstein’s ambitious agenda does not come without compromises – notably in the form of efficiency and costs [52]. By design, processes which operate with the highest degrees of citizen power can be time-consuming, as many more individuals have to be involved in decision-making and they may demand re-iteration of plans and ideas in order to reach consensus. Furthermore, the decisions that they ultimately arrive at might not be financially feasible for the developer, lenders, or off-takers.

To apply Arnstein’s ladder into simple statements indicating the role of the public, we utilize a modified 5-step ladder (Fig. 1, on the right). Here, the two lowest rungs of Arnstein’s ladder, therapy and manipulation, collapse into one statement of “Most of the public need not be aware”. Arnstein’s third rung of ‘informing’ corresponds to “Public should just be kept informed”. In renewable energy development, informing may equate to sending out mailers to residents or posting a notice in the local newspaper. The middle rung of the modified ladder, “Public should provide input” equates to what Arnstein represented in the two rungs of consultation and placation. There can often be opportunities for the public to provide comments in the form of written or oral testimony at public meetings, without that necessarily leading to a two-way discussion or working session to formalize recommendations from that input. Next comes “Public should recommend decisions”, which is akin to partnership in Arnstein’s ladder, and examples may include when a public meeting or working groups sessions lead to specific project recommendations. Finally, “Public should make decisions”, which Arnstein would categorize as empowerment or citizen control, would include situations in which the public (or local representatives) have a direct role as decision-makers, such as with community owned projects or ballot referendums that allow a direct vote on the project. While not perfect substitutes, these statements were developed in collaboration with other experts in the field to clearly distinguish between different levels of public involvement and represent scenarios that are applicable to renewable energy development.¹

3. Methodology

3.1. Recruitment and response rate

In April 2023, we launched an online, email-based survey of industry professionals. Email addresses of potentially eligible respondents were compiled from several sources: the Land Use Planning and Local Affairs

¹ Utilizing 5 response options is also less burdensome for respondents than 8, and was consistent with many other scales used in the survey.

committees of the American Clean Power Association (ACP) ($n = 375$), the Utility-Scale Solar Power Division of the Solar Energy Industries Association (SEIA) ($n = 169$),² from attendee lists of previous webinars hosted by our research group ($n = 103$), our personal contacts from prior work ($n = 102$), and snowball recommendations provided from initial respondents ($n = 32$). Removing contacts that appeared on multiple lists ($n = 68$), the survey was emailed to a list of 713 potentially eligible respondents from 172 companies that develop utility-scale wind and/or solar facilities in the United States. Potential respondents received an initial invitation and up to 4 survey reminders over approximately 2 months. To help encourage respondents, we also provided background information on the survey during ACP and SEIA committee meetings.

After accounting for 52 bad addresses (e.g. blocked, bounced or inactive email accounts) and 20 ineligible individuals (those who self-reported that they do not have the experience noted above), our list of possible respondents was 641. We received 98 completed questionnaires, along with 25 partial completions (individuals who completed all screening questions and at least 1 full page of content questions), for a total of 123 respondents and a response rate of 19.2 %.

3.2. Description of respondents

To our knowledge this survey represents the first of its kind effort to survey a broad range of professionals working across the U.S. Respondents are employed at 62 unique companies representing 51 and 45 % of recent U.S. wind and solar deployment respectively, based on the installed and under construction capacities of these technologies from 2016 through the first quarter of 2023 [57]. These respondents cover all regions of the contiguous U.S.; respondents were asked to select which region(s) of the U.S. they have worked in (Interior, Great Lakes, Texas, Northeast, Southeast, West Coast, and Mid-Atlantic), and at least 40 % of all respondents had worked in each of the regions. The majority (82 %) have worked in more than one of these regions, and more than half have worked in 4 regions or more. Respondents also have considerable experience in the industry: the average years of experience was 5.6 for those with experience only in solar (median = 4.0), 13.1 for those with experience only in wind (median 9.5), and 12.6 for those with experience with both technologies (median 14.0). The average size of the most recent projects developed by these respondents was approximately 150 megawatt (MW) projects for solar, and 250 MW for wind (overall project size range 5 to 1500 MW).

² ACP and SEIA provided member contact information under protection of a non-disclosure agreement that it not be used for any other purposes. Our sampling method was one of convenience, given the lack of any other known source of contact information for this population.

Further, two thirds of the respondents indicated that they work directly on community engagement aspects of development, while others had relevant experience such as permitting, compliance, site development, and/or supervision of these roles. The majority of respondents (82 %) have experience with two or more of the following job descriptions: community engagement, permitting, overseeing budgets, site development, compliance, or supervision of others performing these aforementioned roles.

3.3. Survey design and analysis

The survey started with a screening question to ensure that respondents had direct experience working in community engagement, planning, permitting, compliance and related job descriptions for terrestrial, utility-scale wind and solar energy facilities in the U.S. The survey asked project developers about average project timelines over the last five years, the leading causes of project delays and failures, the community engagement practices utilized by their company, their experience and perspective of the impact of community opposition, their perspective on differences and similarities between wind and solar development, as well as state versus locally based permitting processes, and related topics. While most survey questions had discrete close-ended response options, we did include various open-ended qualitative questions as opportunities for respondents to provide additional context or explanation of their answers. A full summary of survey results is available at <https://emp.lbl.gov/publications/survey-utility-scale-wind-and-solar>. Due to the novel nature of this study, our analysis was descriptive and exploratory, with results of both close and open-ended survey questions combined to respond to the research objectives outlined above.

4. Results

4.1. Industry concern with opposition

Developers report that community opposition and local ordinances that limit or restrict renewable development are leading causes of project delays and cancellations. The only other factor that was selected as a top-three leading cause of cancellation and delay by a majority of both wind and solar developers was grid interconnection issues. “Supply chain or other logistical constraints” was another leading cause of solar project delays according to about half of the respondents. Over half of all respondents were very concerned, with over 80 % at least moderately concerned, that community opposition will get in the way of decarbonization goals. As several developers expressed in open-ended comments, community opposition plays a significant role in the industry:

Community opposition is a major, major factor for developers considering communities and locations for development. (Respondent #94)³

Community acceptance and local permitting is one of, if not THE, biggest challenge to widespread decarbonization. We need all the attention we can get across government to support us on the ground.

(Respondent #73)

These quotes demonstrate the recognition that public concerns are having a major impact on project deployment.

4.2. Current engagement practices

Developers report frequent use of many activities to engage with local communities when siting utility-scale projects (Fig. 2). Some

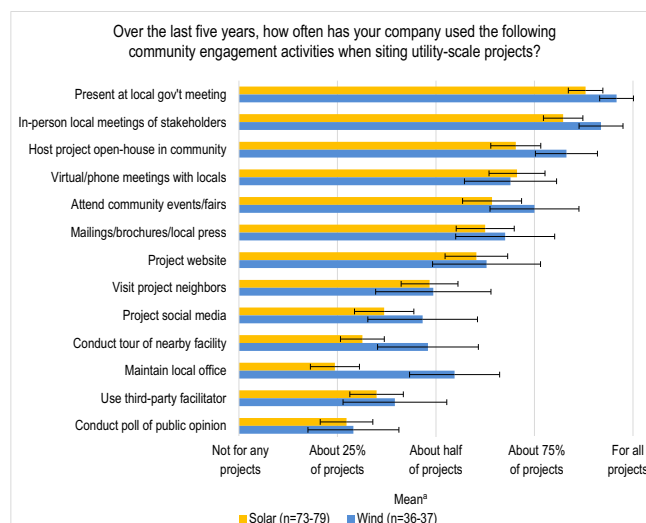


Fig. 2. Reported frequency of engagement activities used by developers in last five years.

^a Mean based on scale of 1 = “Not for any projects” to 5 = “For all projects”. Error bars indicate 95 % confidence intervals of the mean.

activities are common across nearly all projects, such as presentations to local government, or in-person meetings with local stakeholders, while others are noticeably less common, such as conducting a poll of public opinion or maintaining a local office. Several virtual information sharing opportunities, such as maintaining a project website or social media presence are noticeably less common than in-person activities such as presentations and meetings. Overall, there was a slightly higher frequency of engagement reported for wind than solar across many engagement activities, although the difference was only statistically significant based on 95 % confidence intervals for the activity of maintaining a local office. Additionally, several developers provided write-in responses of additional activities they have found particularly effective, including community donations and volunteering (4 respondents), employing local staff (4 respondents) and hosting private events for project landowners (4 respondents).

Permitting regulations often mandate certain practices, but the exact requirements vary across jurisdictions (e.g. states, counties, townships). While we did not directly ask about which of these practices are required, the practices that developers reported as most common (e.g. presenting to local government, or hosting an in-person informational meeting with stakeholders) are also the types of events that jurisdictions are more likely to mandate [58,59]. As one developer noted: “It’s important to point out that developers will treat community engagement differently depending on the legal framework that surrounds the necessary permits (Respondent #76).”

The timing of community engagement activities is key to understanding the role the community plays in shaping the overall plan of a project. Developers reported that they do not initiate community engagement activities until after the land upon which a project will be built is secured for development – a stage sometimes referred to as site control. The majority of both solar (78 % of $n = 74$) and wind (67 % of $n = 36$) developers agreed with the following statement, “Typically, we wait to announce a project in a community until we know we have secured enough land to develop.” This indicates that often the public is unaware, and thus not engaged in project development until a critical component of project design – the location of the proposed project footprint – has already been selected.

Another important part of current engagement practice is the level of financial investment in community engagement. A limited number of respondents provided data on their companies’ spending on community engagement expenditures based on their most recent experience with a

³ Numbers were randomly assigned to respondents and are provided to allow identification of multiple quotes provided by the same individual.

Table 1
Developer perceptions of the impact and characteristics of community engagement: Percent agreement.

| Survey question | Solar | | Wind | |
|--|-------|----------------------|------|----------------------|
| | n | % Agree ^a | n | % Agree ^a |
| Community engagement adds additional risk to the project's likelihood of getting approved. | 75 | 23 % | 37 | 32 % |
| We spend more money in community engagement than we save in reducing delays or likelihood of success. | 75 | 29 % | 36 | 25 % |
| Overall, community engagement often leads to substantive changes in the design of a project. | 75 | 51 % | 36 | 42 % |
| Participating landowners have more control over project outcomes than non-participating landowners. | 75 | 56 % | 36 | 50 % |
| Local residents' concerns about a project are adequately dealt with before a project is approved. | 75 | 65 % | 36 | 67 % |
| Typically, we wait to announce a project in a community until we know we have secured enough land to develop | 74 | 78 % | 36 | 67 % |
| The public has substantial control over whether or not a project will be developed in their community. | 75 | 68 % | 36 | 83 % |
| Increasing community engagement activities results in less likelihood of project cancellations. | 74 | 73 % | 37 | 78 % |

^a We used a five-point Likert scale of "Strongly disagree" to "Strongly agree". The "% Agree" represents percent of respondents that either "Somewhat agree" or "Strongly agree" with the statement.

successful project. These community engagement expenditures were on average approximately \$700 per MW of electric generating capacity for solar ($n = 19$) and \$1100 per MW for wind ($n = 18$).⁴ These values were reported to be less than one-third of the amount spent on site control activities (e.g. soliciting, negotiating, and securing land). Total capital expenditures (CapEx) for recently built wind projects in the U.S. ranges from \$1,363,000 per MW to \$1,725,000 per MW [60], while CapEx for recent utility-scale solar projects in the U.S. ranges from \$1,070,000–\$1,720,000 per MW [61]; the reported community engagement expenses from this survey therefore represent less than 0.1 % of typical CapEx for recently built wind and solar projects.

4.3. Impacts on project design

We asked a series of questions to understand the impacts of community input on projects (Table 1 and Fig. 3). There was majority agreement with statements such as community engagement results in fewer project cancellations, the public has substantial control over whether or not a project will be built, and local residents' concerns are adequately dealt with prior to project approval. The majority did not agree that community engagement would add additional risk to project approval, or that spending on community engagement is more expensive than the savings from reducing delays or likelihood of success. There were no statistically significant differences between wind and solar respondents on this suite of questions. This combination of findings indicates that most developers perceive community engagement to be worthwhile, resulting in less project cancellations on average and at reasonable costs. This observation was reinforced by several respondents to an open-ended question about what that they would have done differently for their most recent canceled project. The most

⁴ We posed this question specifically about successful projects to ensure we were collecting engagement expenditures only for projects that had completed the full development process. Success was defined as projects that are either commercially operational, or not yet operation but with siting authorization (such as projects currently in construction).

frequent response to this question was that, if given the chance, they would have started community engagement, either with the local government, nearby neighbors, Tribal community, or the general public, earlier in the process. However, it is worth noting that this approach can sometimes backfire. One respondent noted:

In this case, we were very open for a long time, incorporating a great deal of community feedback, and providing a community participation option for neighboring non-participants. The long window of engagement (about 3 years before permit application) allowed opposition to form and spread a lot of misinformation, institute recalls of supportive local officials, and ultimately pass new solar zoning restrictions. Respondent #119

So, while it does appear the majority consensus among our respondents is that community engagement is beneficial to project approval, this is not universal, and specific experiences suggest that sometimes proactive community engagement is a threat to project deployment.

We also explored the extent to which engagement impacts project design. About half of solar developers, and slightly fewer wind developers, agreed that community engagement leads to substantive changes in the design of a project (Table 1). When asked how often their company has made different design changes in response to community feedback over the last five years, exclusion of certain properties was among the most likely change for both technologies, along with "Change plans for vegetative screening" and "Increase set-backs" for solar, and "Change turbine layout" and "Add additional neighbor compensation" for wind (Fig. 4). "Including community subscription or ownership" was clearly the least common design change for both wind and solar. These results demonstrate that developers do adjust project designs and features as an outcome of community engagement activities, but not all types of features are altered at the same frequency.

4.4. Developer perceptions of most appropriate engagement

When directly asked about their opinion of the most appropriate way to engage members of the public in decisions about project siting, over three-quarters of both wind and solar respondents indicated the public should provide input (Fig. 5). No respondents indicated that the public should make decisions, and only 6 % of solar and 8 % of wind developers selected that the public should recommend decisions.⁵ There are no statistically significant differences between wind and solar respondents observed on this question. These results provide evidence that most project developers prefer engagement as primarily a one-way process in which the public is a potential source of information that may inform project siting or design, but there is minimal support for a version of engagement in which the public meaningfully participates in decision-making.

This preference for the public to only "provide input" may be explained in part by the experience of developers that this has been the level of public involvement in the majority of successful projects that the respondents have worked on (Fig. 6). According to developers, in the most recent successful project⁶ the respondent had worked on, the public was just kept informed in 21 % of projects, the public provided input in 60 % of projects, and the public recommended decisions in 18 % of projects. It is worth noting that the percent who indicated the public

⁵ The survey question included an image with arrow and the text of "No engagement → High engagement" alongside the response options to indicate a hierarchical representation of these steps.

⁶ Success was defined as projects that are either commercially operational, or not yet operation but with siting authorization. These were closed-ended questions with response options corresponding to the modified Arnstein's ladder (Figure 1). The survey question included an image with arrow and the text of "No engagement → High engagement" alongside the response options to indicate a hierarchical representation of these steps.

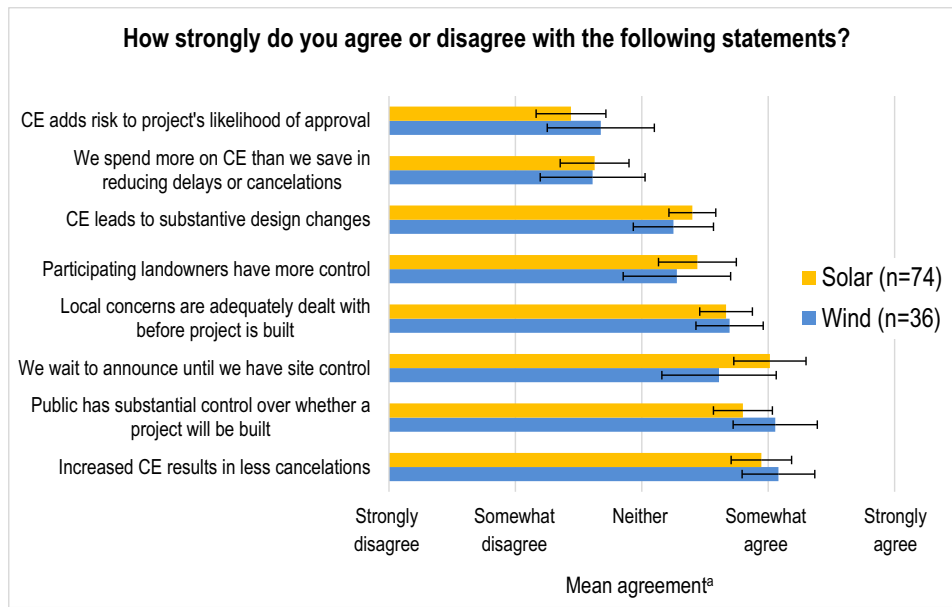


Fig. 3. Developer perceptions of the impact and characteristics of community engagement: Mean level of agreement.
^a Mean based on scale of 1 = “Strongly disagree” to 5 = “Strongly agree”. Error bars indicate 95 % confidence intervals of the mean.

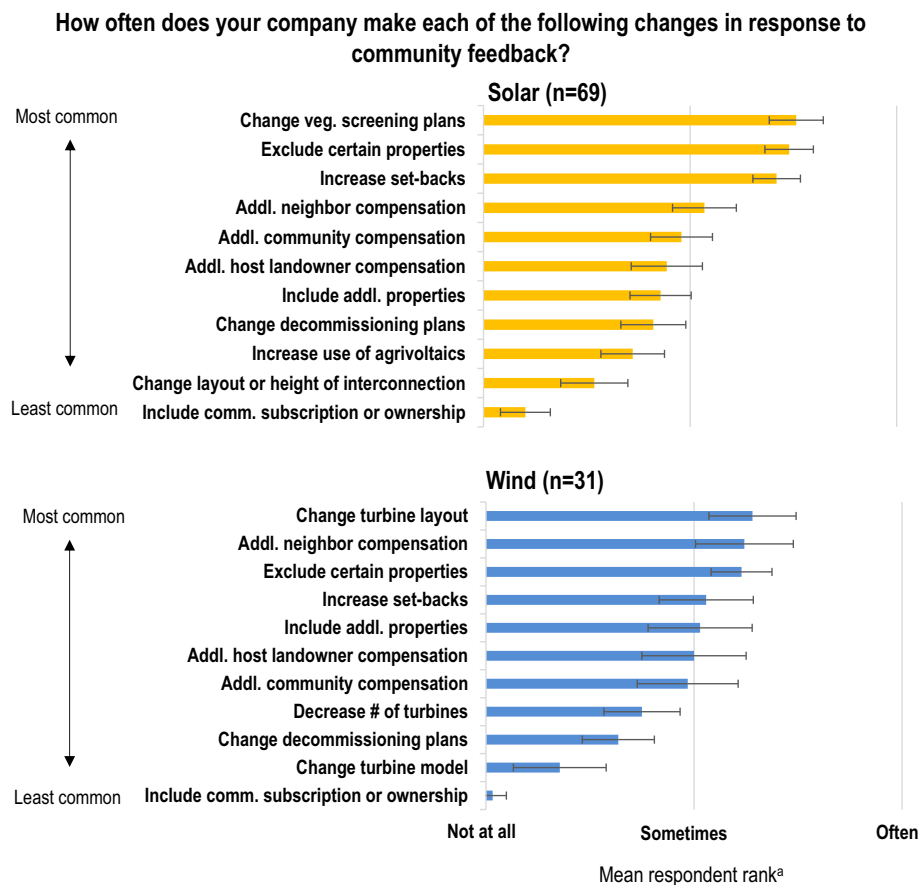


Fig. 4. Reported project design changes in response to community feedback.
^a We asked developers to sort the above project design elements into categories of “Not at all / Never” (1), “Sometimes” (2) and “Often / Frequently” (3). Error bars indicate 95 % confidence interval of the mean.

recommended decisions in their most recent successful project (18 %; Fig. 6) is greater than the percent who preferred the public to make decisions (6 % for solar, and 8 % for wind; Fig. 5), indicating that its

possible public recommendations may not be as detrimental to project success as many developers may assume. Still, the public did not make decisions for the most recent successful projects developed by any of

Which is the most appropriate way to engage members of the public in decisions about utility-scale projects proposed in their community?

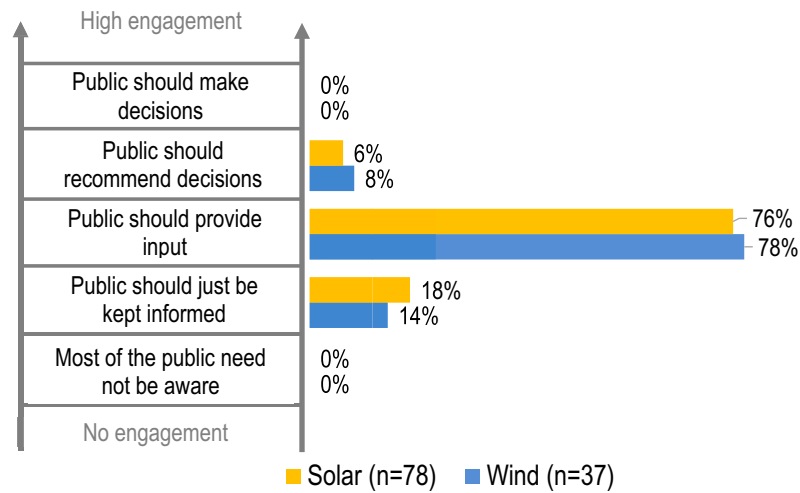


Fig. 5. Developer perceptions of the appropriate level of public engagement in project development.

Which of the following best describes the way members of the public were engaged in decisions about the project?

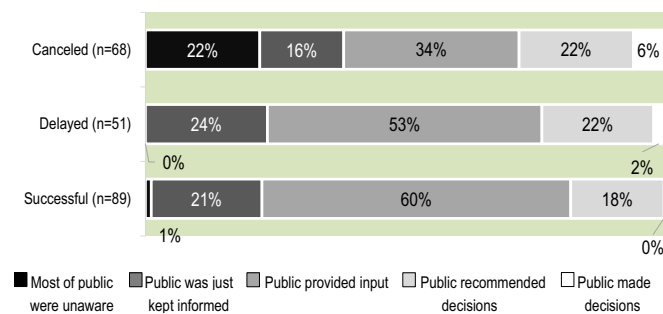


Fig. 6. Level of public engagement in most recent canceled, delayed and successful projects.

these respondents, which in part is an indication that the development of cooperative or community-led projects is not common for respondents in this sample.

The spread is similar for delayed projects⁷: the public was kept informed of 24 % of projects, provided input in 53 % of projects, recommended decisions in 22 % of projects, and made decisions in 2 % of projects. There was more diversity in the level of public involvement in the most recently canceled project⁸ - we see the most noticeable difference being that most of the public was completely unaware of the project proposal in 22 % of the canceled projects. Additionally, in 6 % of projects, the public is reported to have made the project decisions. These projects, while only a minority of all canceled projects, may still generate substantial attention in the industry and contribute to fear or perception of risk associated with public decision-making authority.

Various additional factors may contribute to developers’ preferences for public input but not public decision-making, including developer’s experiences with community opposition, structural or policy barriers, and economic or financial barriers, which we will now describe.

Developers are highly concerned with the impact of community

opposition on project development. As noted in Section 5.1, community opposition was reported as a leading cause of project delays and cancellations on the survey. Additionally, developers are highly concerned about opposition, with 4 out of 5 reporting that they are either moderately or very concerned that community opposition will get in the way of decarbonization goals. In an open-ended question that provided space for respondents to offer any additional information about community engagement that they wished to share, several respondents connected challenges with community engagement to opposition, as expressed in the following quote:

“Opposition is very often unfounded and based on poor information/misleading information and sometimes outright lies. The industry and stakeholders need to continue to collaborate to mitigate the issue to allow more projects to be developed, reduce risk for developers but also allow fair engagement with local communities to ensure their concerns are heard.”

Respondent #94

This respondent calls particularly for *fair engagement*, which they indicate has been hindered by opposition based in bias or misinformation. It is also worth noting that this respondent characterizes community opposition to be “very often unfounded” – which indicates that some developers perceive most criticism or concerns raised about projects to be unjustified, which is likely to impact their engagement with these communities. Another respondent shared a similar concern, noting, “You can be super engaged and still have a project die due to organized opposition, misinformation, and lack of knowledge among decision-makers (Respondent #119.)” Both developers quoted above are frustrated with the ability of current modes of engagement to address community opposition as they experience it.

Relatedly, on another survey question, 95 % of developers agreed with the statement that opposition is more often caused by a vocal minority of residents, and about half of the respondents agreed that opposition is often driven by outsiders, as opposed to local residents. These perceptions – that community opposition is driven by a vocal minority and fueled by misinformation – were raised by many respondents as examples of key barriers to productive community engagement and a fair process.

While communities often have legitimate questions and concerns that can be addressed through good-faith community engagement, organized opposition towards a project always—literally, 100 % of the time—spreads

⁷ Delayed projects were defined as projects that experienced a delay of 6 months or more beyond the projects expected timeline.

⁸ Project cancellation was defined as a project their company began developing, but is no longer pursuing.

misinformation to drum up support and create controversy. Developers are not trusted (or unbiased) authorities on these issues nor are the third-party experts we bring into communities. As a result, misinformation becomes conventional wisdom and communities are often left without credible messengers telling them the facts. Respondent #23

In this quote the respondent acknowledges that developers are not unbiased, a recognition that was shared across multiple respondents. Several respondents recognized that they were unlikely to be considered credible given their vested interest in a project moving forward. Another particularly interesting feature of this quote is the acknowledgement of a combination of “legitimate” questions and concerns and misinformation. Another respondent also mentioned this mix:

There is a very real and effective playbook of whipping up a vocal minority with a mix of real and misinformed concerns and using that to put fear into local decision makers and state policy makers to kill project permits. It's an increasingly well documented and very difficult environment despite best-in-class efforts. Respondent #4

(emphasis added)

However, another respondent's perspective on the issue was slightly different, noting: “The main root cause for opposition continues to be a lack of education and understanding of the facts. Too many people believe things that are not true (Respondent #44)”. In this quote, there is no reference to or acknowledgement of a combination of legitimate and illegitimate concerns, but only a focus on the public having a poor understanding of facts.

In responding to questions about challenges with engagement, several respondents pointed to the need for structural changes, both at the state or local level. One noted for example, that “policies incentivize fights rather than dialogue and authentic participation are a major barrier [to improving community engagement] (Respondent #119).” Another noted, “Local or state processes are sometimes so stringent, draconian, or discretionary/risky that it incentivizes developers to not conduct community engagement (Respondent 76).” These two respondents were referring to policies specifically related to community participation, and call for a need to consider not just *if* community engagement is required by policy, but what specific tactics or practices are promoted or required. They suggest more flexible approaches that better allow developers and communities to engage in conversation or dialogue may be preferable to rigid or strict participation protocols or checklists.

Developers also reported structural barriers to providing different forms of economic incentives to local communities, which limit their ability to respond to community concerns that may arise during engagement activities. For example, approximately 80 % of respondents reported that electricity bill discounts are not at all or only slightly feasible, and when asked why, the majority indicated logistical or policy barriers, such as not having the authority or mechanism by which to offer such discounts to local residents. There are, of course, some developers who simply lack the desire to provide such as a program, such as the one who noted, “Generally, developers feel this is a ridiculous proposition, even without looking at the cost (Respondent #87).”

Similarly, over 80 % of respondents indicated that offering community ownership models is not at all or only slightly feasible. This corresponds with the earlier finding (Fig. 3), in which we found that community subscription or ownership was the least likely project design feature to change in response to community feedback. The most frequently cited reason that community ownership would be infeasible was due to financing difficulties. For example, community organizations like local and tribal governments or non-profits have only recently become eligible to access and monetize the federal investment tax credits, and often lack capital or credit history to obtain the needed financing for projects. Others referenced that community ownership simply did not match their business model, it would make the development process overly complex, or that profit margins in the industry

are too thin and they lack incentive to pursue community ownership options. As one developer put it, “Projects need to be economically competitive. If one county or municipality is going to require higher taxes, their projects will not be competitive with projects in the surrounding areas (Respondent #62).” This quote references the role of destructive competition in limiting the possibility of individual actors within the system to make decisions that are not in their companies' best economic interest.

With a more extreme perspective, one respondent in particular noted how community ownership of utility-scale wind projects simply does not make sense, stating:

“This makes no sense for utility-scale development. The ownership needs to come from an entity with an enormous amount of capital. If we are talking about a non-financial ownership, why would we want a community that dislikes the project to have any ownership over it? I cannot imagine a world in which it makes sense. This is utility energy, not community energy.”

Respondent #87

The quote emphasizes how, for this respondent, the very idea of community ownership over a utility-scale development seems illogical – they are unable to even *imagine* it. Furthermore, what they have also expressed here is the assumption that a community will undoubtedly dislike a project – this assumption was not prefaced in the survey question. This demonstrates that, at least for some developers, corporate ownership is fully engrained in their conceptualization of utility-scale energy.

5. Discussion

Our findings confirm that the “decide-announce-defend” (DAD) model remains the predominant practice of the industry. The majority of developers report that they typically wait to announce a project in a community until site control is established. This is an important consideration for assessment of procedural justice, as the selection of land and signing of project leases, which occurs through private negotiations with landowners, is perceived by the public and other local stakeholders as a critical decision point: after this decision point, these stakeholders often sense that their opinions and input do not matter or have any meaningful influence [24]. The perpetuation of the DAD model corresponds with developers' perspectives on the most appropriate way to involve communities: the majority of developers conceptualize the ideal type of community engagement to be when communities are consulted and given the opportunity to provide input on siting decisions, but not to make specific project recommendations or decisions. This level of engagement we characterize as ‘halfway up the ladder’, or halfway towards the idealized vision of empowerment advanced by Arnstein and seemingly supported by narratives of just transition. Arnstein recognized the halfway step as a form of tokenism, and noted that it would not amount to meaningful empowerment of the public in decision-making or lead to substantial redistribution of benefits across society [52]. In more recent literature, this type of engagement has been framed as instrumentally motivated [5,8] in that it is pursued primarily for its potential to help achieve the ultimate goal of project deployment, and not necessarily in order to support the type of democratic decision-making and re-distribution envisioned for a just transition. These considerations call into question whether or not the current dominant industry practices should be even be characterized as community “engagement” if we understand engagement as a tool for achieving justice [16,54].

The various respondents' references to project economics reminds us that utility-scale wind and solar project development operates in a market system with an obligation to secure profit for shareholders. This structures the decisions that developers can make [22]. The underlying economic logic is that decisions that might increase local community benefits or otherwise adjust projects to respond to community concerns

are not worthwhile to developers unless this improves their profitability. The market-based rationality does not reward the pursuit of community engagement for moral reasons. This helps explain how developers' ability to engage with and respond to community concerns are only sustainable if they make economic sense, and there is a lack of empirical evidence that increased community engagement is cost-effective. But, importantly, our results do suggest that many in the industry do believe engagement can be cost-effective, as has been expected in prior literature [10]. Only about a quarter of respondents indicate that their company currently spends more on community engagement than they save in reducing delays or cancelations, and three-quarters agree that increasing community engagement results in less project cancelations. This is despite the fact that current spending on community engagement is a very small proportion of total project expenditures.

If many of the employees in this industry see it as a relatively cost-effective practice, this begs the question of why the industry is not investing more in community engagement. There are several possible explanations apparent from our research. One, it's certainly not universally the case that increased spending in community engagement will always result in project success. There are projects for which the industry experience has been the opposite, as several of our respondents highlighted [62]. It's possible these stories get more attention and hold more weight over company leadership who make decisions about how much to invest in engagement. Considerations about the cost-effectiveness of community engagement should consider the full portfolio of projects, rather than be based on individual cases. It is possible that even with strong community engagement programs, not all projects will necessarily be built, but the overall success rate may still improve. Another possible explanation relates to frustration with the current public participation rules and requirements, and the perceived structural barriers to responding to community desires. Third, there is also frustration with the growing prevalence of organized oppositional tactics, and developers report being ill-positioned to respond to misinformation given their perceived lack of credibility in communities [63–65]. These challenges may limit the industry's investment in community engagement if they feel their options for responding to community feedback are limited by factors or regulations outside of their control.

Fourth, there is currently limited empirical evidence examining the effectiveness of community engagement, which has prompted recent funding opportunities for such research [66]. As we noted in the introduction, this survey is one of the first efforts to broadly survey industry professionals on these topics and establish the perceived effectiveness of community engagement. Various respondents noted that they support the idea of initiating community engagement earlier in the development process based on their experiences with a recently canceled project, suggesting that earlier engagement is one potential pathway for improvement. However, firmer empirical data on the outcomes of different community engagement approaches could support increased company spending on these approaches. We would emphasize, the ability to collect such data will require industry buy-in and willingness to allow third-party evaluation of their company practices. To date, it has been difficult to collect such data due to a variety of factors, but one critical barrier has been a lack of documented implementation of meaningful community engagement practices in a way that would facilitate the systematic study of their effectiveness. If these practices are found to be cost-effective, this evidence could encourage the industry to take meaningful steps towards improvement of current business as usual engagement practices.

Answering the question of the cost-effectiveness of meaningful community engagement could help justify additional industry investments in quality engagement. This is admittedly an incremental approach, but may help contribute to more transformative change over time [8]. Importantly, it seems feasible within the current socio-economic system as evidence of cost-effectiveness could appeal to the instrumental motivation of the market. To more directly advance social equity and democratic decision-making [32], further structural reforms

are likely necessary to facilitate additional 'steps up the ladder'. For example, federal incentives, such as those that currently increase tax credits available for developing projects with domestic materials or in energy communities, could be used to incentivize projects that offer shared decision-making and/or profit-sharing. The market does not incentivize such activities on its own. It is notable that the item most likely to represent a fundamental or systemic shift from standard practice, that is, community subscription or ownership, has very rarely been incorporated in projects developed in the last five years. Developers attribute this to the structural and financial barriers of such arrangements, indicating those factors would need to be addressed in order for community ownership to become more common. Additionally, our findings exemplified that there is also the perspective in industry that community ownership simply does not make sense for utility-scale energy facilities. This contrasts with the agenda of energy democracy to shift the energy sector away from privatization and corporate control towards public and social ownership models [18]. There is growing interest and attention to a middle-ground approach of community benefit plans or agreements, which may be another feasible incremental approach, but it is still important that these also be developed with care and collaboration with community members [5,67].

Also notable was the frequency with which developers cited knowledge gaps (i.e., information deficit) and misinformation as a driver of opposition and a barrier to meaningful and fair community engagement. This 'information deficit' explanation for opposition has been largely discredited in prior literature, for example because higher levels of knowledge of wind energy facts do not necessarily correlate with support or positive attitudes [68–70]. Still, some developers seem to have held onto the idea that a simple 'cognitive fix' (e.g. providing the public with more factual information) would be enough to reduce opposition, even though this is not supported by research [71]. Similarly, we did not hear developers emphasize how opposition may often emerge because the local public approaches the issue of renewable development out of a concern for local place protection, even though this has been a key insight from existing social science research [72,73]. These observations suggest that the industry exhibits its own 'information deficit' about research that could inform their practices. This suggests the need for additional coordination and knowledge-sharing between research and developers.

Access to trustworthy information about a proposed project and its potential impacts is a core tenet of procedural justice [7,74], but this begs the question as to the extent to which we should rely on developers alone to conduct fair and meaningful community engagement, or whether the role of neutral intermediaries, facilitators, and information providers needs to be increased alongside developer-led engagement efforts [28,75,76]. It may make sense to first identify which of these groups is most trusted by the public to lead fair engagement processes [64,77], augment the capacity of existing local leaders where possible [76], and to emphasize that these intermediaries focus on education and taking an active role in facilitating dialogue, as opposed to acting more as public relations managers [75]. One area in particular where trusted third-parties may be most useful is in helping local communities understand the economic potential of projects and negotiate for appropriate community benefits, which has been utilized in other industries [78].

Finally, some of our findings on developers' perceptions of community engagement seem in conflict with one another. For example, most developers responded that the public does have substantial control over whether a project will be developed in their community, but also agree that participating project landowners have more control than non-participating landowners. Additionally, several respondents identified private dinners with landowners as a form of community engagement. These findings suggest that at least for some developers, exclusive events for private landowners are considered part of their 'public' or 'community' engagement strategy. This confirms how the current development process of large-scale energy infrastructure in the U.S. challenges

the traditional understanding of the public sphere, in that private companies and landowners have exclusive access to critical decisions about how and where large-scale renewables are being developed [14]. The prevalence of exclusive, private participation in key decisions such as establishing the initial project footprint highlights a tension in renewable energy development that is too often ignored, that is, the tension between preservation of private property rights and collective decision-making about a community or region's development possibilities and priorities, such as with aspirational or coordinated planning approaches [49,76]. Indeed, this tension is part of a larger ongoing debates about the compatibility of environmental protection, social justice, and economic growth [72,79]. We emphasize the need for these tensions to be acknowledged when seeking explanations for opposition to renewables and in designing potential policy responses.

5.1. Limitations

Given the lack of a comprehensive database of the full population of all development professionals it is infeasible to know with certainty the extent to which our sample is representative. We also did not collect demographic information on the respondents. Despite the recognized limitations of our sample, it is more comprehensive than known studies on the topic, and we are confident that we have captured a meaningful range of respondents to illustrate important insights into the perspectives and experiences of this group. Given the potential for self-selection bias (e.g. that survey response is more likely when the topic is of particular salience to the respondent) [80], and that our sampling and recruitment activities drew particularly upon individuals that have demonstrated interest in community engagement, our sample of respondents may, if anything, be likely to represent a subset of the large, utility-scale developer community that has particular interest and affinity for community engagement.

This survey represents a first of its kind effort to survey a large number of project developers on these topics, and therefore there is a limited theoretical base of knowledge upon which to base our questionnaire and analysis plans. When we initiated the survey, we had an incomplete understanding of the sensitivity of some questions and the level of detail that project developers may be able to provide about their practices, given some of these topics are considered trade secrets. We were also limited in developing our list of potential respondents based on availability of contact information. These factors limited our ability to conduct rigorous statistical analysis or prediction, especially because certain questions, such as those related to project finances, had more limited responses.

Additionally, as is common in survey research, there are many additional questions we would have liked to ask, but were not included in this effort given the constraint of managing questionnaire length. For example, to fully understand the current impact or results of existing community engagement practices, it would have been useful to gain deeper insights into some of the decision-making contexts or specific trade-offs involved when developers do make project design changes in response to community feedback, versus when they do not. Additionally, several developers expressed frustration with the structure of mandated participation opportunities; future research might investigate in more detail how different participation structures might support or undermine meaningful dialogue. These types of questions should be explored in future research to better understand the current landscape of engagement.

6. Conclusion

Achieving ambitious decarbonization targets in a matter of decades will require substantial clean energy deployment. Estimates suggest the need for new development to be several orders of magnitude higher than current deployment levels every year for the next decade [81]. Given the growing impact of community opposition, and in order for this level of

development to occur aligned with goals of a just transition, we expect host communities will need to be true partners and advocates for these projects. Meaningful community engagement is critical for ensuring this type of partnership. Here, we have shared perspectives and experiences of project developers with respect to community engagement. We have discussed how the current industry practices and understanding of engagement do not necessarily align with conceptual understandings of procedural justice. We have also acknowledged that the ability of developers to pursue additional engagement is limited by the logic of the market and the lack of empirical evidence on the outcomes of engagement. These findings draw attention to the critical need to continue more dialogue and develop specific understandings about what quality and fair engagement really looks like, and how to manage trade-offs between ensuring procedural justice for host communities versus justice considerations for other marginalized groups [16]. Here, we have highlighted perspectives of developers, but other key stakeholders are also important, such as local residents, local, state, and federal decision-makers, wildlife and conservation organizations, and energy justice experts and practitioners, among others. Undoubtedly, these various groups will have different perspectives than developers towards key aspects of community engagement, like how early in the development cycle it should start, and what level of decision-making authority should be afforded to the public. A greater shared understanding of what meaningful community engagement looks like, what the goals and expectations from such engagement are, and how to achieve them could also inform the design of possible responses to the barriers currently faced in the industry, such as through incentives to better facilitate such practices.

CRediT authorship contribution statement

Robi Nilson: Writing – review & editing, Writing – original draft, Visualization, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Joseph Rand:** Writing – review & editing, Validation, Methodology, Investigation, Funding acquisition, Conceptualization. **Ben Hoan:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Salma Elmallah:** Writing – review & editing, Conceptualization.

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.

Data availability

The data that has been used is confidential.

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