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Missing the mark

Avoiding community misengagement in large-scale solar development

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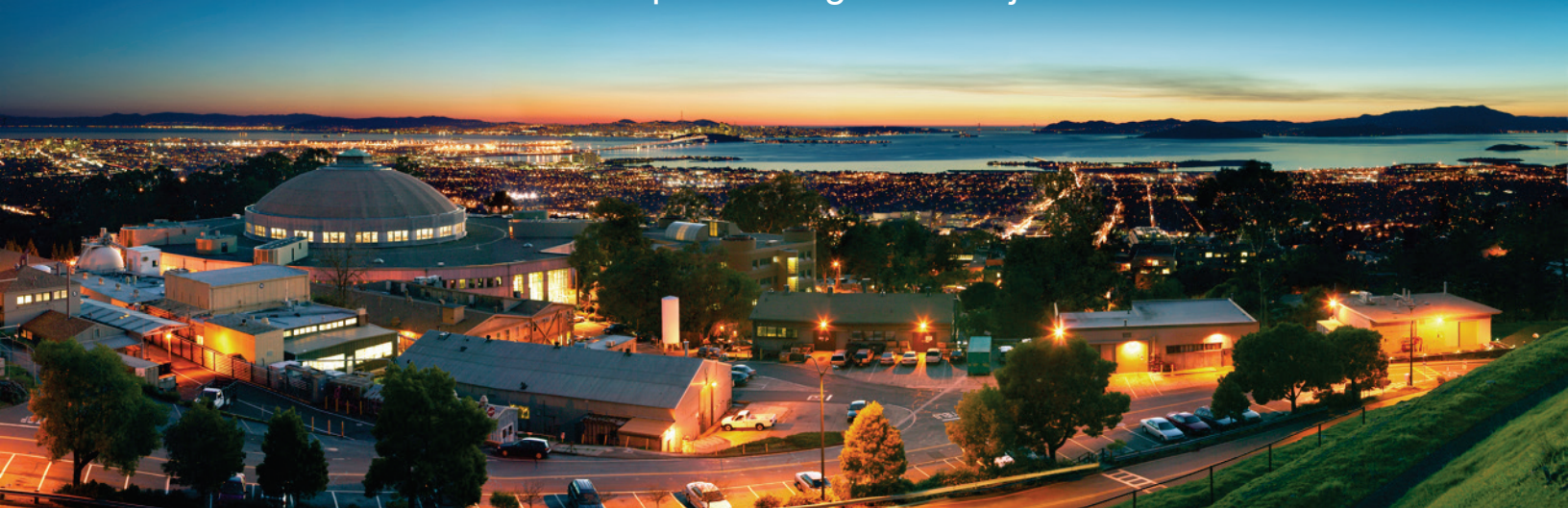
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Missing the mark: Avoiding community misengagement in large-scale solar development

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Abstract

Scholars have long argued the need for increased community engagement around large-scale solar (LSS) development in the United States (US). Despite this call, meaningful engagement processes remain rare, both because they are often not statutorily required and because a range of actors, including state and federal policy-makers, renewable energy developers, local officials, landowners, and nearby residents disagree about the need for as well as the intended goal of such processes. This disagreement has led to dramatic policy shifts around engagement and fostered processes that are insular, instrumental, abbreviated, and often focused on achieving a single objective: either the termination or approval of a LSS project. Here we work to distinguish this form of engagement, which we define as misengagement, from a more meaningful form of engagement, which has as its goals transparency, accessibility, and fairness as well as expanding the number and specificity of the perspectives, interests and impacts considered. We describe the development of a more structured and deliberative engagement process that was deployed by University Extension personnel in 5 US states with over 300 participants, resulting in a guidebook that provides step-by-step instructions for individuals interested in pursuing more community-centered solar development. We also propose five questions that surfaced over the course of this work and that organizers of meaningful engagement processes should consider in order to avoid misengagement: how, when, where, who (for and by) and why should such a process occur. Finally, we discuss tensions and tradeoffs associated with and between each question.

1. INTRODUCTION

An increasing number of scholars have written of the need for more community engagement around large-scale solar (LSS) development in the United States (US). Pragmatically, they argue that more engagement could improve landscape fit, contribute to a more honestly negotiated and fairer distribution of compensation and cost, reduce impacts to wildlife, improve stormwater management, and even lead to the adoption of eco- or agrivoltaics (1,2,3). They and others argue that increased engagement could also improve residents' perceptions of and attitudes regarding the LSS siting and permitting process, generate more support for solar and renewable energy more broadly, expand access to more affordable and reliable electricity, and potentially accelerate the rate of LSS deployment (1,3,4,5,6,7,8,9,10). Yet others, perhaps less interested in accelerated deployment, provide a normative justification, arguing that greater engagement is necessary to effect what Arnstein (11) called "citizen control," community ownership, or the conflagration of the status quo required for a truly just transition (12,13,14,15,16).

While there is broad agreement about the need for increased engagement, and numerous critiques of previous or missing engagement processes, depictions of what exactly more and more *meaningful* engagement around LSS should look like on the ground are lacking in the US.¹ This is the case despite numerous suggestions and critiques from scholars abroad, including those in the United Kingdom (17), Sweden (18), the Netherlands (19), Taiwan (20), Brazil and Portugal (21,22), Mexico (23), and Canada (24). Here we attempt to fill this gap by describing a two-year effort to develop, deploy and evaluate a more meaningful community engagement process in the US called community-centered solar development, or CCSD. In the remainder of this section, we describe how community engagement is often wielded in the US. We then introduce a distinction between this type of "*misengagement*" and CCSD, which had as its goal to increase the transparency, accessibility, and fairness of engagement, as well as expand the number of perspectives, interests and impacts considered. In the Methods, we describe the development and deployment of the CCSD process. In the Results we describe the outcomes of that process, specifically a series of community conversations and a step-by-step guidebook for initiating those conversations. In the Discussion, we identify and engage tradeoffs associated with five questions that arose in writing the guidebook and should be considered when developing an engagement process: namely, i) how, ii) when, iii) whom (with, by and for), iv) where, and v) why should it occur?² Finally, in answering these questions, we work to distinguish and suggest best practices for mitigating *misengagement*, or engagement processes that are insular, instrumental, abbreviated, single- rather than multi-objective, and occur in the absence of more meaningful engagement.

1.1. Siting policy and meaningful engagement in the US

Despite scholars' call for more and more meaningful engagement around LSS, such processes are rare in the US.³ Not only are they rarely required of and often perceived to be more costly and time-consuming by renewable energy developers, but a range of actors, including developers, state and federal policy-makers, local officials, landowners, and nearby residents often disagree about the intended goal of such processes (29). This disagreement has led to dramatic shifts in policy prescribing which level of government retains permitting authority over and thus where and how

¹ Specific guidance is lacking in numerous contexts, not just around LSS.

² Previous authors have tackled some, but not all, of these questions, and not always systematically or about LSS specifically (2,19,25).

³ There are a few notable exceptions, e.g., (26,27,28).

much community engagement is required for LSS projects (30,31). These shifts have not always been consistent along political or ideological lines; instead, the policies adopted appear to promote more or less community engagement strategically to either accelerate or stall development.

For example, in the state of Michigan (MI), legislation was recently passed by a Democratic majority that relocated most LSS permitting authority from municipal governments to a state-appointed board. The stated reason was to provide a more level and predictable playing field for industry with respect to zoning and land use policy, as well to slow the number of municipalities adopting restrictive zoning ordinances or working to stall development (32,33,34). This shift in authority was both accompanied by and came as a result of widespread vocal opposition to LSS development in rural and conservative areas of the state (31,35,36). Similar efforts and opposition occurred in Illinois (IL) following the passing of legislation that shifted permitting authority there to the state (37). The extent to which this kind of legislation will impact community engagement in Michigan and Illinois is unclear, but many expect public involvement to decrease (38).

On the other extreme, in Ohio (OH), state law, SB 52 in particular, co-sponsored by two Republicans, and signed by the Republican governor in 2021, empowered local governments, giving them the ability to pass solar bans—what (39) call “an extreme position in favor of local authority.” SB 52 also requires that all LSS proposals serve the “public interest, convenience, and necessity” of the state in order for the Ohio Power Siting Board to issue a permit. The board’s meetings have been frequented by vocal opponents often engaged in and organized by interest groups resisting solar and working to limit LSS development (40). In MI, OH, IL, and elsewhere across the US, there is little evidence of meaningful engagement reliant on best practices (1) and the principles we ultimately describe below. In the few examples where more meaningful community engagement was argued to have occurred, the result has nearly always been the stalled deployment of renewables (41,42)⁴.

1.2. Distinguishing meaningful community engagement from *misengagement*

Clearly, what is meant by *meaningful* community engagement around LSS has important implications (44). Previous authors have distinguished between three arguments for greater participation of the public in decision-making: substantive, normative and instrumental (19,29,45,46). The substantive argument purports that more and varied perspectives will improve the quality of information and thus lead to better decisions. The normative argument is focused more on process and relies on the “democratic ideal that members of the public have the right to influence the decisions that affect them or the things they value” (29). Developers regularly advocate for and contribute to a form of instrumental engagement, or processes that work to achieve a singular outcome or objective of achieving LSS permit approval (9,19). They argue that providing notice of potential projects to community-members too early, i.e., before land leases have even been secured, or hosting workshops, provides would-be opponents—often argued to be only a vocal minority of residents (47,48)—more time to organize (1,3). As a result, many developers prefer to delay notice until site control has been completed (1), leading to a “decide-announce-defend” model and exclusionary form of engagement (22,23,49). That model becomes less about initiating or expanding meaningful dialogue, or what Stirling (50) calls “opening up” social choice and policy discourse, and more about achieving the necessary requirements to finish a project (9). On the other side, opponents of LSS tend also to pursue a single objective: the cancellation of LSS

⁴ There are a few useful exceptions outside the US: e.g., (43).

projects. Their form of engagement often includes shouting down project supporters in public meetings,⁵ initiating protests, and pursuing moratoria and recall elections to replace local officials supportive of development (51,52,53). Recent efforts to catalogue the many instances of opposition across the US demonstrate the significant impact of these engagement efforts (54,55,56).

Both of these forms of instrumental engagement could be considered meaningful in that they achieve the organizers' explicit objective of approving or cancelling LSS projects. However, here we adopt a more substantive and normative approach, seeking to distinguish our engagement process from the instrumental form. We go so far as to refer to instrumental engagement as *misengagement* because it i) has only one stated objective, ii) can be ignorant of, if not openly hostile to, competing interests or perspectives, and iii) intentionally recruits individuals invested in achieving that objective. This misengagement is more insular and reductive than, and often arises in the vacuum of or intentionally seeks to replace, what Renn and Habermas (25,57) have advocated for as, a "fair and equal exchange of arguments." Those scholars advocate for the open critique of factual claims on the basis of the "state of the art," i.e., the best available scientific evidence, rather than persuasion. The rise of misengagement efforts parallels the spread of misinformation about LSS in the US, which Southwell et al (58) define as "publicly available information that is misleading or deceptive relative to the best available scientific evidence and that runs contrary to statements by actors or institutions who adhere to scientific principles." Like misengagement, misinformation is often used to replace evidence-based claims, or else fill the gaps caused by missing information (59).

Below we describe the development of our CCSD community engagement process, which was also intended to align LSS development with communities' values, interests, and priorities. We show the measures adopted to increase transparency, accessibility, and fairness in engagement and greater adoption of constructive, participatory dialogue—all elements of what Webler and Tuler (60) argued make up "good" public participation processes.

2. METHODS

2.1. Research Context

The CCSD project began in 2021 as a 3-year comprehensive interdisciplinary mixed-methods research project intended to improve understanding of community impacts, perceptions and preferences for LSS development in the US. The project included 5 tasks: i) a qualitative case study analysis of 6 LSS sites (3), ii) a national LSS neighbor survey (61), iii) analyses of LSS impacts on local tax, income and employment, iv) LSS geospatial categorization (62), and v) community-based solutions and visioning, which involved development of the community engagement process and guidebook described below.

Results from the first two tasks demonstrated that communities required assistance in understanding, communicating, influencing and aligning LSS development with their values, interests and priorities (3,63). This work also demonstrated that while more meaningful engagement was necessary, specific guidance about how to conduct, and examples of existing, meaningful community engagement processes on LSS were lacking. Those that did exist often targeted specific contexts or audiences, such as local officials (e.g., (64)). Interview and survey

⁵ Or, again as Stirling (279:(50)) notes, "closing down" appraisal to focus on a single course of action that appears "preferable under the particular framing conditions" provided.

results also suggested that while trusted third-party liaisons working on behalf of communities to engage with developers were desired (3), University faculty, staff, and Extension personnel⁶ were more trusted than developers, local, state and federal officials, and utility personnel to fill that role (63).

2.2. Development of the CCSD Process and Guidebook

The CCSD team's community-based solutions and visioning task thus began with a recruitment process of University Extension personnel from across the US to assist in first developing a community engagement model for LSS and second describing that process step-by-step in a publicly available and accessible guidebook (65). Project team-members identified two University Extension offices in September 2023, with whom the team had ongoing relationships and collaborations: Michigan State University (MSU) Extension and University of Wisconsin (UW) Extension. Each Extension office was provided \$50,000 and approximately 9 months to develop and deploy an initial engagement model. These partners were referred to as "Level 1" partners. The CCSD team then hosted a virtual convening in December 2023 in which 22 Extension personnel from 12 institutions attended and exchanged ideas about engaging communities in collaborative planning for renewables, shared tools and resources, and learned about this opportunity and the funding available. Ten thousand dollars was made available to up to 4 institutions each to serve as "Level 2" partners. At the end of the convening a survey was distributed gauging attendees' interest in serving as a host to pilot a community engagement process. Using this survey, Cornell, University of Maryland (UMD), and Iowa State University (ISU)) were identified and eventually agreed to serve as Level 2 partners.

Level 1 and Level 2 partners had distinct roles. Level 1 partners were provided more funding and more time to develop the overarching structure of the engagement process and identify best practices of existing community engagement models. Level 2 partners would later rely on those recommendations and materials to develop their own processes. This was intended to reduce the time, cost, and uncertainty associated with developing the process and lead to a more generalizable and replicable process. Importantly, both Level 1 and 2 partners were also asked to identify a community (i.e. a county) in their jurisdiction that would benefit from engagement around LSS. Throughout the process, our work was reviewed by the CCSD Technical Advisory Committee (TAC), made up of 12 individuals with experience in community engagement and solar development.⁷

Working closely with our Level 1 partners in particular in the winter of 2024, we collectively identified and engaged the five questions introduced above, i.e., i) how, ii) when, iii) who, iv) where, and v) why should engagement occur? We also discussed how the answers to these questions would be interrelated. For instance, *How* to go about establishing a meaningful engagement process requires significant experience, training, forethought, and financial resources, as well as a willingness to initiate and the courage to lead such a process amidst fear of conflict. *When* to initiate a process, how long it should run, and the frequency and length of meetings can

⁶ All land-grant universities and colleges in the US have an Extension office. Since 1914, the goal of these Extension offices has been to provide non-formal education and learning activities for, and communicate knowledge learned through research and teaching to, rural residents and farmers, as well as individuals living in urban areas (47).

⁷ The prime funder of the CCSD process had little influence over the specific forms of engagement or intended deliverables chosen and did not directly engage with or advise the Extension partners.

dramatically affect *Who* can and will attend, the number and depth of discussion and objectives considered, as well as the effectiveness of results and the cost. *Who* has this level of expertise and experience, and interest in pursuing such a process, varies both across and within communities. Rare—and typically expensive—are community-led processes that are built on trust, intentionally structured, well facilitated, evidence-based, and likely to generate meaningful recommendations or land-use plans. *Who* to include, *Whose* interests to consider and *Who* will be impacted also affects the process and results. Thoughtfully considering *Where* to focus engagement, e.g., *Where* to hold meetings and the geography of impacts and individuals to consider, can aid in avoiding both instrumental and oppositional forms of engagement. But it also requires meaningfully considering *Why* the process is or should be initiated. What is the intended result, or the explicit deliverable? Will the process generate a list of recommendations for developers or local officials, a land-use plan, a draft ordinance? Or perhaps the process is intended only to be a simple listening session for residents to have their questions answered. Of the five questions, determining *Why* appeared to be the most important and conveniently the most straightforward question to answer, but the answer is also typically driven by organizers with a single objective in mind. These five questions ultimately determined the number, type, location, objectives, and attendance at the resulting community meetings.

3. RESULTS

3.1. Eight “Community Conversations”

Table 1 describes the meeting particulars and the purpose of each community conversation⁸ developed and deployed by our Extension partners. By the end of the project, UMD and ISU had each conducted one 3-hour conversation in their respective community. MSU and Cornell had each conducted a two-part conversation on separate evenings—the former using a 90-minute session each night, the latter two 3-hour sessions, and UW conducted a single similar 3-hour conversation twice in neighboring communities. Eight conversations were held in all, with over 300 people attending (some residents may have and were encouraged to attend both meetings in MI and NY). Entry and exit surveys were used by partners either to recommend topics for additional meetings, ask questions or raise concerns, or evaluate the current meeting’s speakers or topics. One partner also conducted a community survey to assess community perspectives and concerns associated with LSS.

As opposed to hybrid or virtual meetings, all of the conversations were held in-person and conducted in large rooms in conveniently located public or commercial buildings in each community. Attendees were asked to sit either at long tables facing a stage, or at smaller 6-8 person roundtables. Partners avoided holding Q&A or call-and-response sessions and instead promoted small-group discussions or asked attendees to write down and submit their questions or concerns to facilitators. Two partners incentivized attendance. The specific rationale, timing, location, focus, and community members sought for and leading each meeting, are all described in the next section and correspond to different sections of the CCSD guidebook.

Table 1. Level 1 (in green) and 2 (in tan) Partners, Conversation Topics, Times, and Locations (all meetings occurred in 2024)

⁸ The meetings were called community conversations to demonstrate our collective goals of inclusivity, fairness, transparency, and accessibility.

Partner; County (#/stage of LSS)		Meeting Particulars (Date, Time, Attendees, Township)	
		1 st Mtg	2 nd Mtg
Mich State Univ; Osceola County, MI (0 LSS proposed)	Sequential Mtgs	Mar 20; 7-8:30pm; ~80 attendees; Evart, MI	April 11; 7:00-8:30pm; ~65 attendees; Evart, MI
		Education and information about LSS; “The good, the bad and the trade-offs of LSS”	Wildlife and health impacts; Interpretation of land classifications (active, marginal and open land); Responsible siting priorities
Univ of Wisconsin; Portage County, WI (1 LSS active; 1 in construction)	Stand-alone Mtgs	Mar 27; 5:30-8:30pm; ~50 attendees; Plover, WI	Mar 28; 5:30-8:30pm; ~50 attendees; Stevens Point, WI
		Overview of LSS development; Roadmap for addressing developers and citizen input on LSS; Concerns and tradeoffs of LSS; Residents’ vision of how LSS fits in the community; Community members’ ability to shape projects; Community revenue use	<i>Ibid</i>
Univ of Maryland; Queen Anne’s County (Multiple LSS in development)	Stand-alone Mtg	Aug 26; 5:30-8:30pm; ~23 attendees; Wye Mills, MD	N/A
		What you should know about solar; Legal aspects of solar development in Maryland; Overview of LSS in Maryland; Displacement, environmental, health and safety concerns	
Cornell Univ Jefferson County, NY (Multiple LSS in development)	Sequential Mtgs	Aug 20; 5:30-7:30pm, ~15 attendees Watertown, NY	Sep 18; 5:30-7:30pm, 18 attendees Watertown, NY
		Challenges and opportunities of large-scale solar development; Municipal regulation and community involvement; Co-siting solar with agriculture; Renewable energy zoning; Balance between solar growth and land use priorities	Large-scale solar development’s intersection with agriculture and the environment
Iowa State Univ Kossuth County, IA (0 LSS proposed)	Stand-alone Mtg	Sep 17; 5:30-8:30pm, Algona, IA	N/A
		County’s experience with solar development; Solar energy in Iowa; Social, economic and environmental costs and benefits of solar development	

3.2. The CCSD guidebook: Eight key steps

Developed iteratively with Level 1 and 2 partners and our TAC, the resulting CCSD guidebook (65) contained 8 key steps (see Figure 1), a 41-point checklist, and an online resource library with sample documents, hyperlinks, and other materials useful for conducting a meaningful engagement process. The steps, which we describe in more detail below, and checklist were inductively determined by observing how partners chose to structure and organize their conversations. As Table 1 depicts, not all partners did the same thing—sometimes approaches succeeded, sometimes they did not. The guidebook aimed to capture what worked well everywhere, highlight decision-points, and provide evidence-based recommendations for future

organizers. More simply, it is intended to assist organizers in articulating potential responses to the five questions of how, when, whom (with, by and for), where, and why should these conversations occur?



Figure 1. The CCSD Guidebook’s eight steps for preparing, planning and conducting a successful conversation about LSS

In determining sites to conduct engagement, both Level 1 and 2 partners employed what would ultimately become **Step 1** of the guidebook. Step 1 advises an organizer—here the Extension partner themselves—to examine what has already occurred with respect to LSS and other large infrastructure development in a community, work to identify existing attitudes and support or opposition to both existing and new development, and determine what residents are interested in and able to influence going forward. This requires learning the policy environment and constraints. For this work, and throughout the guidebook, partners were instructed to focus on engaging residents at the county level, rather than in specific townships, as the latter may exclude key stakeholders and would potentially have been difficult to replicate.

Both Level 1 partners engaged in extensive stakeholder engagement, conducting interviews, focus groups, and stakeholder mapping exercises to populate their “local advisory group.” This advisory group, per (19) would work with the partner to identify residents’ key concerns, values, priorities, the perceived risks and opportunities associated with LSS development, the best times and locations for holding meetings with residents, and constraints residents may face in attending. They also advised on who to invite both as experts and speakers and as participants from the community. Importantly, this process required explicitly identifying the purpose of the engagement process. Defining the purpose of each conversation made up **Step 2** of the guidebook. Because defining a purpose may also determine who specifically should participate in, or be added to, the local advisory group, establishing a local advisory group was listed as **Step 3**. Both Level 1 partners were encouraged and able to provide financial compensation to members of their local advisory group, though both agreed doing so would not be necessary were the process to be replicated.

Once the purpose of each community conversation was established—these varied from providing an update on the current status of LSS development in the community, to providing an avenue for residents to voice concerns, to educating residents about what they could, and likely could not, influence about LSS projects (see Table 1 for a full list of topics discussed at each conversation), partners crafted an agenda for each conversation (**Step 4**). These agendas were key to establishing

residents' expectations and ground rules for participation, identifying when, what and how guest speakers and invited experts should frame their discussions, and ultimately preparing speakers and organizers on how to handle difficult questions and disruptions. One element of the guidebook is a list of frequently asked questions (FAQ) that was developed over the course of the project, with numerous questions being asked in multiple communities. The guidebook does not provide answers to FAQ, but instead provides strategies on how and when to respond, as well as human and online resources useful for informing responses.

In crafting the agenda, organizers worked to select dates, times, and venues for meetings (**Step 5**) and use outreach and marketing materials and channels (**Step 6**) that were as inclusive and representative as possible. After providing recommendations for how to conduct the conversation (**Step 7**), **Step 8** of the guidebook provided tips for concluding the process, namely holding debriefs and additional meetings with the local advisory group and local decision-makers, preparing and disseminating public reports, and creating a home for online resources and materials.

4. DISCUSSION

In this section we discuss enduring tensions identified by project-team members and partners as they planned, conducted and evaluated their community conversations. Rather than provide definitive answers to the five questions introduced above, we consider tradeoffs between and present recommendations for conducting meaningful engagement and avoiding misengagement—or worse, meaningless engagement⁹, as well as identify key characteristics of each (see Figure 2). Our results align with many of the observations and recommendations from scholars in the US and elsewhere who have pointed out the need to not only expand, but more importantly improve, engagement processes around LSS development (e.g., (3,9,10,17,18,19,21)). We argue that our community conversations, and meaningful engagement more broadly, require significant effort and commitment from unbiased organizers to fairly consider multiple perspectives, objectives, impacts and concerns, as well as increase accessibility and transparency (18,21,22). These objectives are in stark contrast to those that define misengagement, which is often led by interested parties (on opposite sides) focusing on achieving a single objective, limiting representation (9,19), and often parallels or relies on the spread of misinformation. Thus, meaningful engagement and CCSD has as their goals more substantive and normative principles of public participation (29,45,50), and expanding the set of marginal issues, interests and democratically legitimate “participatory processes” considered (50). And both eschew the far more common, opaque and exclusive procedures associated with either project-oppositional or -supportive forms of misengagement (9,19).

⁹ Meaningless engagement, which we argue is a more extreme version of misengagement, also occurs on both sides. Those opposed to development rely on haphazard, isolated communication and dialogue, interact online and only between concerned residents, and share only that information which discourages development. On the other hand, those in support of LSS projects use closed-door or invite-only meetings, craft and direct their presentations only to officials accounting for permit-required information, and ignore public comments.

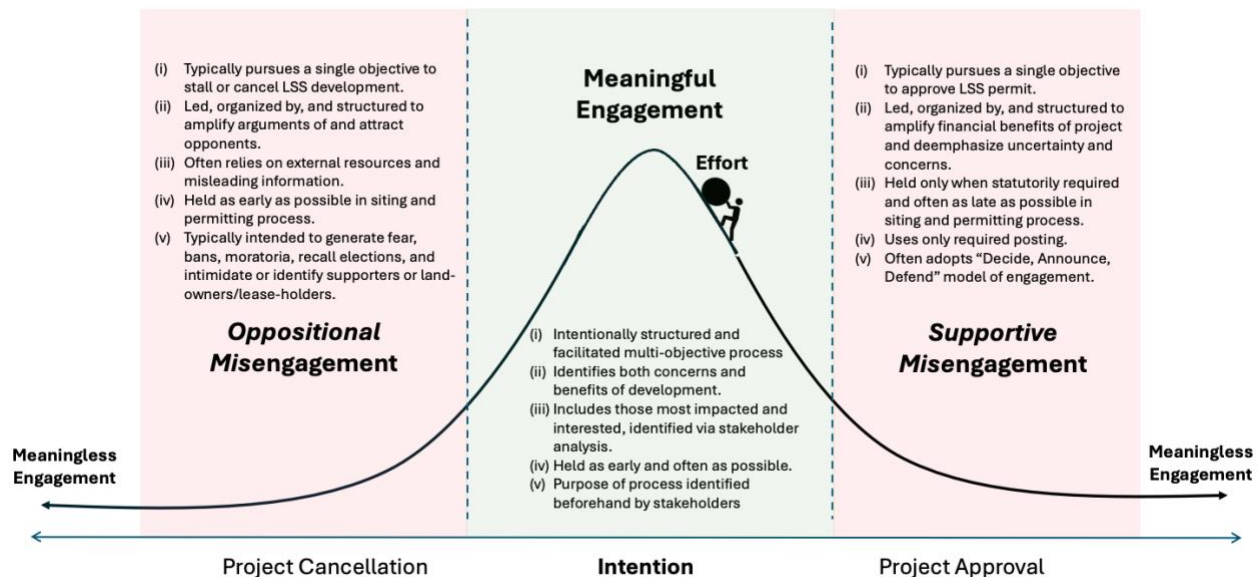


Figure 2. The Engagement Curve: Meaningful Engagement, Misengagement and Meaningless Engagement. Moving higher on the curve (toward the center) requires greater effort, specifically considering a greater number of objectives and perspectives, as well as holding more and more accessible conversations in different locations. The curve also represents how quickly and easily engagement can miss the mark and focus only on a single objective, i.e., project cancellation (oppositional) or approval (supportive), or worse devolve into engagement that is anything but.

4.1. How and how much will it cost to conduct meaningful engagement?

4.1.1. *In person-only events may improve discussion but limit access and representation*

Meaningful engagement requires a sufficient number of individuals, perspectives and interests be represented in the process (19), an “opening up” of participation (50). To achieve this, our partners held in-person meetings in large rooms in convenient locations. When appropriate, attendees were seated at smaller roundtables to facilitate discussion. In-person meetings, rather than virtual, were decided upon to encourage discussion and promote community cohesion, which has been found to be lacking in some communities experiencing renewable development (66,67). Conducting in-person meetings also helped organizers to limit disruptions (see section 4.1.2. below), a common symptom of misengagement efforts (51,52,53). However, due to meetings being held in rural areas, attendance required residents to have access to a personal vehicle, and because the meetings were in the evening, residents had to leave their home and potentially secure childcare.¹⁰ Organizers and the local advisory board should consider this tradeoff, as this decision could deter some residents who are most likely to be impacted from development from attending.

It became clear that holding in-person meetings may discourage younger people and those more comfortable engaging online from participating, as the former were largely absent. During and immediately following the Covid-19 pandemic, virtual meetings were thought to discourage engagement and lead to suboptimal results, potentially due to online meetings reducing entitativity, or “group-ness” (68) and zoom fatigue caused by constant eye contact and overload from too many

¹⁰ At all of our events parking and registration was free, and some partners offered reimbursement for personal vehicle mileage and on-site childcare.

faces and backgrounds (69); however, this has not always been the case (70,71). Holding hybrid meetings was considered and is a potential solution; however, these meetings are not without their own challenges, including technical glitches; unequal engagement; a lack of familiarity by some with the format; different Internet capacities; and finally, potentially, higher costs (72,73). If organizers do decide to hold a hybrid meeting, they should design the meeting around that format from the onset, rather than simply add a hybrid option ad hoc (72).

4.1.2. *Intentionally structuring discussion can limit disruption and dominance*

To avoid the most impassioned or vocal attendees from dominating discussion (19), most partners chose not to provide a mechanism for participants to speak to the whole room, instead relying on the practice of attendees writing down questions and concerns and submitting them to facilitators who would then read them aloud to the full room. This form of engagement not only prevented discussion from stalling upon or continually returning to a single concern, but also empowered individuals who may not feel comfortable speaking in front of the whole room to still voice their question or concern (possibly anonymously). The more typical form of Q&A at government meetings, where residents identify their name and address, has led to numerous incidences of misengagement as oppositional forces shout down supporters and officials alike (74,75,76).

Roundtable discussions do not eliminate the influence of dominant personalities. These individuals may still work to control small-group discussions; however their influence is reduced, especially if each table has a facilitator. While small-group discussion allows for a wider range of and more specific topics to be covered, they also require or at least benefit from additional staff, volunteers, or experts available to respond to more and more varied concerns. This increases the human and potentially financial cost of engagement (19). These methods, which proved effective in our partners' meetings, could be interpreted by some participants, likely those in opposition to LSS projects, as stifling voices. However, we agree with Renn and Habermas that in order to provide "equal opportunities" for an "exchange of arguments," it is likely that those participants who lack power, privilege or political status will require assistance in making their voice heard (25,57).

4.1.3. *Incentivizing participation may increase attendance but be perceived negatively*

Two partners incentivized attendance by providing gift cards to people who registered, requiring only that they provide contact information.¹¹ Those conversations were the best attended (at least by residents); however, those partners also dedicated considerable time and energy to recruiting and advertising their events, and so it is not clear if the incentive or wider advertising increased participation. Thus whether to provide incentives remains a question needing further study. Depending on who is organizing the meeting, incentives, much like payments to neighbors of renewable projects, could be perceived negatively (9,77), especially if organizers have betrayed a single objective such as opposing or supporting a project.

4.1.4. *Investing in engagement reduces costs in the long run*

The decisions over whether to hold in-person or virtual meetings, hire additional staff or volunteers, or incentivize attendance all contribute to the financial cost of engagement. Certainly, one of the reasons that misengagement proliferates is that it's far easier and cheaper to conduct. Online posts rife with misinformation or singular presentations made in support of a special-use permit at a local government meeting require little meaningful outreach, consideration of multiple perspectives, or conversation with residents. Organizers here were provided considerable time and financial

¹¹ Registration also provides a useful means of collecting attendees' contact information.

resources and assistance from the project team and other Extension offices to both develop and deploy their process. Still, most partners urged that the cost of planning and conducting a meaningful community engagement process could be as low as a few hundred dollars and would only increase, still to only \$3,000 to \$5,000, if experienced facilitators and guest speakers had to be paid and flown in (65). Processes could cost even less if organizers' time and effort were donated, or if state and local planning or community organizations or Extension offices leveraged their expertise.

These cost estimates are dwarfed by the costs of engagement reported by some developers, which Nilson et al (1) identified amount to upwards of \$700 per MW of solar generating capacity installed. These authors (1) further demonstrate that developers' engagement costs are less than 0.1 percent of the typical capital expenditures required for recent solar projects. And a majority of developers agreed that these costs were more than made up for by the money saved in reducing development delays and avoiding project cancellation. Spending money early to meaningfully engage communities and align projects with stakeholders' preferences may not only speed development and save money in the long run (78), but also demonstrates procedural fairness is a priority (19) and reduces the opportunity for misengagement to take root. Note that meaningful engagement requires work by, and potentially eliciting funds to pay, neutral or unbiased organizers or facilitators, rather than developers who are likely to pursue a single objective, and state and federal government officials who were the least trusted by residents to provide information about solar projects (63).

4.2. When to initiate and how often to engage?

4.2.1. Engaging early and often increases opportunities to affect decisions

Despite our initial intent to engage communities before LSS projects had been proposed, this was difficult due to the number and demands of communities already having experienced proposals. This is unfortunate, as a common refrain at municipal meetings in which LSS special-use permits or zoning ordinances are being discussed is that residents were either not informed early enough to meaningfully influence decisions or simply were not informed at all (3). While most municipalities have public notice requirements, a recent survey of solar neighbors showed that less than twenty percent of respondents had been aware of their nearest project prior to construction, and of those more than half thought the public was mostly unaware (10,63).¹² While this should concern developers, as the public being completely unaware of project proposals appears to result in increased project cancellation as well (1), Nilson et al also demonstrated that developers delay initiating engagement until after the land for the project has been secured, i.e. until after the location of the project has been determined (1).

Developers argue that initiating engagement before securing site control could unnecessarily disturb communities if the projects aren't ultimately pursued. But meaningful engagement ideally incorporates long-term visioning, an opportunity for residents to articulate their values, goals and concerns, and embraces discussion of multiple objectives and inclusion of diverse interests and perspectives—all goals of the current process. Rather than focus solely on either project approval or termination, meaningful engagement, particularly structured processes that work to identify shared values and fundamental objectives on which everybody can agree are important (79,80,81), are far less likely to disrupt communities. Additionally, more and earlier opportunities to engage

¹² That same survey showed that over a third of respondents had not been aware of their nearest LSS project until they received the survey (though most respondents were aware of projects over 100 MW in size).

increase the variety and depth of concerns able to be discussed, reduces the extent to which residents may feel rushed (25), and increases the likelihood that community members will be able to influence planning and participate in decision-making (10,78,82). When [redacted for peer review] (10) asked residents about the most appropriate way to engage members of the public about solar, the majority of respondents, even those who didn't participate, urged the public should be able to provide input, but the late timing of information provision limited their ability to do so. While our focus is on encouraging earlier engagement, we must not ignore calls for meaningful engagement to take place after development, as this is when community members often feel least heard and most burdened (18).

4.2.2. *Longer conversations increase the demands on organizers and participants*

Asking the public to provide input or recommend decisions requires longer more-in depth processes than were deployed here—indeed, only two of our five partners asked attendees to attend multiple meetings and provide feedback on the first and propose discussion topics for the second. Longer conversations likely cost more to operate and require more from organizers and participants, particularly processes that require repeated attendance and homework, such as reviewing ordinances, permits or maps. Recommending amendments to zoning ordinances (83), revising master plans, or helping craft community benefit plans can take multiple evenings and considerable time, naturally limiting the number and type of people that are willing or able to participate. While conversations that go beyond just LSS to incorporate discussion of how such development relates to other large-scale infrastructure in the community and the energy system as a whole may be necessary (17), they would also require significant resources. On the other hand, providing residents an opportunity to voice concerns, receive updates on local development, or resources on how to negotiate solar leases, as many of our partners did, can take place in a single evening. No matter the duration of the meetings, meaningful engagement should come early enough in the development lifecycle that residents don't feel they are simply being told what's coming, but instead are able to engage in a dialogue.

4.3. **Who should organize and speak?**

4.3.1. *Identify local champions and maintain source credibility*

Each of the CCSD conversations described above relied on local stakeholders, often a “local champion,” such as a former official or well-known civically engaged resident, to help initiate the process or host the meeting. Identifying these credible, trusted individuals is key to recruiting members to the local advisory board, marketing the conversations to the wider community, promoting a respectful and inclusive environment at the meetings, and recognizing the importance of incorporating place-based knowledge, experience and relationships in LSS development (17,20,84). These individuals can not only serve as an effective liaison between developers, local officials and residents (3), they could be empowered to and ultimately provide “new capabilities to local stakeholders, municipalities and representative entities” (21), particularly in rural areas.

Nevertheless, establishing and maintaining source credibility throughout the process is a key component of meaningful engagement (85,86); however, doing so has been especially difficult in the renewable energy space in the US (87). An important component of establishing source credibility is an individual's lived experience, particularly in a rural community. Urban elites, who may be perceived to either not understand or respect rural realities, tend not to be trusted. In each case above, the local champions involved were both trusted members of the community and credible purveyors of information. This is not always the case however, and misengagement and the spread of misinformation tend to occur due to individuals who are trusted, but lack credibility. In

the opposite case, credible individuals who lack trust tend not to be invited to participate at all. It should be noted that evaluating the information provided or motives adopted by potential organizers may be difficult for residents if they themselves are not already well-informed, a problem noted by developers (19).

4.3.2. Acknowledge the need for multiple forms of expertise (and experts)

Organizers aside, deciding who to invite to speak in or to a community required our partners to consider a number of competing elements. Meaningful engagement should not only allow stakeholders to engage in a shared understanding of, as well as analyze and deliberate on, tradeoffs with their peers (18), but also change their minds (24). Both informing analysis and facilitating discussion often requires unique skillsets however. The former tends to be done by subject-matter experts who understand technical concepts, methods, relationships between inputs and outcomes, and have an appreciation of the most up-to-date and best available scientific evidence (or know where it's lacking). It also requires individuals who can communicate those concepts clearly and concisely to a general audience. Meaningful deliberation requires facilitators who are at least tacitly knowledgeable about the science, but more importantly trained in leading productive goal-oriented discussions and able to synthesize and communicate those discussions' results. Rarely are these two skillsets shared by a single individual, though the Extension personnel leading this work are certainly candidates, perhaps the reason they're most commonly identified as trusted purveyors of information (63).

Furthermore, the variety of subject-matter expertise and experts complicate selection, particularly in the world of LSS. Experts could be considered either generalists, e.g., a local official who understands how LSS projects move through the permitting space, or specialists, such as a toxicologist who understands the materials in a PV cell and how they degrade (or do not) over time. Answering specific questions from community-members or correcting misinformation takes a nuanced and confident approach (to the extent that we advise meeting organizers to write participants' questions down and address them after the meeting), and may be more difficult for either expert depending on the specificity of the question. Another distinction exists between experts that have been exposed to numerous cases and designs but tend to operate at the state or national (or international) level, and thus know little about the local context. Alternatively, there are individuals who are long-standing members of and knowledgeable about a local community, but may be limited in their breadth of understanding of the broader technical or political landscape. Determining which expert to invite and subject matter to cover requires considerable consultation with the local advisory board.

4.4. Where to conduct engagement?

4.4.1. Holding meetings in different locations expands impacts considered

Partners' decision about where to hold their conversation was a key determinant of who ultimately participated. This is because location, at least in part, determines who makes up the audience and as a result the type and distribution of impacts and objectives that are meaningfully considered (23). A meeting held in a rural area near large tracts of farmland and transmission lines may attract individuals most likely to lease or be impacted by neighbors' leases. Holding a meeting in an urban or suburban location may attract individuals less likely to experience direct visual impacts, but still likely to benefit from increased tax revenue and reduced air pollution from a shuttered coal plant, as well as be more likely to support efforts to decarbonize energy systems and be concerned about global warming (88,89). If a solar project or proposal already exists in a community, residents living within one mile tend to be more engaged, concerned and aware of its impacts, as well as

potentially be a participating landowner in the project (63). Perhaps as a result, they tend to be targeted more by developers than others for engagement (19). Yet many of the impacts from LSS manifest beyond the immediate vicinity. Misengagement efforts likely take these considerations into account, purposely locating meetings or activities in the locations most likely to attract or be accessible to individuals who support a single objective (23). Meaningful engagement would—and should—look to attract a wider range of perspectives, interests and those impacted, thus necessitating meetings in multiple locations, if not at least marketing meetings in multiple communities.

4.4.2. The type of building and room where it happens matters

All of our partners elected to hold their conversations in either public buildings or hotel conference rooms. Most public-notice requirements for renewable projects require meetings be held at government buildings, often in the county seat or, occasionally, the state capitol. Meaningful engagement should occur in public facilities and spaces that are well known and easily accessible to residents, and whenever possible avoid the use of privately owned facilities, such as hotels or restaurants. Nevertheless, public meeting rooms have been the working space of misengagement for years; these rooms often overflow with residents seated cramped in tightly packed rows of chairs, or standing along walls, often waiting for hours to speak at a single microphone (74,75,76). Hearing speakers and seeing visual aids is not always easy, or encouraged, despite many guests having visual or audible impairments. Meaningful engagement on the other hand requires meeting spaces that have enough room for people to move about comfortably (especially those with mobility needs), audio amplification for presenters, staff, and participants (if desired), seating that allows for and minimizes interference during small-group discussions, and visual aids that are clearly visible (printed slides and multiple screens are especially useful). While public buildings are the norm, spaces colocated with police departments or jails should be avoided, and though schools or educational facilities are often convenient for parents and can provide space for children to play, organizers should ensure that adult-sized tables and chairs are available.

4.5. Why engage at all?

4.5.1. Expand the number of objectives, interests and impacts considered

Too often misengagement occurs because the organizer has a single objective in mind, typically either to stall or terminate a project, or else facilitate the approval of a permissive zoning ordinance or special-use permit. Both forms of misengagement result in insular and uncreative alternative-focused thinking and discussion (90). Such discussion also falls prey to confirmation bias and motivated reasoning (91,92). Often, only information that supports the organizers' objective is provided or acknowledged, and any conflicting evidence is ignored or framed so as to raise doubt or suspicion about its validity or source. These efforts may not run smoothly. Regularly meetings intended to inform the public about a LSS proposal become overrun with project opponents feeling they need to shout or become aggressive to be heard (75). Organizing then takes place outside the meeting to initiate further misengagement efforts. And the cycle continues. As was the focus here, meaningful engagement efforts instead consider both the good and the bad of LSS, articulate its tradeoffs, and most importantly work to expand the number of and articulate more specifically the perspectives and objectives considered. These types of engagement may spawn additional meetings or activities purposely, looking not to close off conversation but inspire more. These activities and the inclusion of additional diverse perspectives represent a way to move “up the ladder” of engagement, which Nilson et al (1) present as motivated by democratic ideals to increase public influence over the direction and pathway of the energy transition.

4.5.2. *Meaningful engagement may require a unique type of organizer*

One of the reasons that University Extension personnel were the most sensible organizer of the community conversations above is that their principal objectives lie outside the realm of solar development. Moreso, extension offices pursue multiple interlinked objectives, such as addressing public needs, applying knowledge to critical issues, engaging and empowering people to transform their lives and communities, and most notably putting “knowledge to work in pursuit of economic vitality, ecological sustainability and social well-being” (93). These multiple objectives require expanding discussion, rather than limiting it. Similar organizations working in the solar space may be difficult to find, with most either pursuing more widespread development or working to slow transition. This tension between objectivity and advocacy is especially difficult to navigate when we consider which organizations have the most resources to spend on initiating and conducting engagement, e.g., renewable developers or well-funded conservative lobbying groups (94,95). Many organizations have already taken an explicit position on solar, e.g., either as a clean energy imperative or a waste of taxpayer-funded subsidies. Others have more muted, but still apparent objectives. While University Extension offices are not the only appropriate organizers of meaningful engagement around LSS, (e.g., (96)) they employ a unique blend of local contextual knowledge, subject-matter expertise, and community-members’ trust.

5. Conclusion

We describe here our attempt to develop a meaningful engagement process around LSS intended to promote more CCSD, along with five questions and tensions necessary for organizers to consider to avoid falling into misengagement. Simply encouraging more community engagement around LSS may be less important than distinguishing between forms of engagement and promoting a more meaningful form (21). Meaningful engagement has as its goals transparency, accessibility, and fairness as well as expanding the number and specificity of the perspectives, interests and impacts considered. Meaningful engagement promotes more dialogue, but structured in a way that reduces disruption and domination and empowers stakeholders across the “participation spectrum,” particularly those community members needing support to be heard (18,19). Misengagement on the other hand, which is far more common, is exclusive, instrumental, abbreviated, and focuses on achieving a single objective: typically the termination or successful permitting of a LSS project. Misengagement stops conversation. Whereas meaningful engagement has positive co-benefits, specifically the articulation of long-term goals and shared fundamental values, misengagement creates disruption, and even when, or perhaps necessary to be successful, purposely works to sever long-standing relationships in communities (23). As Figure 2 shows, despite organizers’ best intentions, meaningful engagement requires considerable effort and intention to avoid falling into mis- or even meaningless engagement.

We note that the discussion above was qualitative, and that our process was only conducted in five communities. Despite our commitment to creating a flexible and replicable process, additional study is necessary to understand how representative our partners’ experiences here were or how well this process works to align LSS development outcomes with community members’ values and priorities. Additional study could work to distinguish between misengagement and meaningful engagement quantitatively. To do so, scholars could work to develop a scale (e.g., (29)) involving questions for engagement participants (or even residents living near solar projects) around i) the variety of perspectives sought or included in the engagement process; ii) the extent to which residents or participants were able to or would like to hear from or contribute to multiple interests or stakeholder groups; iii) the number and types of speakers and the valence or level of affect (openness or aggression) associated with each; iv) the perceived role and objectivity of the process

organizer, v) the timing of the process, i.e., early or late in the LSS development stage, and vi) and the number or timing of meetings. Importantly, use of this type of scale as well as other longitudinal work, either qualitative or quantitative, could be used to determine and distinguish between what is expected of meaningful engagement and what is actually experienced (21).

This is not to say that a survey is sufficient. In order for engagement to be meaningful, it must account for what are unique and context-dependent, place-based values, priorities, and concerns. As our CCSD guidebook stipulates, meaningful engagement processes should require:

- i) understanding early-on the local, social, political and environmental context in which LSS has been proposed and engagement will take place,
- ii) engaging local stakeholders to determine who is most likely to be impacted by and interested in LSS, and how to reach them,
- iii) determining what those residents who engage in a process can actually influence,
- iv) establishing where, how often and the format in which to hold meetings to maximize the number and types of perspectives and impacts considered,
- v) ensuring all who attend are able and comfortable in sharing their perspectives and hearing others',
- vi) identifying trusted and credible purveyors of information, and
- vii) generating useable results that are shared with community members.

As discussed above, achieving these objectives requires consideration of a host of difficult and enduring tradeoffs.

CRedit authorship contribution statement

Douglas L. Bessette: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Joseph Rand:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. **Ben Hoen:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Robi Nilson:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Jacob White:** Writing – original draft, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Karl Hoesch:** Methodology, Investigation, Data curation, Conceptualization. **Sarah B. Mills:** Writing – review & editing, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare no financial interests or personal relationships which may be considered as potential competing interests.

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Data availability

No data was used for the research described in the article.

Sources

1. Nilson R, Rand J, Hoen B, Elmallah S. Halfway up the ladder: Developer practices and perspectives on community engagement for utility-scale renewable energy in the United States. *Energy Research & Social Science* [Internet]. 2024 Nov 1 [cited 2024 Aug 12];117:103706. Available from: <https://www.sciencedirect.com/science/article/pii/S2214629624002974>
2. Shaw K, Hill SD, Boyd AD, Monk L, Reid J, Einsiedel EF. Conflicted or constructive? Exploring community responses to new energy developments in Canada. *Energy Research & Social Science* [Internet]. 2015 Jul 1;8:41–51. Available from: <https://www.sciencedirect.com/science/article/pii/S2214629615000468>
3. Bessette D, Hoen B, Rand J, Hoesch K, White J, Mills SB, et al. Good fences make good neighbors: Stakeholder perspectives on the local benefits and burdens of large-scale solar energy development in the United States. *Energy Research & Social Science*. 2024;
4. Bidwell D, Sovacool BK. Uneasy tensions in energy justice and systems transformation. *Nat Energy* [Internet]. 2023 Mar 13 [cited 2023 Mar 17];1–4. Available from: <https://www.nature.com/articles/s41560-023-01217-8>
5. Fast S, Mabee W, Baxter J, Christidis T, Driver L, Hill S, et al. Lessons learned from Ontario wind energy disputes. *Nat Energy* [Internet]. 2016 Jan 25 [cited 2022 Nov 30];1(2):1–7. Available from: <https://www.nature.com/articles/nenergy201528>
6. Firestone J, Hoen B, Rand J, Elliott D, Hübner G, Pohl J. Reconsidering barriers to wind power projects: community engagement, developer transparency and place. *Journal of Environmental Policy & Planning* [Internet]. 2018 May 4 [cited 2021 Jul 8];20(3):370–86. Available from: <https://doi.org/10.1080/1523908X.2017.1418656>
7. Liu L, Bouman T, Perlaviciute G, Steg L. Public participation in decision making, perceived procedural fairness and public acceptability of renewable energy projects. *Energy and Climate Change* [Internet]. 2020 Dec 1 [cited 2025 Jan 16];1:100013. Available from: <https://www.sciencedirect.com/science/article/pii/S2666278720300131>

- 724 8. NAS. Accelerating Decarbonization in the United States: Technology, Policy, and
725 Societal Dimensions [Internet]. Washington, D.C.: National Academies Press; 2023
726 [cited 2023 Nov 14]. Available from: <https://www.nap.edu/catalog/25931>
- 727 9. Ryder S, Walker C, Batel S, Devine-Wright H, Devine-Wright P, Sherry-Brennan F. Do the
728 ends justify the means? Problematizing social acceptance and instrumentally-driven
729 community engagement in proposed energy projects. *Socio-Ecological Practice
730 Research* [Internet]. 2023 Jun 1;5(2):189–204. Available from:
731 <https://doi.org/10.1007/s42532-023-00148-8>
- 732 10. Hoesch KW, Mills SB, Rand J, Nilson R, Bessette DL, White J, et al. What to expect when
733 you're expecting engagement: Delivering procedural justice in large-scale solar energy
734 deployment. *Energy Research & Social Science* [Internet]. 2025 Feb 1 [cited 2025 Apr
735 25];120:103893. Available from:
736 <https://www.sciencedirect.com/science/article/pii/S2214629624004845>
- 737 11. Arnstein SR. A ladder of citizen participation. *Journal of the American Institute of
738 planners*. 1969;35(4):216–24.
- 739 12. Jacroux E, Freshour C. Struggles over solar in the United States: Oppositional coalitions
740 and the limits of territorial resentment. *Energy Research & Social Science* [Internet].
741 2024 Jul 1 [cited 2025 Feb 10];113:103532. Available from:
742 <https://www.sciencedirect.com/science/article/pii/S2214629624001233>
- 743 13. Lennon B, Dunphy NP, Sanvicente E. Community acceptability and the energy
744 transition: a citizens' perspective. *Energ Sustain Soc* [Internet]. 2019 Dec [cited 2025
745 Jan 16];9(1):1–18. Available from: [https://link.springer.com/article/10.1186/s13705-](https://link.springer.com/article/10.1186/s13705-019-0218-z)
746 [019-0218-z](https://link.springer.com/article/10.1186/s13705-019-0218-z)
- 747 14. Sovacool BK, Dunlap ,Alexander A., and Novaković B. When Decarbonization
748 Reinforces Colonization: Complex Energy Injustice and Solar Energy Development in
749 the California Desert. *Annals of the American Association of Geographers* [Internet].
750 2025 Mar 16 [cited 2025 Apr 11];115(3):640–70. Available from:
751 <https://doi.org/10.1080/24694452.2024.2433040>
- 752 15. Stephens JC. Energy Democracy: Redistributing Power to the People Through
753 Renewable Transformation. *Environment: Science and Policy for Sustainable
754 Development* [Internet]. 2019 Mar 4 [cited 2025 Apr 10];61(2):4–13. Available from:
755 <https://doi.org/10.1080/00139157.2019.1564212>
- 756 16. Tornel C. Decolonizing energy justice from the ground up: Political ecology, ontology,
757 and energy landscapes. *Progress in Human Geography* [Internet]. 2023 Feb 1 [cited
758 2023 Feb 3];47(1):43–65. Available from: <https://doi.org/10.1177/03091325221132561>

- 759 17. Roddis P, Roelich K, Tran K, Carver S, Dallimer M, Ziv G. What shapes community
760 acceptance of large-scale solar farms? A case study of the UK's first 'nationally
761 significant'solar farm. *Solar Energy*. 2020;209:235–44.
- 762 18. de Fine Licht K, Håkansson M. Justice Under the Sun: Evaluating Procedural Justice in
763 Large-Scale Solar Park Development. *Sustainable Development* [Internet]. 2025 Jun 10
764 [cited 2025 Jun 26];n/a(n/a). Available from:
765 <https://onlinelibrary.wiley.com/doi/abs/10.1002/sd.3562>
- 766 19. van Boven F, van Vliet B, Bush S, Stremke S. Inclusive intent, instrumental outcomes:
767 how developer rationales shape participation in solar energy projects. *Energy Research
768 & Social Science* [Internet]. 2025 Jul 1 [cited 2025 May 12];125:104110. Available from:
769 <https://www.sciencedirect.com/science/article/pii/S2214629625001914>
- 770 20. Shyu CW. Energy justice-based community acceptance of local-level energy transition
771 to solar photovoltaic energy. *Energy Reports* [Internet]. 2025 Jun 1 [cited 2025 Jul
772 9];13:609–20. Available from:
773 <https://www.sciencedirect.com/science/article/pii/S2352484724008424>
- 774 21. Rielli LE, Campos I. The process matters: Exploring public participation in solar energy
775 projects in Brazil and Portugal. *Energy Research & Social Science* [Internet]. 2025 Jul 1
776 [cited 2025 Jul 9];125:104078. Available from:
777 <https://www.sciencedirect.com/science/article/pii/S2214629625001598>
- 778 22. Brás OR, Ferreira V, Carvalho A. People of the sun: Local resistance and solar energy
779 (in)justice in southern Portugal. *Energy Research & Social Science* [Internet]. 2024 Jul 1
780 [cited 2025 Jul 9];113:103529. Available from:
781 <https://www.sciencedirect.com/science/article/pii/S2214629624001208>
- 782 23. Barragan-Contreras SJ. Procedural injustices in large-scale solar energy: a case study in
783 the Mayan region of Yucatan, Mexico. *Journal of Environmental Policy & Planning*
784 [Internet]. 2022 Jul 4 [cited 2025 Jul 9];24(4):375–90. Available from:
785 <https://doi.org/10.1080/1523908X.2021.2000378>
- 786 24. Dolter BD, Boucher M. Solar energy justice: A case-study analysis of Saskatchewan,
787 Canada. *Applied Energy* [Internet]. 2018 Sep 1 [cited 2025 Jul 9];225:221–32. Available
788 from: <https://www.sciencedirect.com/science/article/pii/S0306261918306482>
- 789 25. Renn O. Participatory processes for designing environmental policies. *Land Use Policy*
790 [Internet]. 2006 Jan 1 [cited 2025 Apr 21];23(1):34–43. Available from:
791 <https://www.sciencedirect.com/science/article/pii/S0264837704000882>
- 792 26. Hoesch KW, Bessette DL, Bednar DJ. Locally charged: Energy justice outcomes of a
793 low-income community solar project in Michigan. *Energy Research & Social Science*

- 794 [Internet]. 2024 Jul 1 [cited 2024 May 9];113:103569. Available from:
795 <https://www.sciencedirect.com/science/article/pii/S2214629624001609>
- 796 27. Reicher, Norris B, Wilkinson J. Uncommon Dialogue | Large-Scale U.S. Solar
797 Development: Integrating Climate, Conservation and Community | Stanford Woods
798 Institute for the Environment [Internet]. Stanford Woods Institute; Solar Energy Industry
799 Association; The Nature Conservancy; 2023 [cited 2025 Apr 11]. Available from:
800 <https://woods.stanford.edu/research/solar-landconservation>
- 801 28. Susskind L, Chun J, Beron D, Chaudhuri A, Paul S. A university-based clinical approach
802 to renewable energy facility siting in the United States. Cell Reports Sustainability
803 [Internet]. 2024 Jan [cited 2024 Jan 30];1(1):100002. Available from:
804 <https://linkinghub.elsevier.com/retrieve/pii/S2949790623000022>
- 805 29. Bidwell D, Schweizer PJ. Public values and goals for public participation. Environmental
806 Policy and Governance [Internet]. 2021 [cited 2025 May 13];31(4):257–69. Available
807 from: <https://onlinelibrary.wiley.com/doi/abs/10.1002/eet.1913>
- 808 30. Graham L. State authority over siting renewable projects in place, for now [Internet].
809 Michigan Public. 2024 [cited 2025 Jul 9]. Available from:
810 [https://www.michiganpublic.org/environment-climate-change/2024-11-29/state-](https://www.michiganpublic.org/environment-climate-change/2024-11-29/state-authority-over-siting-renewable-projects-in-place-for-now)
811 [authority-over-siting-renewable-projects-in-place-for-now](https://www.michiganpublic.org/environment-climate-change/2024-11-29/state-authority-over-siting-renewable-projects-in-place-for-now)
- 812 31. House K. Group launches campaign to overturn Michigan solar siting law | Bridge
813 Michigan. Bridge [Internet]. 2024 Jan 4 [cited 2025 Apr 22]; Available from:
814 [https://www.bridgemi.com/michigan-environment-watch/group-launches-campaign-](https://www.bridgemi.com/michigan-environment-watch/group-launches-campaign-overturn-michigan-solar-siting-law)
815 [overturn-michigan-solar-siting-law](https://www.bridgemi.com/michigan-environment-watch/group-launches-campaign-overturn-michigan-solar-siting-law)
- 816 32. Advanced Energy United. State-level siting and permitting reform policy principles
817 [Internet]. 1801 Pennsylvania Avenue NW, Suite 410, Washington, DC 20006; 2024.
818 Available from: [https://advancedenergyunited.org/hubfs/2024%20Folders/2024%20-](https://advancedenergyunited.org/hubfs/2024%20Folders/2024%20-%20Fact%20Sheets/External%20State-Level%20Siting%20and%20Permitting%20Reform%20Policy%20Principles.pdf)
819 [%20Fact%20Sheets/External%20State-](https://advancedenergyunited.org/hubfs/2024%20Folders/2024%20-%20Fact%20Sheets/External%20State-Level%20Siting%20and%20Permitting%20Reform%20Policy%20Principles.pdf)
820 [Level%20Siting%20and%20Permitting%20Reform%20Policy%20Principles.pdf](https://advancedenergyunited.org/hubfs/2024%20Folders/2024%20-%20Fact%20Sheets/External%20State-Level%20Siting%20and%20Permitting%20Reform%20Policy%20Principles.pdf)
- 821 33. Evergreen Action. Fact vs. Fiction: Michigan Siting Bills will Boost Communities, Not
822 Burden Them [Internet]. 1250 Connecticut Ave NW Suite 700 Washington, DC 20036;
823 2023 Oct [cited 2025 Apr 22]. Available from:
824 [https://www.evergreenaction.com/press/fact-vs-fiction-michigan-siting-bills-will-](https://www.evergreenaction.com/press/fact-vs-fiction-michigan-siting-bills-will-boost-communities-not-burden-them)
825 [boost-communities-not-burden-them](https://www.evergreenaction.com/press/fact-vs-fiction-michigan-siting-bills-will-boost-communities-not-burden-them)
- 826 34. Evergreen Action. Warp Speed Clean Energy [Internet]. 1250 Connecticut Ave NW Suite
827 700 Washington, DC 20036; 2023 Dec. Available from:
828 [https://collaborative.evergreenaction.com/policy-hub/Warp-Speed-Clean-Energy-](https://collaborative.evergreenaction.com/policy-hub/Warp-Speed-Clean-Energy-December-2023.pdf)
829 [December-2023.pdf](https://collaborative.evergreenaction.com/policy-hub/Warp-Speed-Clean-Energy-December-2023.pdf)

- 830 35. French R. Mid-Michigan smacks down wind energy. Will it harm the state's green plan? |
831 Bridge Michigan. Bridge [Internet]. 2025 Apr 18 [cited 2025 Apr 22]; Available from:
832 [https://www.bridgemi.com/michigan-environment-watch/mid-michigan-smacks-](https://www.bridgemi.com/michigan-environment-watch/mid-michigan-smacks-down-wind-energy-will-it-harm-states-green-plan)
833 [down-wind-energy-will-it-harm-states-green-plan](https://www.bridgemi.com/michigan-environment-watch/mid-michigan-smacks-down-wind-energy-will-it-harm-states-green-plan)
- 834 36. McWhirter S. Who should decide where in Michigan to build large wind farms and solar
835 fields? mlive [Internet]. 2023 Oct 30 [cited 2025 Apr 22]; Available from:
836 [https://www.mlive.com/public-interest/2023/10/who-should-decide-where-in-](https://www.mlive.com/public-interest/2023/10/who-should-decide-where-in-michigan-to-build-large-wind-farms-and-solar-fields.html)
837 [michigan-to-build-large-wind-farms-and-solar-fields.html](https://www.mlive.com/public-interest/2023/10/who-should-decide-where-in-michigan-to-build-large-wind-farms-and-solar-fields.html)
- 838 37. Anderson SR, Johnson MF. The spatial and scalar politics of a just energy transition in
839 Illinois. Political Geography [Internet]. 2024 Jun 1 [cited 2025 Mar 11];112:103128.
840 Available from:
841 <https://www.sciencedirect.com/science/article/pii/S0962629824000775>
- 842 38. MTA. Renewable Energy Siting and Permitting [Internet]. Michigan Townships
843 Association; 2023 [cited 2025 Apr 11]. Available from:
844 <https://michigantownships.org/renewable-energy-siting-and-permitting/>
- 845 39. Hess DJ, Seo H, Belletto K. Strengthening local siting authority for utility-scale solar:
846 effects on regulatory decisions and public opposition. Climatic Change [Internet]. 2025
847 Mar 1 [cited 2025 Mar 4];178(3):1–21. Available from:
848 <https://link.springer.com/article/10.1007/s10584-025-03885-9>
- 849 40. Kowalski K. Rural Ohioans oppose solar farms, right? Not so, developer finds. Ohio
850 Capital Journal [Internet]. 2025 Feb 20 [cited 2025 Apr 22]; Available from:
851 [https://ohiocapitaljournal.com/2025/02/20/rural-ohioans-oppose-solar-farms-right-](https://ohiocapitaljournal.com/2025/02/20/rural-ohioans-oppose-solar-farms-right-not-so-developer-finds/)
852 [not-so-developer-finds/](https://ohiocapitaljournal.com/2025/02/20/rural-ohioans-oppose-solar-farms-right-not-so-developer-finds/)
- 853 41. Field P, Huggins M, Sperber B, Wilson D. EXPLORING WIND VERMILLION: A NOVEL
854 EXPERIMENT IN COMMUNITY ENGAGEMENT AND WIND ENERGY SITING. 2023.
- 855 42. Hecate Energy. Shepherd's Run Solar Farm [Internet]. 2025 [cited 2025 Apr 22].
856 Available from: <https://www.shepherdsrunsolar.com/>
- 857 43. Waters N, Pendered O. Community engagement good practice guidance for solar farms
858 [Internet]. BRE National Solar Centre; 2015. Available from:
859 [https://files.bregroup.com/bre-co-uk-file-library-copy/filelibrary/pdf/Brochures/BRE-](https://files.bregroup.com/bre-co-uk-file-library-copy/filelibrary/pdf/Brochures/BRE-NSC_Good-Practice-Guide.pdf)
860 [NSC_Good-Practice-Guide.pdf](https://files.bregroup.com/bre-co-uk-file-library-copy/filelibrary/pdf/Brochures/BRE-NSC_Good-Practice-Guide.pdf)
- 861 44. Renn O. Risk governance: coping with uncertainty in a complex world. Routledge; 2017.
- 862 45. Fiorino DJ. Citizen participation and environmental risk: A survey of institutional
863 mechanisms. Science, Technology, & Human Values. 1990;15(2):226–43.

- 864 46. Stirling A. Analysis, participation and power: justification and closure in participatory
865 multi-criteria analysis. *Land Use Policy* [Internet]. 2006 Jan 1 [cited 2025 May
866 13];23(1):95–107. Available from:
867 <https://www.sciencedirect.com/science/article/pii/S0264837704000948>
- 868 47. Crawford J, Bessette D, Mills SB. Rallying the anti-crowd: Organized opposition,
869 democratic deficit, and a potential social gap in large-scale solar energy. *Energy*
870 *Research & Social Science* [Internet]. 2022 Aug 1;90:102597. Available from:
871 <https://www.sciencedirect.com/science/article/pii/S2214629622001013>
- 872 48. Lai HL, Devine-Wright P, Hamilton J, Mander S, Clery D, Rattle I, et al. A Place-based,
873 Just Transition framework can guide industrial decarbonisation with a social licence.
874 *Energy Research & Social Science* [Internet]. 2025 Mar 1 [cited 2025 Feb
875 19];121:103967. Available from:
876 <https://www.sciencedirect.com/science/article/pii/S2214629625000489>
- 877 49. Barnett J, Burningham K, Walker G, Cass N. Imagined publics and engagement around
878 renewable energy technologies in the UK. *Public Underst Sci* [Internet]. 2012 Jan 1
879 [cited 2025 Jan 17];21(1):36–50. Available from:
880 <https://doi.org/10.1177/0963662510365663>
- 881 50. Stirling A. “Opening Up” and “Closing Down”: Power, Participation, and Pluralism in the
882 Social Appraisal of Technology. *Science, Technology, & Human Values* [Internet]. 2008
883 Mar 1 [cited 2025 May 12];33(2):262–94. Available from:
884 <https://doi.org/10.1177/0162243907311265>
- 885 51. Weise E. They hoped solar panels would secure the future of their farm. Then their
886 neighbors found out [Internet]. *USA TODAY*. [cited 2025 Jul 9]. Available from:
887 [https://www.usatoday.com/story/news/investigations/2024/02/04/solar-power-in-](https://www.usatoday.com/story/news/investigations/2024/02/04/solar-power-in-kansas/71920670007/)
888 [kansas/71920670007/](https://www.usatoday.com/story/news/investigations/2024/02/04/solar-power-in-kansas/71920670007/)
- 889 52. Kenneally W. Columbia County supervisor facing Tuesday recall vote says solar farm
890 concerns behind effort [Internet]. *Channel3000.com*. 2023 [cited 2025 Jul 9]. Available
891 from: [https://www.channel3000.com/news/columbia-county-supervisor-facing-](https://www.channel3000.com/news/columbia-county-supervisor-facing-tuesday-recall-vote-says-solar-farm-concerns-behind-effort/article_7ad8562a-1f81-11ee-b1e3-9fac7a8b38ff.html)
892 [tuesday-recall-vote-says-solar-farm-concerns-behind-effort/article_7ad8562a-1f81-](https://www.channel3000.com/news/columbia-county-supervisor-facing-tuesday-recall-vote-says-solar-farm-concerns-behind-effort/article_7ad8562a-1f81-11ee-b1e3-9fac7a8b38ff.html)
893 [11ee-b1e3-9fac7a8b38ff.html](https://www.channel3000.com/news/columbia-county-supervisor-facing-tuesday-recall-vote-says-solar-farm-concerns-behind-effort/article_7ad8562a-1f81-11ee-b1e3-9fac7a8b38ff.html)
- 894 53. Grover H. East Mountains residents rail against proposed Diamond Tail Solar [Internet].
895 *New Mexico Political Report*. 2024 [cited 2025 Jul 9]. Available from:
896 [https://nmpoliticalreport.com/2024/10/30/east-mountains-residents-rail-against-](https://nmpoliticalreport.com/2024/10/30/east-mountains-residents-rail-against-proposed-diamond-tail-solar/)
897 [proposed-diamond-tail-solar/](https://nmpoliticalreport.com/2024/10/30/east-mountains-residents-rail-against-proposed-diamond-tail-solar/)
- 898 54. Susskind L, Chun J, Gant A, Hodgkins C, Cohen J, Lohmar S. Sources of opposition to
899 renewable energy projects in the United States. *Energy Policy* [Internet]. 2022 Jun 1

900 [cited 2022 May 5];165:112922. Available from:
 901 <https://www.sciencedirect.com/science/article/pii/S0301421522001471>

902 55. Horowitz D, Borgess P, Conroy J, Bessette D. US Renewable Energy Organized
 903 Opposition & Support Database [Internet]. 2025. Available from:
 904 www.oppositiondb.com

905 56. Weise E, Suhail Bhat. Across America, clean energy plants are being banned faster than
 906 they're being built [Internet]. USA TODAY. 2024 [cited 2024 Oct 7]. Available from:
 907 [https://www.usatoday.com/story/news/investigations/2024/02/04/us-counties-ban-](https://www.usatoday.com/story/news/investigations/2024/02/04/us-counties-ban-renewable-energy-plants/71841063007/)
 908 [renewable-energy-plants/71841063007/](https://www.usatoday.com/story/news/investigations/2024/02/04/us-counties-ban-renewable-energy-plants/71841063007/)

909 57. Habermas J. Towards a theory of communicative competence. *Inquiry*. 1970;13(1–
 910 4):360–75.

911 58. Southwell BG, Brennen JSB, Paquin R, Boudewyns V, Zeng J. Defining and Measuring
 912 Scientific Misinformation. *The ANNALS of the American Academy of Political and Social*
 913 *Science* [Internet]. 2022 Mar 1 [cited 2025 Apr 23];700(1):98–111. Available from:
 914 <https://doi.org/10.1177/00027162221084709>

915 59. Fergen JT, Jacquet JB, Shukla R. ‘Doomscrolling’ in my backyard: Corrosive online
 916 communities and contested wind development in rural Ohio. *Energy Research & Social*
 917 *Science*. 2021;80:102224.

918 60. Webler T, Tuler S. Four Perspectives on Public Participation Process in Environmental
 919 Assessment and Decision Making: Combined Results from 10 Case Studies. *Policy*
 920 *Studies Journal* [Internet]. 2006 [cited 2025 May 13];34(4):699–722. Available from:
 921 <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1541-0072.2006.00198.x>

922 61. Rand J, Hoesch K, Nilson R, Hoen B, Mills S, Bessette D, et al. More Power to Them: U.S.
 923 Large-Scale Solar Neighbors’ Support for Additional Solar. *Front Sustain Energy Policy*
 924 [Internet]. 2025 Apr 9 [cited 2025 Apr 11];4. Available from:
 925 [https://www.frontiersin.orghttps://www.frontiersin.org/journals/sustainable-energy-](https://www.frontiersin.orghttps://www.frontiersin.org/journals/sustainable-energy-policy/articles/10.3389/fsuep.2025.1579170/abstract)
 926 [policy/articles/10.3389/fsuep.2025.1579170/abstract](https://www.frontiersin.orghttps://www.frontiersin.org/journals/sustainable-energy-policy/articles/10.3389/fsuep.2025.1579170/abstract)

927 62. Fujita KS, Ancona ZH, Kramer LA, Straka M, Gautreau TE, Garrity CP, et al. United States
 928 Large-Scale Solar Photovoltaic Database (USPVDB) [Internet]. U.S. Geological Survey
 929 and Lawrence Berkeley National Laboratory data release; 2024. Available from:
 930 <https://doi.org/10.5066/P9IA3TUS>

931 63. Rand J, Hoesch K, Mills SB, Hoen B, Nilson R, Bessette DL, et al. Perceptions of a large-
 932 scale solar project neighbors: Results from a national survey [Internet]. Lawrence
 933 Berkeley National Lab.(LBNL), Berkeley, CA (United States); 2024 Apr. (Community-
 934 Centered Solar Development (CCSD)). Available from:
 935 <https://escholarship.org/uc/item/18w742c6>

- 936 64. ICMA, APA. Solar@Scale [Internet]. International City/County Management
937 Association; American Planning Association; 2022 [cited 2025 Apr 1]. Available from:
938 <https://icma.org/page/solarscale-guidebook>
- 939 65. Bessette D, White J, Mills SB, Hoen B, Rand J, Nilson R, et al. SUPPORTING
940 COMMUNITY-CENTERED SOLAR DEVELOPMENT: A GUIDE TO HOSTING COMMUNITY
941 CONVERSATIONS ABOUT LARGE-SCALE SOLAR DEVELOPMENT. 2024 Dec; Available
942 from: [https://www.canr.msu.edu/resources/supporting-community-centered-solar-](https://www.canr.msu.edu/resources/supporting-community-centered-solar-development)
943 [development](https://www.canr.msu.edu/resources/supporting-community-centered-solar-development)
- 944 66. Larson E, Krannich R. “A Great Idea, Just Not Near Me!” Understanding Public Attitudes
945 About Renewable Energy Facilities. null [Internet]. 2016 Dec 1;29(12):1436–51.
946 Available from:
947 <https://www.tandfonline.com/doi/abs/10.1080/08941920.2016.1150536>
- 948 67. Walker G, Devine-Wright P, Hunter S, High H, Evans B. Trust and community: Exploring
949 the meanings, contexts and dynamics of community renewable energy. Energy Policy
950 [Internet]. 2010 Jun 1;38(6):2655–63. Available from:
951 <https://www.sciencedirect.com/science/article/pii/S0301421509003541>
- 952 68. Blanchard AL, McBride A. Putting the “Group” in Group Meetings: Entitativity in Face-to-
953 Face and Online Meetings. In: Managing Meetings in Organizations [Internet]. Emerald
954 Publishing Limited; 2020 [cited 2025 Apr 29]. p. 71–92. Available from:
955 [https://www.emerald.com/insight/content/doi/10.1108/s1534-](https://www.emerald.com/insight/content/doi/10.1108/s1534-085620200000020004/full/html)
956 [085620200000020004/full/html](https://www.emerald.com/insight/content/doi/10.1108/s1534-085620200000020004/full/html)
- 957 69. Karl KA, Peluchette JV, Aghakhani N. Virtual Work Meetings During the COVID-19
958 Pandemic: The Good, Bad, and Ugly. Small Group Research [Internet]. 2022 Jun 1 [cited
959 2025 May 1];53(3):343–65. Available from:
960 <https://doi.org/10.1177/10464964211015286>
- 961 70. Stefanoudis PV, Biancani LM, Cambronero-Solano S, Clark MR, Copley JT, Easton E, et
962 al. Moving conferences online: lessons learned from an international virtual meeting.
963 Proceedings of the Royal Society B: Biological Sciences [Internet]. 2021 Oct 20 [cited
964 2025 Apr 11];288(1961):20211769. Available from:
965 <https://royalsocietypublishing.org/doi/full/10.1098/rspb.2021.1769>
- 966 71. Cao H, Lee CJ, Iqbal S, Czerwinski M, Wong PN, Rintel S, et al. Large scale analysis of
967 multitasking behavior during remote meetings. In 2021. p. 1–13.
- 968 72. Doran AL, Dutch V, Warren B, Watson RA, Murphy K, Aldis A, et al. Planning virtual and
969 hybrid events: steps to improve inclusion and accessibility. Geoscience
970 Communication [Internet]. 2024 Oct 2 [cited 2025 Apr 29];7(4):227–44. Available from:
971 <https://gc.copernicus.org/articles/7/227/2024/>

- 972 73. Schulte-Römer N, Gesing F. Online, offline, hybrid: Methodological reflection on event
973 ethnography in (post-)pandemic times. *Qualitative Research* [Internet]. 2023 Dec 1
974 [cited 2025 Apr 29];23(6):1620–46. Available from:
975 <https://doi.org/10.1177/14687941221110172>
- 976 74. Lucrece K. ‘It would be very detrimental’: Neighbors pack hearing on Lancaster County
977 solar farm. *KLKN-TV* [Internet]. 2025 Jan 15 [cited 2025 May 1]; Available from:
978 [https://www.klknv.com/it-would-be-very-detrimental-neighbors-pack-hearing-on-](https://www.klknv.com/it-would-be-very-detrimental-neighbors-pack-hearing-on-lancaster-county-solar-farm/)
979 [lancaster-county-solar-farm/](https://www.klknv.com/it-would-be-very-detrimental-neighbors-pack-hearing-on-lancaster-county-solar-farm/)
- 980 75. Smith J. Fort Gratiot solar meeting adjourned amid difficulty accommodating massive
981 crowd. *Port Huron Times Herald* [Internet]. 2023 Oct 22 [cited 2025 Apr 11]; Available
982 from: [https://www.thetimesherald.com/story/news/2023/10/11/fort-gratiot-solar-](https://www.thetimesherald.com/story/news/2023/10/11/fort-gratiot-solar-meeting-adjourned-amid-difficulty-accommodating-massive-crowd/71140362007/)
983 [meeting-adjourned-amid-difficulty-accommodating-massive-crowd/71140362007/](https://www.thetimesherald.com/story/news/2023/10/11/fort-gratiot-solar-meeting-adjourned-amid-difficulty-accommodating-massive-crowd/71140362007/)
- 984 76. Melendez L. ‘Go somewhere else’: Yutan residents grow frustrated with solar farm
985 developers [Internet]. <https://www.wowt.com>. 2021 [cited 2025 May 1]. Available from:
986 [https://www.wowt.com/2021/04/01/go-somewhere-else-yutan-residents-grow-](https://www.wowt.com/2021/04/01/go-somewhere-else-yutan-residents-grow-frustrated-with-solar-farm-developers/)
987 [frustrated-with-solar-farm-developers/](https://www.wowt.com/2021/04/01/go-somewhere-else-yutan-residents-grow-frustrated-with-solar-farm-developers/)
- 988 77. Walker BJA, Russel D, Kurz T. Community Benefits or Community Bribes? An
989 Experimental Analysis of Strategies for Managing Community Perceptions of Bribery
990 Surrounding the Siting of Renewable Energy Projects. *Environment and Behavior*
991 [Internet]. 2017 Jan 1 [cited 2021 Jul 6];49(1):59–83. Available from:
992 <https://doi.org/10.1177/0013916515605562>
- 993 78. Schelly C, Prehoda E, Price J, Delach A, Thapaliya R. Ratepayer Perspectives on Mid- to
994 Large-Scale Solar Development on Long Island, NY: Lessons for Reducing Siting
995 Conflict through Supported Development Types. *Energies* [Internet]. 2020 Jan [cited
996 2025 Mar 28];13(21):5628. Available from: [https://www.mdpi.com/1996-](https://www.mdpi.com/1996-1073/13/21/5628)
997 [1073/13/21/5628](https://www.mdpi.com/1996-1073/13/21/5628)
- 998 79. Gregory R, Failing L, Harstone M, Long G, McDaniels T, Ohlson D. Structured decision
999 making: a practical guide to environmental management choices. John Wiley & Sons;
1000 2012.
- 1001 80. Guerrero AM, Shoo L, Iacona G, Standish RJ, Catterall CP, Rumpff L, et al. Using
1002 structured decision-making to set restoration objectives when multiple values and
1003 preferences exist. *Restoration Ecology* [Internet]. 2017 [cited 2021 Nov 15];25(6):858–
1004 65. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/rec.12591>
- 1005 81. van Poorten B, Beck M. Getting to a decision: using structured decision-making to gain
1006 consensus on approaches to invasive species control. *Management of Biological*
1007 *Invasions*. 2021;12(1):25.

- 1008 82. Boudet HS. Public perceptions of and responses to new energy technologies. *Nat*
1009 *Energy* [Internet]. 2019 Jun [cited 2021 Jul 8];4(6):446–55. Available from:
1010 <https://www.nature.com/articles/s41560-019-0399-x>
- 1011 83. Clinton County. Advisory Committee – Utility Scale Solar and Wind Zoning Regulations |
1012 Clinton County, MI [Internet]. 2023 [cited 2025 Mar 28]. Available from:
1013 <https://www.clinton-county.org/932/Advisory-Committee-Utility-Scale-Solar-a>
- 1014 84. Nilson R, Stedman R. Reacting to the Rural Burden: Understanding Opposition to
1015 Utility-Scale Solar Development in Upstate New York. *Rural Sociology* [Internet]. [cited
1016 2023 Mar 19];n/a(n/a). Available from:
1017 <https://onlinelibrary.wiley.com/doi/abs/10.1111/ruso.12486>
- 1018 85. Dudo A, Besley JC, Yuan S. Science Communication Training in North America:
1019 Preparing Whom to Do What With What Effect? *Science Communication* [Internet].
1020 2021 Feb 1 [cited 2024 Apr 1];43(1):33–63. Available from:
1021 <https://doi.org/10.1177/1075547020960138>
- 1022 86. Hovland CI, Janis IL, Kelley HH. *Communication and persuasion*. 1953;
- 1023 87. Sparkman G, Attari SZ. Credibility, communication, and climate change: How lifestyle
1024 inconsistency and do-gooder derogation impact decarbonization advocacy. *Energy*
1025 *Research & Social Science* [Internet]. 2020 Jan 1 [cited 2025 Apr 11];59:101290.
1026 Available from:
1027 <https://www.sciencedirect.com/science/article/pii/S2214629619302440>
- 1028 88. Howe PD, Mildenberger M, Marlon JR, Leiserowitz A. Geographic variation in opinions
1029 on climate change at state and local scales in the USA. *Nature Clim Change* [Internet].
1030 2015 Jun [cited 2025 Apr 11];5(6):596–603. Available from:
1031 <https://www.nature.com/articles/nclimate2583>
- 1032 89. Tenbrink T, Willcock S. Place attachment and perception of climate change as a threat
1033 in rural and urban areas. *PLOS ONE* [Internet]. 2023 Sep 6 [cited 2025 Apr
1034 11];18(9):e0290354. Available from:
1035 <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0290354>
- 1036 90. Keeney RL, Keeney RL. *Value-focused thinking: A path to creative decisionmaking*.
1037 Harvard University Press; 2009.
- 1038 91. Druckman JN, McGrath MC. The evidence for motivated reasoning in climate change
1039 preference formation. *Nature Clim Change* [Internet]. 2019 Feb [cited 2025 Apr
1040 11];9(2):111–9. Available from: <https://www.nature.com/articles/s41558-018-0360-1>
- 1041 92. Kunda Z. The case for motivated reasoning. *Psychological bulletin*. 1990;108(3):480.

- 1042 93. CCE. About Cornell Cooperative Extension (CCE) [Internet]. 2025 [cited 2025 Apr 10].
1043 Available from: [https://cals.cornell.edu/cornell-cooperative-extension/about-cornell-](https://cals.cornell.edu/cornell-cooperative-extension/about-cornell-cooperative-extension)
1044 [cooperative-extension](https://cals.cornell.edu/cornell-cooperative-extension/about-cornell-cooperative-extension)
- 1045 94. Allnut B. Who's behind a ballot initiative to repeal Michigan's renewable.... Canary
1046 Media [Internet]. 2024 Feb 13 [cited 2025 Apr 11]; Available from:
1047 [https://www.canarymedia.com/articles/enn/whos-behind-a-ballot-initiative-to-repeal-](https://www.canarymedia.com/articles/enn/whos-behind-a-ballot-initiative-to-repeal-michigans-renewable-energy-siting-laws)
1048 [michigans-renewable-energy-siting-laws](https://www.canarymedia.com/articles/enn/whos-behind-a-ballot-initiative-to-repeal-michigans-renewable-energy-siting-laws)
- 1049 95. Goldenberg S. Conservative thinktanks step up attacks against Obama's clean energy
1050 strategy. The Guardian [Internet]. 2012 May 8 [cited 2023 Jan 6]; Available from:
1051 [https://www.theguardian.com/environment/2012/may/08/conservative-thinktanks-](https://www.theguardian.com/environment/2012/may/08/conservative-thinktanks-obama-energy-plans)
1052 [obama-energy-plans](https://www.theguardian.com/environment/2012/may/08/conservative-thinktanks-obama-energy-plans)
- 1053 96. NCI. National Charette Institute [Internet]. East Lansing, MI: Michigan State University
1054 School of Planning, Design, and Construction; 2025 [cited 2025 May 1]. Available from:
1055 <https://www.canr.msu.edu/nci/about>
- 1056