Mobilizing to Support Large-Scale Solar and Storage

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Abstract

Nearly one year since the Inflation Reduction Act supercharged the transformation to clean energy for the U.S., progress in one sector has noticeably lagged: large-scale renewable energy generation and storage. Interest rates and transmission access are partly to blame, but so is the intensity of public opposition to many of these projects. This paper summarizes existing and original research on the roots of this opposition, on their interconnected campaigns and on the role that disinformation plays. It offers an assessment of responses from local or state agencies and from nascent groups of citizens that are beginning to challenge their arguments. It explores an original proposal, drawing on resources of the American Solar Energy Society to create a framework for plain-talk, fact-based outreach, negotiation of community benefits and advocacy to meet solar deployment goals. Considerations for adoption of this proposal and of alternative solutions are included.

Keywords: siting, permitting, disinformation, delays, large-scale solar, utility-scale solar, battery storage, ASES, advocacy, mobilizing

Introduction: A Need for Outreach and Advocacy

The U.S. Department of Energy (U.S. DOE) goal to achieve 100% decarbonized electricity is unprecedented in its scale and speed. Driven by climate imperatives and supported by the Inflation Reduction Act (IRA), the electricity sector has been challenged to deliver about two terawatts of solar and wind generation by 2035, deploying at a rate that varies by scenario up to eight times faster than at the beginning of this decade, according to the National Renewable Energy Laboratory (NREL) Energy Futures Study (Denholm et al., 2022). According to NREL, an accompanying need for two- to 12-hour energy storage will require even faster growth in deployments than for solar and wind generation.

An assessment of first-year progress towards IRA decarbonization goals showed that progress lags in the deployment of large-scale renewables and storage (Clean Investment in 2023, 2024). Interest rates and transmission access are largely to blame, but so is the intensity of public opposition to many large wind or solar generation and battery projects. A recent survey of developers, led by Berkeley Lab, confirmed that opposition to large-scale solar is "more frequent and more expensive to address than it was five years ago" (Robi et al., 2024). The same study found that permitting challenges and community opposition closely followed grid-interconnection constraints as the top three reasons for large-scale solar- project cancellations.

The early response to rising public opposition to large-scale renewables has included increasing legal and regulatory authority at the federal and state level. Legislation in 13 states takes varying degrees of authority for siting away from local agencies and places it at the state level (Cappelletti & Hanna, 2024). This helps where state governments currently support a clean energy transition, but it poses risks if state or federal policy support shifts against that transition.

Our research on consequences and remedies to local project opposition began with frontline work to understand and address opposition to conditional-use zoning for a 100-MW solar project with a 48-MW (4-hour) battery system, proposed by AES Corp. for a private site near Santa Fe, NM.

In 2023, Cliburn and Associates assessed public comments on that proposal, using artificial intelligence (AI) to spot themes, strategies or likely sources of factual as well as false statements (Cliburn & Adams, 2023). We have continued to document the Santa Fe case study, increasingly motivated to quell disinformation and public opposition that has spilled from the country zoning board into the broader local and state policy landscape. We also have broadened our scope to include a literature review and interviews with local and state agency staff, social science researchers, and citizen-advocates who are working to resolve siting challenges. Some of that research is summarized in the Spring 2024 issue of *Solar Today* in the article "It's Time to Stand up for Solar" (Cliburn, 2024).

As detailed below, we find that while an academic understanding of this opposition contributes to remedial strategies, their successful execution relies on support from citizens on the ground. Prevailing distrust in experts, misrepresentation of risks, and social media's immediacy are hard to overcome. Conventional expertise cannot win public support for the clean energy buildout unless it is supported by local envoys. Our proposed solution, building on existing ASES member networks and programs, offers one strong option to deliver on these needs.

Research Basis for the Proposed Solution

From General Permitting Guidance to Opposition Research

The study of opposition to large-scale renewable energy projects is a relatively recent field of research. In 2022, when we began citizen advocacy in relation to a proposed solar and storage project near Santa Fe, NM, one source of information that was often recommended was *Solar@Scale: A Local Government Guidebook for Improving Large-Scale Solar Development Outcomes* (Solar@Scale, 2022). This still-popular guidebook includes many references, but little discussion of local opposition as a source of project delays and cancellations. This is evidenced by only a handful of returns on searches in text and references in the guidebook for terms such as *opposition, protest,* or *deny*. Further, it did not anticipate the prevalence of battery storage and associated controversies.

Research teams at institutions such as the University of Michigan, Columbia University, Massachusetts Institute of Technology, University of Minnesota, and Yale University have begun to investigate where assumptions of public support have gone wrong. For example, the paper "Sources of opposition to renewable energy projects in the United States" assessed 53 large-scale renewable energy projects dating back to 2008 and derived seven major sources of opposition (Susskind et al., 2022).

More recent survey-based research (summarized in Figure 1) identifies 14 sources of opposition to large-scale solar and wind, though it can be noted that the veracity of specific complaints was not explored (Nilson et al., 2024).

Good fences make good neighbors: Stakeholder perspectives on the local benefits and burdens of large-scale solar energy development in the United States draws on more than 50 interviews of those living near solar energy developments to examine trends in their concerns, satisfaction with outcomes and advice for improving processes (Bessett et al 2024).

Another effort looked at how information about proposed projects emerged and moved via media and informal channels through stakeholder communities (Michaud & Hao, 2023).

Our own research used online tools, including ChatGPT, to track opposition concerns and map them in relation to project sites, neighborhood characteristics, and specific language used by opposition leaders. Among other findings, we found a strong correlation between disinformation in public comments and specific language offered on opposition websites and in fliers circulated in specific neighborhoods (Cliburn & Adams, 2023).

Across recent research, there is confirmation of the power of disinformation from unconventional sources, ranging from online chats to unsourced video clips posted on social media. The survey of project developers and related professionals cited above indicates that the average cost to a developer of a delay in large-scale solar deployment, often driven by public concerns, is about \$200,000 per megawatt (MW) (Robi et al. 2024).

Industry associations have begun to respond, forming and sponsoring conferences to discuss research and possible solutions. These are led by American Clean Power (ACP) association and institutions such as the Electric Power Research Institute and the U.S. DOE, including Sandia National Laboratories and Berkeley Lab among others. Enterprises, such as the storage division of DNV GL and Wood Mackenzie, as well as some nonprofit organizations, recently began to promote research-based solutions that incorporate public engagement.

Fig. 1. Common concerns reported by 123 survey respondents from about 60 companies engaged in large-scale U.S. solar or wind development. The frequency of a reported concern does not indicate its veracity, but the repetition of concerns can affect public acceptance. (Berkeley, 2024)



Common Concerns Reported by Large-Scale Project Developers

Applied Research for Better Policies, Outreach, and Public Processes

Some efforts to address permitting and siting outcomes focus on applying research to improve policy, processes, and outreach. One nexus for this work is the U.S. Department of Energy Renewable Energy Siting Through Technical Engagement Program, or R-STEP (Office of Energy Efficiency and Renewable Energy, 2024). This program funds research, technical assistance, and state-based collaboratives. Collaboratives involve state, industry, and local partners, following models first introduced in leading states such as New York and Minnesota. For example, the Clean Energy Resource Teams (CERTs) program in Minnesota involves the state energy office and the historically trusted University of Minnesota Extension among other partners. The CERTs mission is to provide education and tools to local communities to support a swift and equitable energy transition. Much of its work is focused on building stakeholder trust (M. Birch, personal communication, January 25, 2024).

The first round of R-STEP awards, announced in April 2024, have funded programs in Indiana, Iowa, Michigan, Mississippi, North Carolina, South Carolina, and Wisconsin. Each state will emphasize a different set of partners, resources, and information channels, but the focus on fact-based outreach and trust-building is a throughline.

Disinformation Messaging and Messengers

Those who have been on the frontline of local solar and storage development controversies recognize the impact of disinformation. The author has tracked a currently delayed conditional-use zoning process for a project near Santa Fe, New Mexico. Through this effort, we documented misinformation and disinformation about the Santa Fe County project, including in formal and informal comments and — as our research expanded — in reviewing opposition information networks nationwide. We focused on content and processes, avoiding most judgments of credentials. These are fraught, since our society values "out of the box" thinkers and must credit activists from typically excluded classes for many far-reaching societal contributions.

Nevertheless, solar opposition websites typically misapply information from their sources and favor charged language about "industrial solar" from "corporate energy developers" who plan to sell their generation to utilities that will send it (disregarding laws of physics) to cities far away. They often feature dramatic, unsourced photos (e.g., abandoned PV panels and battery fires). Their websites bear confusing names, such as Citizens for Responsible Solar and the Clean Energy Coalition for Santa Fe County.

There are relatively few grassroots organizations or voluntary efforts that focus on building informed grassroots advocacy to counter the opposition. The New York-based United Solar Energy Supporters (USES) provides one example. USES board members and advisors come from solar technical fields, local planning and permitting, project development and communications backgrounds to assist frontline, non-expert volunteers (Cliburn, 2024). By encouraging neighbor-to-neighbor outreach, USES has built public trust and contributed to project approvals. (Scanlon, personal communication, January 5, 2024).

Recognizing the extent of the need for informed advocacy, a nonprofit called Greenlight America recently emerged as "an independent, philanthropically funded nonprofit to support local groups and volunteers who want to get utility-scale clean energy projects built in their communities." Founders of Greenlight America have political campaign experience. Their expertise and access to industry, labor, and political networks are strong, but at this time they are offset by minimal evidence of an authentic local presence (Greenlight America, n.d.).

The playbook for quelling disinformation and encouraging public engagement has been evolving over decades. The study of research-based behavioral strategies for clean energy adoption that could be used alongside or instead of economic incentives was institutionalized in 2007 with the advent of a biannual Behavior, Energy and Climate Change Conference. This conference is co-sponsored by the American Council for an

Energy-Efficient Economy and programs at Stanford University and the University of California at Berkeley. Archived proceedings sometimes refer to the importance of choosing the right messengers and information channels, as potentially greater than the importance of crafting the right message. Rebuttals to energy disinformation, such as one recent resource from the Sabin Center may not be effective unless strategically delivered (Eisenson et al., 2024). Broad explorations of disinformation techniques, such as the winner of the 2024 Harvard Goldsmith Book Prize, *Foolproof: Why Misinformation Infects Our Minds and How to Build Immunity*, may be helpful in developing any strategic solar advocacy plan (Van der Linden, 2023).

Research Takeaways That Inform This Proposal

The success of opposition campaigns depends on vulnerable information gaps, misperception of risks, and genuine uneasiness about the pace of change in our technologies and our landscapes. Opposition thrives in an atmosphere of ignorance regarding both the electric grid and the scale of investment needed to transform the energy system. Distrust of utilities, big tech, science, and government or corporate power is a common theme that drives solar and storage disinformation. Calls for delay until "the facts are better known" or for alternative solutions are common.

Expertise is increasing in many fields that can support large-scale solar and storage siting, such as process management, training for planning and zoning officials, and policy development at every level. Yet we are focused on one key gap: the need to identify authentic, local messengers and resources they can use. Efforts to fill this gap are complemented by best practices, such as:

- Offering proactive outreach about utility-scale battery technology. The public needs early dialog about the need for battery storage and its performance. This includes understanding the role of field testing and continuous improvement, instead of assuming that lab-perfected solutions can be deployed at some future date.
- Sharing success stories through social media, testimonials, and public tours. Those who oppose large-scale projects often circulate outdated or out-ofcontext information. Timely, relevant examples are needed.
- *Facilitating community dialog.* This may require finding reasonably neutral cosponsors, outside the official permitting processes. Public distrust may extend to local agency staff, officials, or anyone who could profit economically in any way.
- Promoting negotiation of community benefits agreements, relatively early in the siting process can be a game-changer. Many solar advocates and local officials do not know about these tools, which may improve outcomes and build local wealth (Eisenson & Webb, 2023).

• Familiarizing solar advocates with local and state agencies and processes. This includes encouraging process leaders to involve fire safety and infrastructure officials early and to provide resources to them.

ASES: A Model for Mobilizing Effective Citizen Advocacy

A review of needs and best practices for speeding successful deployment of large-scale solar and storage, as described in this paper, suggests that ASES could play a powerful role. Twenty thousand ASES members nationwide can provide location-specific presence and a core group of potential advocates. ASES membership includes longtime leaders in renewable energy-technology development and deployment, as well as in design, social science research, and policy. About 40 local and student chapters across the U.S. already exist. Membership includes thousands who have used ASES's relationship with the Clean Energy Credit Union to invest in clean energy for their homes and vehicles. All members regularly receive information from ASES, and many participate in at least some of the organization's educational online dialogs, technical divisions, webinars, tours, conferences, and media.

Taken together, ASES members could be described as neighbors; they share the pain of accepting the changes in their communities to achieve a clean energy transition. They often reside in or near communities where large-scale renewable energy developments could change landscapes and economies. Through their involvement in ASES programs, many are primed to support strong community-benefit strategies, while rejecting outright disinformation and injustice. The ASES vision for "a world equitably and sustainably transformed to 100% renewable energy" is generally known across the membership, and the climate's non-negotiable timeline is understood.

Table 1 summarizes three key aspects of a proposal to mobilize ASES membership to help achieve large-scale solar and storage deployment goals. The effort involves establishing partnerships among ASES Solar Envoys and some of the most trusted sources of relevant, research-based technical and policy solutions. Many of these partnerships already exist, for example, through the involvement of scientists in ASES technical divisions, conferences, and publications. These kinds of partnerships are exemplified in the discussion above regarding how USES functions (USES members include members of ASES). Other targeted partnerships include developing ties with the U.S. DOE R-STEP state collaboratives, as well as with like-minded nonprofits.

Most of the ASES resources summarized in Table 1 already exist. For example, the ASES National Solar Tour is a long-time success story. It was expanded and improved in recent years with the option to host tours of community-scale solar projects and to include site videos. The tour is an opportunity to bring the public into contact with large-scale solar success stories and to answer their questions in specific terms.

The addition of a siting resource archive would be one new aspect of the proposed resource package. ASES has ready access to many resources for this archive through its divisions and conferences and through partnerships, as discussed above.

Hypothetical Mobilization of ASES Membership	
to Help Achieve Solar Deployment Goals	
This proposal for mobilizing membership of the American Solar Energy Society (ASES) is currently hypothetical; yet it exemplifies how strategies to quell misinformation and opposition to large-scale solar and storage could be applied.	
Partnerships	 ASES Solar Envoys who are volunteers from among the ASES state and student chapters and the 20K+ at-large members. Semi-autonomous in-state groups bring more partners.
	 DOE Renewable Energy Siting Through Technical Engagement in Planning (R-STEP) program and state grant recipients, including state agencies and nonprofits.
	 Formal or informal relationships with NREL, Sandia, PPNL, Berkeley Lab, universities and broad-based research centers.
	Professional planning associations, associations of counties, etc.
	 Solar and storage companies, associations and foundations.
Resources	 ASES Technical Divisions that assist with factual research, strategy and a Solar Envoy training program.
	 ASES communications, including Solar Today magazine, Solar@work social media, and the National Solar Conference.
	 The ASES National Solar Tour, which may showcase community and large-scale solar and storage projects, as well as homes.
	 A new ASES web page that could support curated resources and links to active campaigns and partner resources.
Training, Networking & Evaluation	 A Solar Envoy training that would cover topics from grid basics to media literacy, including understanding risk perception, busting solar and storage myths, and community benefit agreements. Technical Divisions and various partners would assist.
	 ASES communications resources could support peer networking and further their replication.
	 A "wiki" do-it-yourself database could track successes and setbacks. If funding is secured, the program would set goals for replicating process and policy improvements and would pursue annual evaluation and planning.

Table 1. Summary of a proposal for development of a Solar Envoy program option.

Relevant training and informal certification might be valuable for the many ASES members who — like most Americans — have knowledge gaps and misperceptions about the topics that swirl at the center of siting controversies. It is fair to assume that many ASES members would initially oppose large-scale solar development. Large-scale solar does not exemplify the self-sufficiency that many ASES members value; it is, however, a practical necessity for meeting critical climate goals.

ASES training topics might include grid basics, media literacy, understanding risk perception, busting common solar and storage myths, options for community benefit agreements, and local agency process improvements. ASES technical divisions offer expertise that could assist in implementing this training. Training could be offered for a fee to non-members. Network development could motivate "graduating" Solar Envoys to initiate action. A few environmental non-profits, such as Climate Reality Project and Environmental Defense Fund offer examples of how the preparation and support of local envoys could work.

It is beyond the scope of this paper to suggest a budget and funding pathway for this proposed solution. Because the proposal builds on many of ASES's existing strengths and resources, the budget could be relatively modest. We can think of no other organization that is so prepared for this effort. It has focused on solar energy and related technologies as key to the climate solution, and it has a unique diversity of expert and citizen-science members. There may be opportunities for federal funding or to join various collaborative programs. Private foundations and donors are likely to support the plan. There is also an opportunity for partial, no-cost implementation. For example, expanding the vision for the National Solar Tour could be an option presented to ASES chapters. Interest groups and organizations, such as the Solar and Storage Industries Institute, may be willing to work with ASES chapters to help showcase large projects. It is not advisable for industry to dominate this effort, but it may offer support.

The review of research on improving outreach and siting processes for large-scale solar and storage has led us to suggest this effort, centered at ASES, as a strong response to an urgent need. The timeline for deploying clean energy is inescapable. So is the importance of public engagement to ensure broad-based equity and support energy democracy in this far-reaching energy transition.

Conflict of Interest

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