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ELECTRICITY MARKETS & POLICY

Stakeholder perspectives on the local benefits and burdens of large-scale solar energy development in the United States

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Webinar Structure

1. **CCSD Project Background**
2. **Introduction to Case Study Analysis**
   - **Site Criteria & Selection**
   - **Interview Protocol & Methods**
   - **Interview Analysis**
3. **Results by Research Question**
   1. What are residents' most common concerns regarding LSS systems across states, site types, landscapes and ownership structures?
   2. What strategies have developers and officials employed, or could employ, to improve perceptions and project outcomes and better align LSS development with local land-use plans, community needs and values?
4. **Conclusions**

CCSD Project Background

Background

- To meet the current administration's decarbonization and energy equity goals, roughly 30 - 60 gigawatts (GW) of solar capacity would need to be installed in the United States (US) every year between now and 2035.
- Most of this capacity is expected to be in the form of large-scale solar (LSS), or individual projects generating over 1 megawatt $(MW)_{dc}$.
- Rapid expansion of LSS in the US relies both on officials at the local or state level providing appropriate land use permits, and residents being willing to host these systems.
- Research has demonstrated that residents and officials' support for proposed LSS projects can be lower than national opinion polls would suggest.
- LSS project development and outcomes may be improved by centering communities' values, priorities and concerns. *But how can this be done most effectively?*

CCSD Project Detail: 6 Tasks

The case study interviews described herein represent the first task in a series of 6 tasks, which make up a comprehensive and interdisciplinary mixed-methods research project intended to facilitate "Community Centered Solar Development," or CCSD.

1. **Case Study Analysis:** Analyze 7 existing Large-Scale Solar (LSS) projects by executing interviews to uncover key factors that led to project success or threatened failure.
2. **National LSS Neighbor Survey:** Conduct a national random survey of at least 1,000 LSS project neighbors, oversampling among site types, to reexamine case-study findings at a broader empirical scale.
3. **Tax, Income, and/or Employment Impacts of LSS**: Conduct nation-wide analysis of LSS impacts on local tax, local individual- and firm-level income or employment, baseline average economic impact.
4. **LSS Geospatial Categorization:** Conduct geographic categorization of all existing U.S. LSS sites ≥1 MW_{DC}, as well as analyses of land-use and capacity trends to better understand future LSS development potential.
5. **Community-Based Solutions & Visioning:** Engage in planning with six potential LSS host communities to utilize information from the previous tasks to develop community-centered and audience-specific plans for prospective LSS developments.
6. **Engage Stakeholders and Disseminate Research Outputs**: Establish a technical advisory committee and conduct project level outreach and dissemination on all project deliverables.

Project Team

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University of Minnesota Extension

Cypress Creek Renewables

CCSD Task 1: Case Study Analysis

Why Conduct Case Studies?

Qualitative case studies are crucial for examining complexity, uniqueness, and causal relationships!

- A case study is a comprehensive, typically qualitative, *description* of a particular case, its complexity and uniqueness, and analysis (Simons, 2009; Starman, 2013).
- Case studies are uniquely adept at capturing the *subjective* experience of individuals and identifying variables, structures, and orders of interaction between participants (Mesec, 1998).
- Case studies are regularly used to refine concepts, derive hypotheses, and explore causal relations (Starman, 2013)—work that is difficult to accomplish via quantitative research methods.

Mesec, B. (1998). Uvod v kvalitativno raziskovanje v socialnem delu. Ljubljana: Visoka šola za socialno delo.
Simons, H. (2009). Case study research in practice. London: SAGE.
Starman, A. B. (2013). The case study as a type of qualitative research. *Journal of Contemporary Educational Studies/Sodobna Pedagogika*, *64*(1).

Case Study Analysis Research Questions

Answers to the research questions below are intended to inform subsequent tasks in the CCSD research project and facilitate CCSD more broadly.

(RQ1) What are residents' most common concerns regarding LSS systems across states, site types, landscapes and ownership structures?

(RQ 2) What strategies have developers and officials employed, or could employ, to improve perceptions and project outcomes and better align LSS development with local land-use plans, community needs and values?

What Sites to Include?

To ensure a diverse sample of case study sites and participant perspectives, we developed a list of factors describing different LSS sites, prioritizing certain "Key Factors" and "Ideally Differentiated Factors."

Key Factors	
Unique Site Types	Greenfield Agrivoltaic Superfund Previously contaminated land ("brownfield")
Unique Ownership Structures	Utility (Investor-owned, Public Power, Municipal) Developer/Independent Power Producer (IPP) Community (Owned or Subscriber-model)
Variety of Zoning Levels	Local State Hybrid (depends on capacity)
Recent Completion Date	Post-2020 or In construction
Variety of Project Sizes	Small (<10 MW) Large (> 10 MW)
Unique Topography & Geography	Distribution across US (West, Southwest, Midwest, Southeast, Northeast)
Environmental Justice Communities <1 mile	Yes No

Ideally Differentiated Factors	
Variety of Project Attributes	Setbacks Buffers Heights Visibility
Unique Policies in Effect	State Laws & Regulations (Carbon electricity target) Utility decarbonization targets/policies
Variety of Processes & Designs	No. and type of meetings Ordinance development Utilization of non-traditional designs/methods
Multiple Experiences	Non-participating landowners Participating landowners Local Officials Developers Public Power/Municipal Utility personnel Underrepresented minority groups/organizations Media

What Sites to Include?

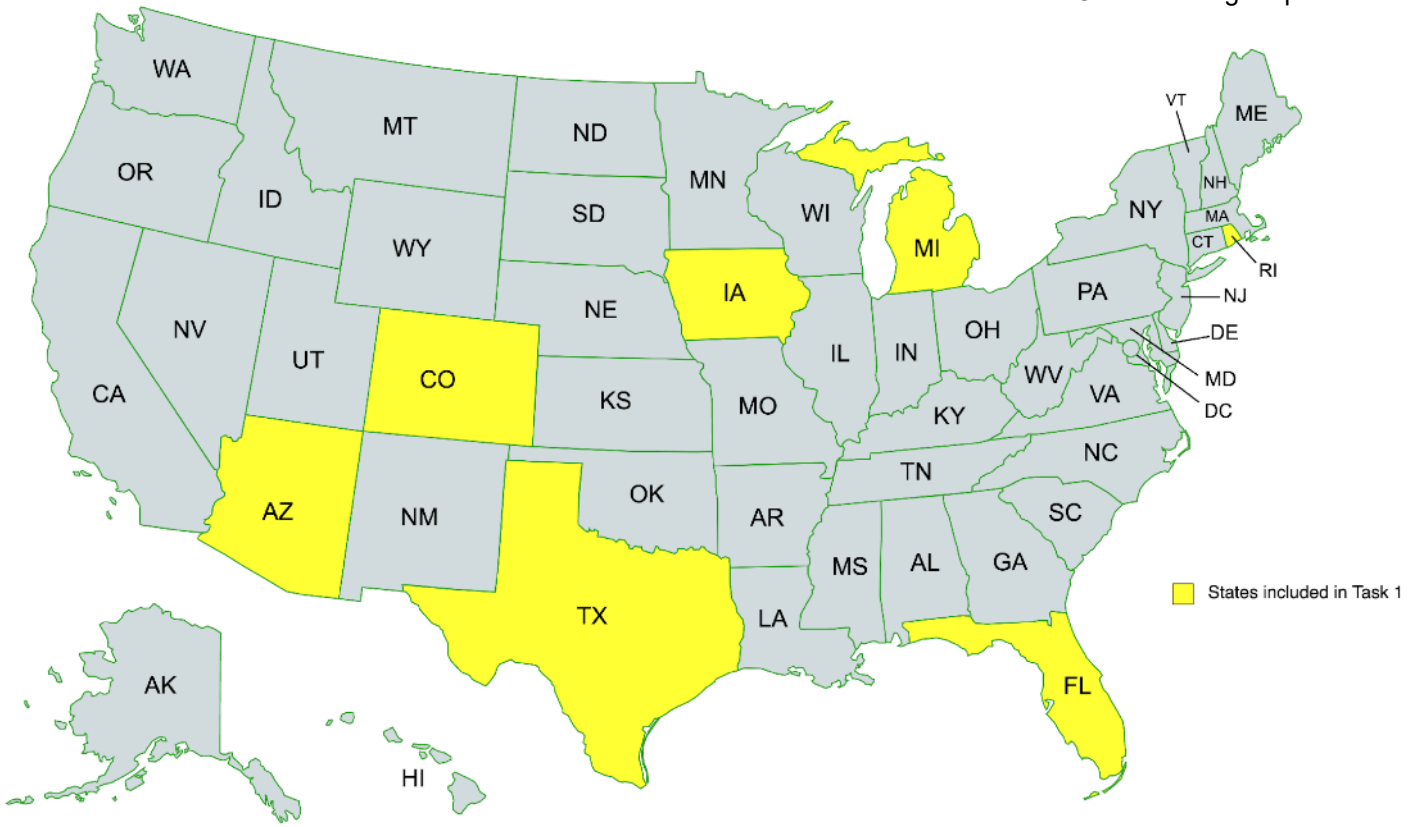
- Elicited site suggestions from subject matter experts
- Performed media keyword searches using site selection criteria
- Reviewed existing datasets and relevant GIS mapping tools, including:
  - inSPIRE Agrivoltaics Map
  - CEQ Climate and Economic Justice Screening Tool
  - RePowering Mapper 2.0 (now 3.0)
  - ArcGIS EIA Large-scale PV Solar Sites
  - EIA-860 data
- Reviewed over 125 individual sites for potential inclusion
- Fifteen sites were selected for discussion among our team members and Technical Advisory Committee, with 7 ultimately selected as case study sites.

Climate and Economic Justice Screening Tool

Created using mapchart.net

7 Sites Selected

Identifying site data is being withheld to protect participant confidentiality.

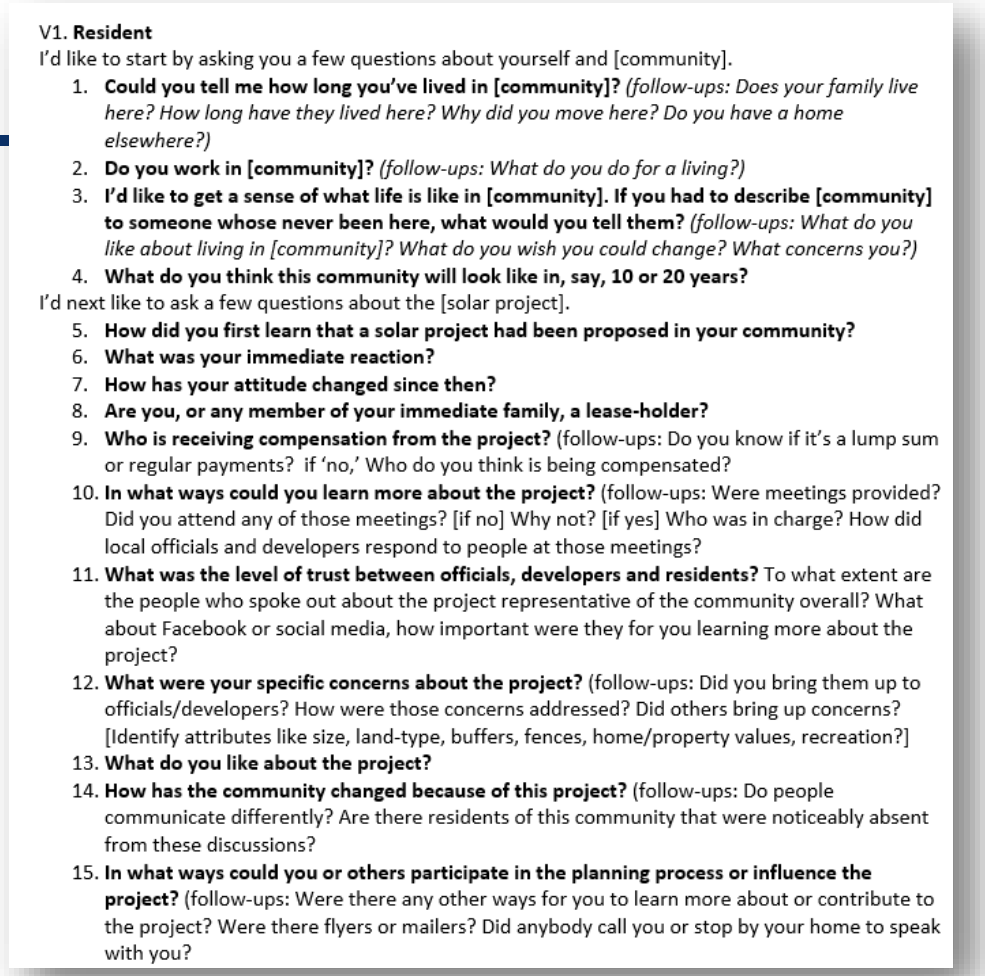


No.	Project Type	Year Completed	Ownership Structure	State Zoning Authority	Size (MW_{AC})	State Renewable Portfolio Standard	Justice40 Communities within 1 mile
1	Agrivoltaic	2020	Community (Subscribed)	Dual (Local & State)	1	YES	NO
2	Greenfield	2021	Independent Power Producer (IPP)	Hybrid (Local < 25 MW)	137.5	EXPIRED	NO
3	Greenfield	2020	Municipal	Hybrid (Local < 75 MW)	74.5	NO	YES (in 3 categories)
4	Greenfield	2020	IPP	Hybrid (Local < 100 MW)	100	YES	YES (in 2 categories)
5	Brownfield	2018	IPP	Local	1.3	YES	YES (in 2 categories)
6	Brownfield	TBD (est. 2023)	IPP	Local	52	YES	YES (in 6 categories)
7	Superfund	2020	Community (Subscribed)	Hybrid (Local < 40 MW)	3.5	YES	NO

CCSD Interview Protocol

We conducted a literature review of large-scale solar studies that relied on interviews (e.g., Crawford et al., 2022; Moore et al., 2022; Pascaris et al. 2021; Nilson & Stedman, 2022)

- Developed 3 linked interview protocols for i) residents, ii) developers, and iii) local officials, eventually adding a fourth protocol for iv) public works and municipal utility personnel
- Protocols focused on attitudes; methods, timing and effectiveness of engagement and communication; trust; site design; zoning and permitting; best practices; advice for future development; and future research needs



V1. **Resident**

I'd like to start by asking you a few questions about yourself and [community].

1. **Could you tell me how long you've lived in [community]?** *(follow-ups: Does your family live here? How long have they lived here? Why did you move here? Do you have a home elsewhere?)*
2. **Do you work in [community]?** *(follow-ups: What do you do for a living?)*
3. **I'd like to get a sense of what life is like in [community]. If you had to describe [community] to someone whose never been here, what would you tell them?** *(follow-ups: What do you like about living in [community]? What do you wish you could change? What concerns you?)*
4. **What do you think this community will look like in, say, 10 or 20 years?**

I'd next like to ask a few questions about the [solar project].

5. **How did you first learn that a solar project had been proposed in your community?**
6. **What was your immediate reaction?**
7. **How has your attitude changed since then?**
8. **Are you, or any member of your immediate family, a lease-holder?**
9. **Who is receiving compensation from the project?** (follow-ups: Do you know if it's a lump sum or regular payments? if 'no,' Who do you think is being compensated?
10. **In what ways could you learn more about the project?** (follow-ups: Were meetings provided? Did you attend any of those meetings? [if no] Why not? [if yes] Who was in charge? How did local officials and developers respond to people at those meetings?
11. **What was the level of trust between officials, developers and residents?** To what extent are the people who spoke out about the project representative of the community overall? What about Facebook or social media, how important were they for you learning more about the project?
12. **What were your specific concerns about the project?** (follow-ups: Did you bring them up to officials/developers? How were those concerns addressed? Did others bring up concerns? [Identify attributes like size, land-type, buffers, fences, home/property values, recreation?]
13. **What do you like about the project?**
14. **How has the community changed because of this project?** (follow-ups: Do people communicate differently? Are there residents of this community that were noticeably absent from these discussions?
15. **In what ways could you or others participate in the planning process or influence the project?** (follow-ups: Were there any other ways for you to learn more about or contribute to the project? Were there flyers or mailers? Did anybody call you or stop by your home to speak with you?

Crawford, J., Bessette, D., & Mills, S. B. (2022). Rallying the anti-crowd: Organized opposition, democratic deficit, and a potential social gap in large-scale solar energy. *Energy Research & Social Science*, *90*, 102597. https://doi.org/10.1016/j.erss.2022.102597

Moore, S., Graff, H., Ouellet, C., Leslie, S., & Olweean, D. (2022). Can we have clean energy and grow our crops too? Solar siting on agricultural land in the United States. *Energy Research & Social Science*, *91*, 102731. https://doi.org/10.1016/j.erss.2022.102731

Pascaris, A. S., Schelly, C., Burnham, L., & Pearce, J. M. (2021). Integrating solar energy with agriculture: Industry perspectives on the market, community, and socio-political dimensions of agrivoltaics. *Energy Research & Social Science*, *75*, 102023. https://doi.org/10.1016/j.erss.2021.102023

Nilson, R. S., & Stedman, R. C. (2022). Are big and small solar separate things?: The importance of scale in public support for solar energy development in upstate New York. *Energy Research & Social Science*, *86*, 102449. https://doi.org/10.1016/j.erss.2021.102449

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CCSD Interview Process

Site maps and Google Earth were used to identify neighbors of projects (focusing on homes with a view of the project)

- Email and telephone invitations, follow-up reminders (after 1 week) and post-cards were used to schedule initial interviews
- Interviews took place via telephone (n = 3), Zoom (12), MS Teams (1), or In-person (38) during site visits
- Site visits, along with pre-arranged meetings and door-knocking, occurred in Summer and Fall 2022

Photos by D. Bessette

CCSD Interview Counts

- **54 interviews were conducted.**
- **104 individuals contacted (not counting resident doors)**

**Interviewee counts are accurate across sites, but site numbers have been redacted to protect participant confidentiality

	Interviewee Counts						
Site No.	**Landowner**	**Developer**	**Resident**	**CBO**	**Government**	**Utility**	**Subtotal**
-			8		1		9
-		2	8		1		11
-		3	3		2		8
-	1	1	3	1	2		8
-		2	1			2	5
-			9			1	10
-						3	3
Subtotal	**1**	**8**	**32**	**1**	**6**	**6**	**54**

- ☐ Interviews were conducted by Bessette, Hoesch, White, and Hoen

CCSD Interview Analysis

- Recorded interviews were transcribed and detailed notes describing interviews that were not recorded were prepared immediately following in MS Word or Excel
- Interview notes and transcriptions were analyzed thematically by the Case Studies lead (Bessette)
  - Thematic analysis (TA) involves systematically organizing, identifying, and deriving themes to provide meaning across interviewee's responses (Rubin & Rubin, 2011)
- Interview results were discussed by the project team following the first site visit, and interview protocols were iteratively revised as themes were identified across subsequent site visits

Photo by D. Bessette

H.J. Rubin, & I.S. Rubin, Qualitative Interviewing: The Art of Hearing Data, Sage, 2011.

CCSD Case Study Results

Interviewees and quotations are identified using a randomly assigned number between 1 and 54, e.g., (“43” = participant 43).

- ☐ The order of numbers is not associated with the order or timing of interviews or sites visited.
- ☐ Quotations followed by multiple numbers are attributable to the first number
- ☐ Quotations and interview numbers provided are not intended to be exhaustive, but instead illustrative

Research Question 1

What are residents' most common concerns regarding LSS systems across states, site types, landscapes and ownership structures?

Concerns were most often associated with either perceptions of development processes or project impacts.

- **Process Concerns focused on:**
  1. Amount and adequacy of information dissemination
  2. Community members' influence and understanding of project attributes
  3. Efficacy of community subscription efforts
- **Impact Concerns focused on:**
  1. Direct and indirect economic impacts
  2. Visual and landscape impacts
  3. Environmental impacts, and
  4. Impacts at the rural-urban divide

Photo by D. Bessette

Process Drivers

Process Driver 1: Information Dissemination

1. **Dissemination of information about LSS to residents was a challenge**
   - An official in Texas noted, “We had a bajillion meetings with the community,…[but] there are always people who didn’t [attend], ‘I never heard about this, why didn't you ask me, why didn't you tell me?’” (45)
2. **Those who had been offered compensation reported feeling more informed than those who hadn’t**
   - A resident in Iowa urged, “We didn’t know anything about it until construction started. We aren’t leasing anything to them, so they didn’t talk to us.” (36)
   - Two residents who had sold a parcel of their land to a solar developer to build a substation identified, “Yes it was fair, people had a say…and we don’t blame them for making money.” (34, 53)
3. **Required processes (e.g., public notices, town hall/community meetings, and signage) were often thought insufficient for raising awareness of LSS projects** (35, 36, 12, 16, 17, 18, 19, 27, 28, 41, 49, 50, 51)
   - One resident in Arizona argued, “…all they have to do is put an alert in the newspaper…who reads the newspaper?” (14)

Photo by Karl Hoesch

Process Driver 1: Information Dissemination

5. **Residents preferred direct engagement with developers (i.e., door-knocking) rather than formal town halls or written notices.** (5, 7, 34, 38, 53, 9, 10, 4).
   - The distance between homes and low population density was reported to make in-person efforts expensive and inefficient
6. **Projects that engage residents early on and provide more opportunities for feedback were perceived more favorably**
   - Officials in Texas identified grass-roots community efforts and involvement were key to moving their project forward (45, 46)
   - Artistic renditions (e.g., watercolor paintings), informational meetings, and tours were identified as helpful by community members at multiple sites (5, 7, 9, 47, 11)
   - Residents upset about projects desired earlier notification to initiate organization of opposition. One neighbor in Arizona urged, “Had we known it was going in, I would have gone to the neighbors and got signatures, started to protest.” (17)

Photo by Doug Bessette

Process Driver 2: Community Influence/Understanding of Attributes

1. **Residents desired opportunities to influence project design elements**
   - Elements included the types and placement of fencing, vegetative screening and buffers, mowing and landscaping schedules and contractors, setback distances, and substation infrastructure (12, 13, 21)
2. **When not acted on, residents felt their feedback was ignored**
   - A landowner and cattle rancher in Arizona urged the developer and planning commissioners to not plant oleander as a vegetative screen, as oleander can be toxic to livestock. Nevertheless, oleander was planted (see inset photo) (12)
3. **Residents were often unaware of which entity was responsible for different stages of project development, operation, and eventual decommissioning**
4. **Residents' understanding of some project attributes and objectives was often limited or skewed by misinformation**
   - The purchaser of electricity was often misidentified (e.g., argued to be an out-of-state or more liberal entity) (36, 12, 16)
   - Residents in Arizona urged: "What their solar panels do to my horses, my family, my kids, my grandkids growing up. I'm in the middle of a- it's radiation! Radiation's what powers those panels! Nothing else." (14, 15)

Photo by Doug Bessette

Process Driver 3: Community Subscription

1. **Community subscription may generate support in areas of high electricity bills**
   - A local official in Texas noted, “a lot of residents suffer from high electricity bills because their homes are not weatherized…so offering them an opportunity to just be able to buy into, from, or even partially own a [solar] system…[was] a little positive in the community” (46)
2. **Low population density around projects make community subscription efforts expensive and inefficient.**
3. **Information regarding and opportunities to participate in subscription for nearby residents were absent at project sites**
   - Neighbors to a site in Rhode Island were unaware of a subscription offer; an official there identified subscription as “an afterthought” (32). Upon learning about the lack of local subscriptions, a developer identified they may cease relying on a third party and resume customer acquisition (42)
4. **Third-party software and companies are used to fulfill subscriptions in potentially distant areas (often urban areas located within the same utility service territory) and meet LMI requirements**
   - Focusing subscriptions on communities adjacent to the project may discriminate against LMI and environmental justice communities further away and in urban areas (43)

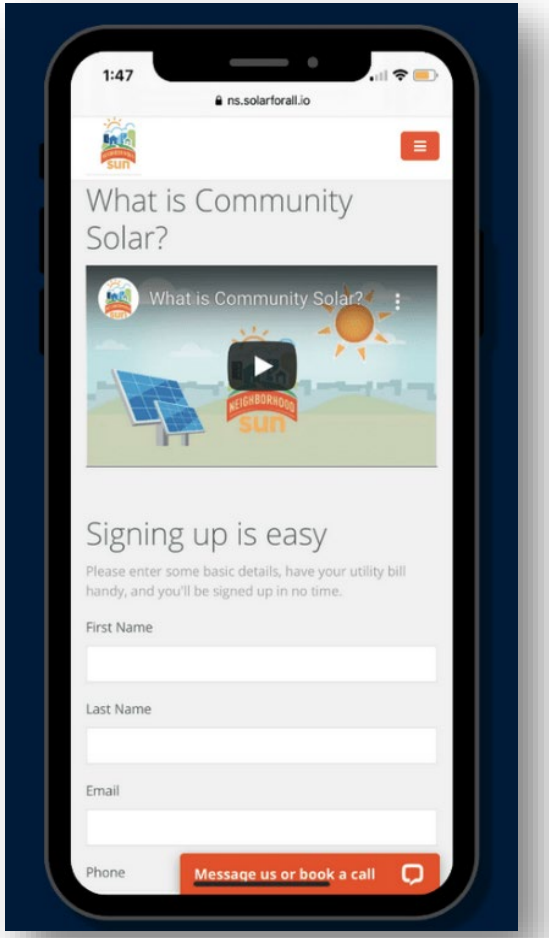


Photo c/o Neighborhood Sun, LLC. https://neighborhoodsun.solar/

Impact Drivers

Impact Driver 1: Direct and Indirect Economic Impacts

1. **Residents may lack awareness of tax revenue generated by projects**
   - Per a developer, “there just isn't the money in the project to, like, build a new school or something, you know. It's not like the way an old coal power plant was, where it would come in and there would be 500 permanent jobs…super boost the tax revenue…solar just doesn't do that. The money's not there in those projects to do that, and it's one of the unfortunate things about our energy transition, which is making people understand that that is the case, like, if you're used to the last big energy project that built you a new school…solar is just not going to do that.” (48)
2. **Residents and officials may be more aware of landowner payments and indirect economic impacts including local employment**
   - Neighboring residents perceived increases in business during the LSS construction phase (26, 39): “We had a farm store up here that probably sold them $50,000 of tools to start out, and it overwhelmed them.” (39)
   - Local electricians and landscapers were used at multiple sites (1, 4, 6)
3. **Residents voiced concerns about the use of federal tax subsidies to support LSS development**

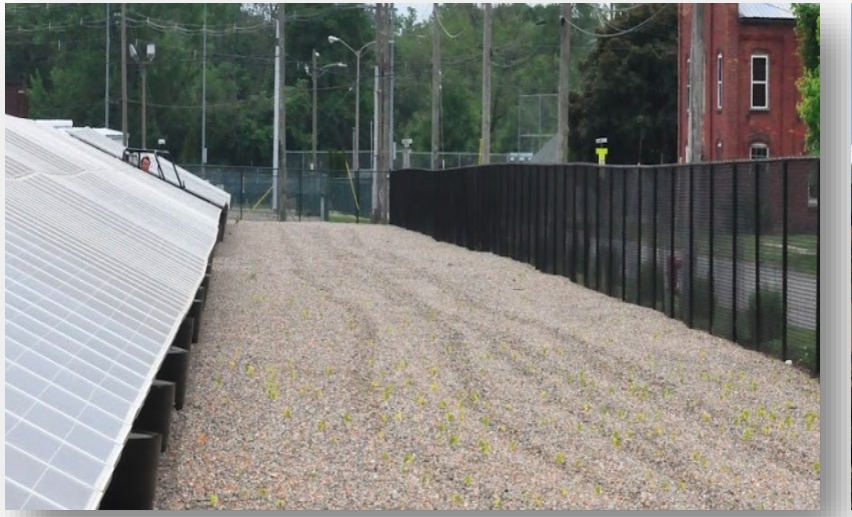
Photo by Doug Bessette

Impact Driver 2: Visual and landscape Impacts

1. **Focusing on aesthetic and landscape fit and minimizing environmental impacts can improve perceptions**
   - A site constructed on the east side of a road and not disrupting the mountain views to the west was key to resident support in Colorado (3).
   - A local official in Michigan required an out-of-state developer to use crushed rocks rather than build atop existing concrete and weeds as foundation so as not to “have to dodge people at the store” (4)
2. **Design elements like fencing, screening, and landscaping significantly affect resident support**
   - Project neighbors in Arizona mentioned the lack of fencing around projects without prompting and preferred fencing block the project from view (16, 17, 19, 20). One resident argued, “it would have been nice if [the developer had] put a fence up, so you didn’t have to look at [the solar].”
   - A developer in Florida identified the value of alternative designs, “in pretty rural areas we've started to do some alternative fencing designs with farm fencing, and building that 6 feet tall…we started to do that after we got some feedback from the local communities that the chain link fencing didn't really blend in well with a very rural area…” (21)

Photo by Doug Bessette

Impact Driver 2: Visual and landscape Impacts



Photos by Doug Bessette

- Alternative designs, pollinator habitats and animal guard can be used instead of chain-link fencing (3, 21), though agrivoltaic project developers must be sure not to void panel warranties; increased height of panels can also increase cost and difficulty of project (6)

3. Interconnection infrastructure (i.e., substations, overhead lines, pylons) is often more visible and can be more intrusive than arrays

- Interconnection details were not always provided to officials and officials sometimes lacked understanding of utilities' needs (1, 2, 32)

Impact Driver 2: Visual and landscape impacts

Photo by google Maps

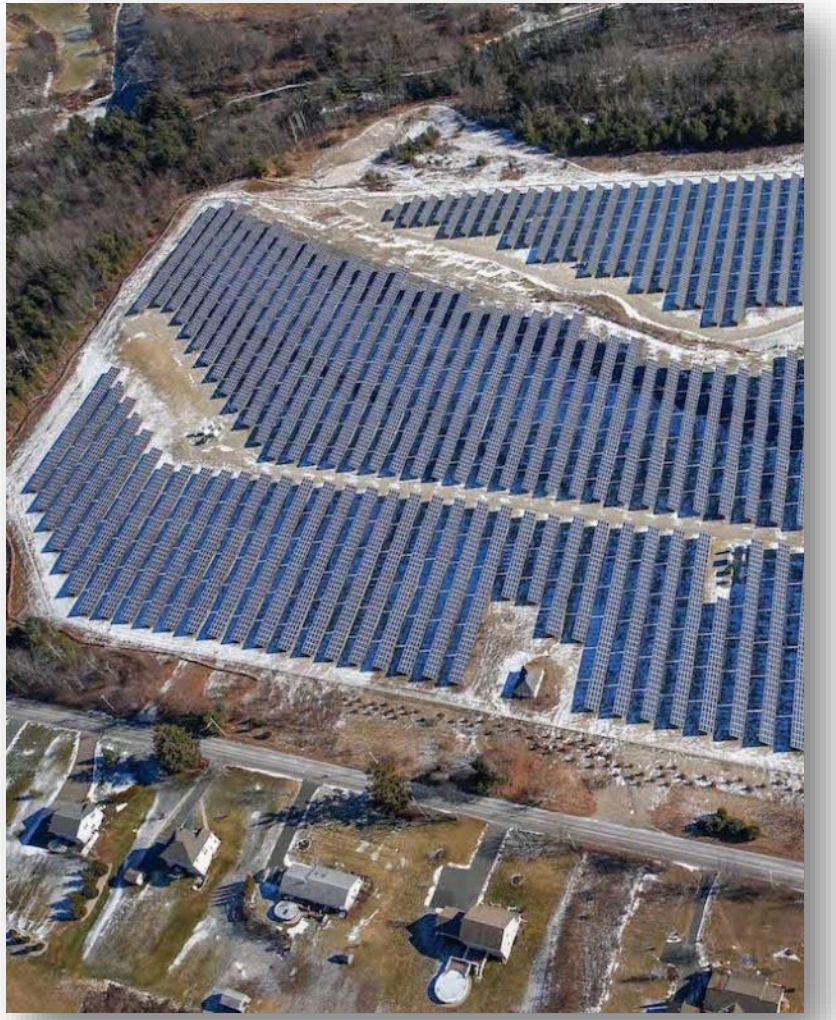
Photos by Doug Bessette

Impact Driver 2: Visual and landscape impacts

4. **Residents report noise, road construction and increased traffic as significant, mostly negative impacts**
   - Neighbors in 5 states complained about the noise and traffic involved in construction (29, 36, 34, 12, 44, 48, 33). One resident lost road access due to the project (12).
   - One developer noted that project neighbors had complained about the noise of inverters at another site requiring the developer to retrofit (23), whereas a local official in Iowa argued the inverter was nearly silent, “it sounds like a bunch of bees around 8 o’clock.” (39)
5. **Concerns about projects taking agricultural land out of production were widespread (even amongst supporters of projects); others argued LSS is key to sustaining degraded farmland**
   - A supporter of a project in Colorado said they were concerned that a hay field had been taken out of production and noted, “those are important, I have animals.” (7)
   - A developer in Florida said, ”95% of our projects are in agricultural use areas.” (21, 53)
   - A landowner and local official in Iowa argued, “I was very enthused [about the project] because we have a lot of farmers that have some ground that's not so favorable for crops, they’re struggling, and with this coming in here they got up the $650 to $850 an acre, maybe more, to not grow crops….I look at solar as farming, they're growing fuel basically by the sun’s rays, not hurting our ground, and taking some land that’s not so productive and turning it into something that we all can benefit from; it's going to lower our dependency on oils and coal…there's always going to be energy in the sun.” (39)

Impact Driver 2: Visual and landscape Impacts

6. **Less concerns were noted with respect to solar development on previously developed or disturbed land and at innovative sites**
   - An official in Texas said, “Every city has a landfill, almost every landfill is in a community like [this] and so if you can do this [here],…you can do it anywhere.”(45)
   - An official in Michigan identified that community members supported the development due to it “being the blight that it was before, you know, a torn-up ground, with graffiti on the fencing; the fencing torn down in areas.” (4)
7. **Despite preference for brownfield development, it remains complex, expensive and adequate space to meet clean energy goals may be lacking.**
   - Developers and officials argued brownfield sites require more involvement from local and state officials, and utilities.
   - Projects require greater experience, more permits, and more collaboration. “Working with cities takes forever…cities aren’t equipped to do this,” said one official in Texas. (45, 47, 48, 46, 32). Developers and officials acknowledge challenges of building solar in light of brownfield remediation and reclamation (48, 46).



Palmer Airfield, MA. Photo c/o remenergy.com

Impact Driver 3: Environmental Impacts

1. **Residents reported concerns about LSS projects creating "heat islands"**
   - Residents in Arizona voiced concern that local temperatures increased after project construction. (12, 13, 15, 17, 19) One said, "the temperature has gone up so much that the trees do not get a frost now, over there, and they've died." (14)
2. **Residents and officials were concerned about impacts of projects to flora and fauna**
   - Residents in Arizona were upset about the loss of Mesquite trees around projects (12, 14, 15, 17, 18).
   - Officials were concerned about gopher tortoises and caracaras (both protected species) and alligators that populated a Florida LSS site (22, 23).
   - A developer in Texas identified that residents in the Western US worry about water resources and stormwater, both during and after construction, as well as water withdrawals for cleaning panels or construction concrete (48)
3. **Climate change mitigation was not a priority for most residents**
   - One official in Colorado noted, "climate change? Not many people care about that…unfortunately" (11, 27).
   - Another in Colorado noted the importance of communicating the impacts of climate change to LSS neighbors, "my piece of this is telling the narrative of the story of this part of the American farmer, right, and it's not good right now, it's not looking so good, and it's continuing to get harder with the context of climate change." (5)

Impact Driver 4: The Rural-Urban Divide

1. **Residents identified concerns or confusion about "where the power goes" and framed electricity as a natural resource - like land, air, or water**
2. **The preference for brownfields and development on capped landfills may attenuate in rural areas**
   - One developer argued, "From a community perspective, yes brownfield sites are usually a lot better [regarding community opposition], though it really varies…you go out to a rural landfill in upstate New York and if it's not fenced and gated people use that as their ATV park and people [are] running all over with their dirt bikes…they're out there hunting, and so sometimes, yeah, you do get some community opposition" (48)
3. **LSS was seen by some as a way of reducing suburbanization and maintaining low density**
   - An official in Rhode Island identified solar as a passive temporary land use that "prevents what will ultimately become of all these lands [i.e., subdivisions]" (32)
   - A resident in Iowa said, "There's some people down here, our neighbors, who'd rather have solar panels than a bunch of people, a housing development. Who came out here to be away from people? I mean who would rather have solar panels than people? That's how much you hate people?" (15)
4. **Increase in extra-local workers can upset the rural economy and community**
   - One local official identified the challenge of increasing local employment, "I think this is where we needed to do a little better here, when they got up at the end of the day, it was 300 people leaving [work] into a community that was already busy enough, we couldn't keep up with milk and we didn't keep up with the beverages and and snacks and and gas, so it made the stores busier and it made some local people upset because they couldn't buy bread, what the heck, we can't keep bread anymore, I can't keep milk in here." (redacted)

Research Question 2

What strategies have developers and officials employed, or could employ, to improve perceptions and project outcomes and better align LSS development with local land-use plans, community needs and values?

Strategies to improve perceptions and project outcomes

1. More direct engagement with LSS neighbors and community residents

- Bus tours, classes with residents focused on job training, coffee with neighbors, regular meetings with community advisory groups, door-knocking, providing visuals and narratives explaining and seeking feedback regarding the process, design elements, and potential outcomes of development, were all recommended to increase engagement (45, 47, 46).
- Developers and other officials agreed that “the most important thing in the process is making sure the community is brought in…getting community buy-in” (21, 9, 4, 1)

2. Local third-party intermediaries as liaisons

- Officials and developers urged projects could rely on a local partner that “speaks the local dialect, knows the people, and understands the community” (48),
- “Community champions,” were recommended i.e., “grass-roots leaders that can get the word out about the project…and [can work] with the local community to address their concerns from the developer side” (46).
- At the same time, it was urged that liaisons should work on behalf of the community to advocate, lead collaboration efforts, and hold developers and owner-operators’ “feet to the fire.”

Strategies to improve perceptions and project outcomes

3. Share success stories *and* opportunity costs of restricting LSS development

- Narrative describing successful examples and communicating project details, development processes, and future impacts are particularly effective, though we must recognize that not everyone is a skilled communicator, “I think there needs to be the storyteller…farmers are not necessarily like that.” (5),
- The opportunity costs of large setbacks should be explained, namely, that they become unutilized land, upsetting lease-holders and community members (39, 21)
- Community members should understand that certain pollinator habitats and vegetative screening may require increased water use (21)
- LSS was argued to be an effective way of limiting density and urban sprawl (16, 21, 32), e.g., "in the grand scheme of things, they’re [i.e., LSS] temporary. if they become subdivisions, it will always become a subdivision” (32)

4. Encourage local economic benefits and subscription carve-outs

- Local parts suppliers, electrical contractors, food service providers, and what one official identified as “pseudo-skilled laborers” can be more meaningfully included in LSS development
- Community subscription can generate support for projects, but should include meaningful opportunities for participation
- Community benefits agreements could include more “significant benefits, true benefits with perpetuity” (45)

Conclusions

- This study engaged a diverse group of stakeholders at 7 LSS sites across the US.
- Stakeholders consistently identified aspects of the LSS development process and project impacts that meaningfully influenced how they perceived the success of each project.
- Despite 6 of the 7 projects being completed—and thus were "successful," we argue that the definition of "successful" LSS development should broaden to encompass aligning with local values of, ensuring beneficial outcomes for, and earning support from local host communities not just in the short-run to obtain construction permits, but throughout operation of the project, what we call **"community-centered solar development".**
- Such support requires attention to process and impact and may benefit from the strategies identified here that work to improve alignment of development with local land-use plans and community values and objectives.

Questions?

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