frontiers | Frontiers in Sustainable Energy Policy

TYPE Original Research
PUBLISHED 17 June 2025
DOI 10.3389/fsuep.2025.1579170

OPEN ACCESS

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RECEIVED 18 February 2025
ACCEPTED 09 April 2025
PUBLISHED 17 June 2025

CITATION
Rand J, Hoesch K, Nilson R, Hoen B, Mills S, Bessette D and White J (2025) More power to them: U.S. large-scale solar neighbors' support for additional solar.
Front. Sustain. Energy Policy 4:1579170.
doi: 10.3389/fsuep.2025.1579170

More power to them: U.S. large-scale solar neighbors' support for additional solar

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Large-scale solar (LSS) electric capacity is expanding rapidly in the U.S., with over 18 GW added in 2023 and over 40 GW in 2024; high levels of LSS deployment are anticipated to continue in coming years to meet growing electricity demand. Such deployment relies on sustained support from host community members and local governments, but that support is not assured, with community opposition now a leading cause of LSS project delays and cancellations. We conducted a nationally representative, stratified random survey of LSS neighbors (living within 3 miles) in order to better understand factors correlated with sentiments about LSS and levels of support and opposition for additional LSS development among residents with direct lived experience. Overall, we find most LSS neighbors are neutral or supportive of additional LSS in or near their communities. While some objective measures—such as the size of the project nearest the respondent, the respondent's education level, and whether they have solar on their own home—are important correlates with support, subjective sentiments and perceptions of respondents are much more informative. Perceptions about how LSS helps or hinders community quality of life, landscape aesthetics, residential property values, climate change, and community interests and priorities were especially salient. In addition, respondents' familiarity with their local project was influential: seeing the project more frequently generally corresponded to lower support for additional LSS. Broadly, we find evidence to reject the NIMBY hypothesis, and, conversely, more evidence to support the relationship between LSS support and community values, identity, sense of place, and protection of that place.

KEYWORDS

solar energy, national survey, public perceptions, support and opposition, siting and permitting

1 Introduction

At the end of 2023, there were more than 4,000 large-scale solar facilities (LSS), defined here as ground-mounted photovoltaic solar energy plants with a rated capacity >1 megawatt$_{DC}$ (MW), spread across nearly every U.S. state (Fujita et al., 2023b; EIA, 2024b). LSS electric generating capacity is expanding rapidly in the U.S., with over 18 gigawatts (GW) of new LSS capacity added in 2023 and over 40 GW added in 2024 (EIA, 2024a; Seel et al., 2024; SEIA, 2025).

Numerous studies examining future U.S. electricity system scenarios indicate that LSS deployment could be as high as 40–70 GW of LSS installed annually over the next 10+ years (Phadke et al., 2020; Jenkins et al., 2021; Larson et al., 2021; Williams et al., 2021; Denholm et al., 2022). Given the average U.S. LSS project size of ∼24 MW in 2023 (Fujita et al., 2023b), those deployment scenarios imply the planning, development, permitting, and construction of over 1,650 LSS projects per year.

LSS permitting in the U.S. typically requires land use approval from a state or local (or in some cases, both) government (Enterline et al., 2024); recent research found over 800 siting ordinances for LSS in the U.S. (Lopez et al., 2023) Although the specifics of the permitting process varies widely, these processes typically enable opportunities for community member input (Gao et al., 2024), for example through meetings or written comments. Therefore, deployment of LSS at the pace and scale described above relies on widespread and sustained support from host community members, local governments, and other stakeholders (Wüstenhagen et al., 2007; Ellis et al., 2023), but that support is not assured. Indeed, the rapidly growing body of academic research and frequency of news articles (see e.g., Roth, 2019; Gearino, 2022; Roth and Instagram, 2023; Zullo, 2023; Weise and Bhat, 2024) on LSS opposition suggests that public support may be eroding as deployment expands. This is further supported by a 2023 survey of large-scale wind and solar project developers, which identified local ordinances and community opposition among the top three causes of project delays and cancellations (Nilson et al., 2024b).

A better understanding of the factors correlated with sentiments about LSS and levels of support for additional LSS development among residents with direct lived experience is needed. Such insights could improve planning, development, and permitting processes for host communities; identify project characteristics, designs, or attributes that are preferred; and better align LSS development with host community needs and values. These better processes and alignment might help to enhance trust, accessibility, fairness, and legitimacy in the processes around siting and permitting of LSS, which can ultimately result in better outcomes that are more widely accepted and can potentially be achieved in shorter timeframes (National Academies of Sciences, Engineering, and Medicine, 2023).

In order to advance understanding in these areas and address some of the research gaps identified in the literature review below, we conducted a national, stratified random survey of residents living within 3 miles (4.8 km) of LSS projects in the U.S. This large, nationally representative dataset allows us to examine a range of covariates, and also provides an important baseline upon which future research can build.

Broadly, the overarching methods, motivation, and objectives closely mirrored Hoen et al.'s (2019) national survey of wind project neighbors. But, in contrast to Hoen et al., which analyzed neighbors' present attitudes toward their local project, we focus primarily on examining existing LSS neighbors' support for additional LSS in or near their communities. We do this for three reasons: (1) we argue that this "support" variable is more relevant for policy, planning, and developer practice to inform future siting and permitting of additional LSS in the U.S., in accordance with the targets and deployment projections described above; (2) although prior survey research has repeatedly asked respondents about their level of support for LSS (proposed or hypothetical) under different circumstances, we are not aware of any studies that have asked *existing LSS neighbors* about their support for additional LSS, and examined the factors relating to that support; and (3) many survey questions relate to post-treatment impacts (e.g., perceptions of the local project's aesthetic impacts; the project's effectiveness in mitigating climate change; ex-post perceptions of the planning process), which raise concerns for endogeneity with one's attitude toward the local LSS plant, but less-so for their support for additional LSS.

2 Literature review

2.1 Background

Despite nearly 40 years of social science research on perceptions toward wind energy in the U.S. (Rand and Hoen, 2017), similar research on LSS is more nascent, and key gaps remain. For example, LSS social science research in the U.S. has thus far been limited to just one or a handful of cases examined as a cross-sectional snapshot (e.g., Carlisle et al., 2014, 2016; Uebelhor et al., 2021; Crawford et al., 2022; Nilson and Stedman, 2023; Bessette et al., 2024; Spangler et al., 2024), and/or focused on hypothetical, rather than existing projects (e.g., Carlisle et al., 2015; Nilson and Stedman, 2022). These efforts have substantially advanced the state of knowledge, but they may not accurately represent the full population of LSS neighbors, and may not uncover key findings that could only be discovered by analyzing a larger set of projects representing more varied characteristics and regions.

2.2 NIMBY or not?

Opponents of large-scale renewable energy infrastructure are often characterized as having an attitude that renewable energy is in general a positive technology, however it is not one that they would want sited in close proximity—an attitude simplified as the "Not in my backyard" or "NIMBY" phenomenon. This characterization is extrapolated from the observation that renewable energy is generally positively ranked in national opinion polls (Kennedy, 2024), but increasingly likely to be subject to local opposition (Nilson et al., 2024b) and less likely to be supported when people are asked specifically if they support development in their local area (Leiserowitz et al., 2024).

However, it is increasingly apparent that NIMBY is at best an overly simplistic explanation for the complex dynamics that shape public attitudes toward large-scale renewable energy (Devine-Wright, 2009; Batel, 2020; Konisky et al., 2020). One reason attitudes of local residents may be less positive than those of the general population is that exposure to the proposals to develop renewable energy in a local area can serve as a focusing event that highlights the potential impacts of development for residents that have a particular attachment to that locale (Devine-Wright, 2009). For example, the increasing scale of large-scale solar project proposals may come as a shock to many residents, even if they are likely to support rooftop solar or smaller ground-mounted projects (Nilson and Stedman, 2022). Additionally, the policies and processes which determine how the public is engaged in siting and permitting can shape public attitudes (Gross, 2007; Zoellner et al., 2008; Ottinger et al., 2014; Shaw et al., 2015; Anderson and Johnson, 2024; Bessette et al., 2024), with the perception of unfairness often correlating with negative attitudes or opposition (Hoen et al., 2019; Mills et al., 2019; Firestone et al., 2020). This has led some researchers to reframe social "acceptance" as social "acceptability" to emphasize the importance of the process through which acceptance does (or does not) develop (Fournis and Fortin, 2017). Rather than perpetuate the NIMBY framing or study community sentiments for the sole purpose of increasing acceptance, we assert that attitudinal research can help us to better understand the potential impacts of LSS and the social, economic, and political context in which it is developed (Batel, 2020).

2.3 Key dependent variables: "attitude" vs. "support"

Rand and Hoen (2017) distinguished terminology between the two overarching dependent variables examined in prior quantitative survey research focused on perceptions toward wind energy, with "support" used when discussing *proposed* facilities (pre-construction), and "attitudes" when discussing *existing* facilities (post-construction). A substantial body of solar-focused research has similarly coalesced around these dependent variables with numerous studies focused on support of proposed or hypothetical solar (e.g., Carlisle et al., 2014, 2015; Schelly et al., 2020; Cousse, 2021; Crawford et al., 2022; Nilson and Stedman, 2022, 2023; Pascaris et al., 2022), and relatively fewer examining attitudes and perceptions of residents around existing LSS projects (Yenneti and Day, 2015; Yenneti et al., 2016; Bessette et al., 2024; Rand et al., 2024a). It is noteworthy that a large number of surveys have analyzed neighbors' attitudes toward *wind* energy projects in the U.S., going back more than 35 years (Thayer and Freeman, 1987; Swofford and Slattery, 2010; Fergen and Jacquet, 2016; Rand and Hoen, 2017; Firestone et al., 2018; Hoen et al., 2019; Mills et al., 2019). Firestone and Kirk (2019) also asked large-scale wind project neighbors about their relative preference for living in proximity to a wind energy facility compared to a solar, natural gas, coal, or nuclear plant, but that study does not consider preferences for additional power plants near respondents (i.e., it was framed as an either/or choice).

Across this body of research, we have rarely seen a rigorous examination of support for additional energy development among nearby-neighbors of existing energy infrastructure (one example is Motosu and Maruyama (2016), who examined support for additional wind among a very specific group of wind project neighbors). These existing neighbors have direct, lived experience that can be informative to future developments, and their perspectives are highly trusted for future energy planning (Rand et al., 2024a).

In general, key aspects that may relate to support (i.e., independent variables) from prior research can be grouped into two overarching categories: "Objective" variables (i.e., those that are based on facts and direct evidence), and "Subjective" variables (i.e., those based on sentiments, perceptions, beliefs, and values of respondents). In Sections 2.4 and 2.5, we summarize the key correlates with support within each of these categories that have been identified and operationalized in prior literature, and highlight those that we believe have been understudied.

2.4 Objective correlates with support

2.4.1 Proximity

In energy research, including for both wind and solar energies, proximity has had a mixed relationship, with overall limited evidence that vicinity has a direct relationship with support (Konisky et al., 2020), but this is likely contextual. Individuals living closest to large-scale wind or solar projects are more likely to be financially compensated, so proximity can be confounding or mixed (Jacquet and Stedman, 2011; Slattery et al., 2012; Carlisle et al., 2014, 2015; Firestone and Kirk, 2019; Hoen et al., 2019; Spangler et al., 2024).

2.4.2 Project size

It has been hypothesized that the size of a LSS project could be related to attitudes or support. Nilson and Stedman (2022) found that residents' support for utility scale projects in counties with active LSS development in upstate New York was substantially lower than support for "community" or "rooftop" solar development, but the specific size [i.e., generating capacity in megawatts (MW)] was not specified. Cousse (2021) also found support for solar rooftop installations to be substantially higher than support for "solar parks" in Switzerland. Roddis et al. found smaller wind and solar projects to be more acceptable by communities and decision-makers (Roddis et al., 2018). "Size" and "scale" are sometimes used interchangeably and sometimes with different meaning. In general, there is a research gap to examine neighbors' perceptions relating to LSS project size, using specific MW capacity details.

2.4.3 Prior land use, farmland conversion, or site type

Land use concerns are particularly acute with LSS, which requires the conversion of roughly 3–5 acres of land per MW of generating capacity (Bolinger and Bolinger, 2022). Nilson and Stedman (2022) found lower support for LSS sited on forest land and productive farmland, with highest support for LSS sited on former landfills and industrial sites; others have similarly documented concerns about farmland loss or conversion (Bessette et al., 2024; Gamper-Rabindran and Ash, 2024). The surrounding land use may also affect preferences for buffer distances between LSS—for example preferring larger buffer between solar and wildlife migration routes (Carlisle et al., 2016). Despite increasing interest in, and prevalence of, solar developed on previously or currently contaminated lands (i.e., "brownfield" development) and so called "agrivoltaic" projects (which co-locate LSS with crop production, pollinator habitat, and/or animal grazing), little survey research has examined community preferences for these different site types, with the exception of Pascaris et al. (2022) who found far higher support for agrivoltaics projects compared to conventional solar in two counties in the U.S.

2.4.4 Demographic characteristics

In general, demographics have not been found to be related to attitudes or support across many studies. For example: age (Carlisle et al., 2015; Nilson and Stedman, 2023) and education (Carlisle et al., 2015; Cousse, 2021; Nilson and Stedman, 2023) have not been significant. Gender, too, is typically not considered useful in understanding attitudes or support of energy technologies (Bell et al., 2020), though some nuances have been examined (Boudet, 2019).

2.4.5 Research gaps—Objective

Several key gaps exist with regard to objective variables that are potentially relevant to LSS support. There has not been an examination of cumulative impacts of LSS deployment—for example the number of LSS projects in proximity to respondents. Similarly, no studies have examined the role of respondents' tenure in the community, or whether they moved into the community before or after the LSS project became operational, though prior research on wind attitudes found this to be important (Hoen et al., 2019; Russell and Firestone, 2021). There is not sufficient evidence of whether sentiments are moderated by the age of the local project [which may imply neighbors becoming accustomed to the project, or a "U-Shaped curve" (Wolsink, 2007)]. Finally, and particularly relevant for LSS, prior research has not controlled for whether respondents have solar on their own rooftops when considering their support for LSS.

2.5 Subjective correlates with support

Prior research has also explored the relationship between LSS support and a range of subjective variables, relating to respondents' sentiments, perceptions, experiences, beliefs, and values. Notable examples are summarized here.

2.5.1 Familiarity

It is important to disentangle respondents' proximity to LSS from their familiarity with the local project; indeed, many living in close proximity to LSS installations may not have known they existed prior to receiving a survey. Large-scale ground-mounted solar is still a relatively new phenomenon in many parts of the country (Nilson and Stedman, 2022). We consider familiarity a subjective variable because it is based on one's self-reported personal experiences.

2.5.2 Environmental beliefs

Large-scale renewable energy developments often tout environmental benefits, both locally and globally, and/or benefits relating to energy security and independence. But underlying environmental attitudes can have a mixed relationship with support for renewable energy, such as when the energy development threatens local wildlife habitat (Warren et al., 2005; Lovich and Ennen, 2011; Mulvaney, 2017; Boudet, 2019; Agha et al., 2020).

2.5.3 Economic impact perceptions

Setting aside objective economic impacts about specific renewable energy projects that could be empirically determined, respondents' perceptions about economic impacts have been shown to be strongly correlated with sentiments about renewable energy (Rand and Hoen, 2017). For example, Slattery et al. (2012) found support for wind energy to be much more strongly associated with socioeconomic factors than aesthetics or moral considerations. Carlisle et al. (2014, 2016) found perceptions of job creation to be a strong predictor for LSS support. Other economic factors like the perceived impact on electricity rates (Uebelhor et al., 2021; Bessette et al., 2024), landowner or community compensation (van Wijk et al., 2021; Vuichard et al., 2021; Trandafir et al., 2023), local ownership or investment opportunities (Vuichard et al., 2021; Hogan et al., 2022; Bessette et al., 2024; Hogan, 2024), and perceived property value impacts (Carlisle et al., 2014; Elmallah et al., 2023) are also shown to be relevant.

2.5.4 Aesthetic and landscape impact perceptions

Visual impacts are generally considered a top concern among community members with regard to siting and permitting large scale wind (Rand and Hoen, 2017) and solar (Carlisle et al., 2016; Crawford et al., 2022; Bessette et al., 2024) power, and LSS developers in the U.S. consider visual concerns to be the primary driver of opposition (Nilson et al., 2024a). With regard to LSS, visual impacts can extend beyond simply the array of solar panels themselves, to also include landscaping, fencing, vegetative buffers, disturbed land, and transmission and interconnection infrastructure (Bessette et al., 2024).

2.5.5 Distributive justice perceptions

Perceptions about how the benefits and burdens (economic or otherwise) of LSS are distributed, known generally as distributive justice, are also related to support for LSS (Crawford et al., 2022; Trandafir et al., 2023). Nilson and Stedman (2023) relate distributive injustice for LSS in the U.S. to the idea of "rural burden," wherein rural residents feel exploited in natural resource extraction for the benefit of urban residents.

2.5.6 Procedural justice perceptions

The role of perceived planning process fairness in influencing sentiments about wind energy has been very well documented (Baxter, 2017; Rand and Hoen, 2017; Firestone et al., 2018, 2020; Elmallah and Rand, 2022), and although there has been relatively fewer studies focused on procedural justice and LSS thus far, it is similarly considered to be highly influential (Zoellner et al., 2008; Carlisle et al., 2015, 2016; Roddis et al., 2020; Crawford et al., 2022; Bessette et al., 2024; Hoesch et al., 2025). There are multiple sub-components that make up procedural justice, including, for example, access to trustworthy information, opportunities to participate in the process, lack of bias among decision-makers, and the ability to influence the outcome of the process (Sovacool and Dworkin, 2015; Sovacool et al., 2016).

2.5.7 Place perceptions, attachment, and quality of life

The notion that renewable energy development can disrupt an emotional bond between individuals and locations where energy projects are sited is well documented (Devine-Wright, 2009; Carlisle et al., 2014; Fast and Mabee, 2015; Van Veelen and Haggett, 2016; Devine-Wright and Batel, 2017; Firestone et al., 2018; Roddis et al., 2020; Crawford et al., 2022; Gamper-Rabindran and Ash, 2024). Researchers note that these large infrastructure developments may conflict with local interests, and can impact identities and meanings that individuals form with particular locations, and therefore negatively affect perceptions of individual or community quality of life.

2.5.8 Research gaps—Subjective

Many of the subjective aspects described above have been well documented for wind energy support, but not for LSS. For example, analyses of LSS support that control for familiarity have not been conducted. More research is needed to assess perceptions of existing LSS projects' impacts on place attachment and quality of life, and how those perceptions relate to support for additional LSS. And relatively little research has closely examined procedural justice in LSS planning, and how it relates to support. More generally, those studies that have examined these subjective variables are often somewhat limited in scope and do not represent broad geographic regions. Moreover, most studies only examine a relatively small subset of variables from within the large list of potentially influential factors described above, and stop short of ranking these variables in terms of their relative importance with regard to their relationship to support.

3 Methods

3.1 Sample design

To address the gaps noted above, this study sought to collect and analyze perspectives from a nationally-representative sample of residents living in proximity to LSS. We utilized the U.S. Photovoltaic Database (USPVDB) to identify the exact locations and boundaries of LSS facilities, along with their associated attributes such as capacity, installed year, and site type (i.e., greenfield, disturbed, or agrivoltaic; Fujita et al., 2023b,a). In order to better capture neighbors' recent experience with LSS planning, development, construction, and operation, only projects that were installed from 2017 to 2021 were included in sample selection. USPVDB data from these projects were matched to residential address data from CoreLogic,[1] yielding 5.5 million U.S. residential addresses within 3 miles (4.8 km) of the LSS projects built from 2017 to 2021.[2] We prepared a stratified random sample, intentionally oversampling residents living within ½ mile of LSS, near larger projects (>50 MW), near innovative site types (agrivoltaics or previously disturbed lands), and in some U.S. regions to ensure a diverse geographic sample. The final stratified random sample included 4,861 residential addresses.

3.2 Survey instrument design

Survey questions were developed to answer the study's research questions, fill gaps in the literature (described above), and to build upon themes identified through in-depth qualitative case study research conducted in a previous phase of this research (Bessette et al., 2024). The final survey instrument included nearly 50 questions; most had closed-ended selection options (e.g., Likert scales), though a handful of open-ended text boxes were included for respondents to provide additional comments or detail. Due to the difficulty in collecting survey data, we did not ask respondents about their political affiliations, which can be polarizing and off-putting in surveys and reduce response rates.

The survey instrument was designed to gather respondents' perspectives relating to a specific LSS project near their home, and their support for additional LSS in or near their community. More details on survey instrument design are described in Hoesch et al. (2025).

3.3 Data collection

Data collection, following Dillman et al.'s (2014) "Tailored Design Method," began in April 2023 with a pilot sample and continued through September 2023. Sampled households were mailed an invitation letter, followed by the printed survey packet (with a $2 bill incentive), and then two reminder postcards. The reminder postcards also included a link to an online version of the survey. Overall, we received 979 usable responses out of 4,846 delivered invitations for a response rate of 20.2% (see Supplementary Table S1 for detail). 90% of usable responses were paper (mail) surveys; only 10% responded via the web survey. Additional details on data collection are described in Hoesch et al. (2025).

Responses were collected from 379 unique LSS projects, representing more than 9 GW of installed capacity, spanning 39 states, and ranging in size from 1 to 328 MW_{dc} (see Figure 1 and Table 1).

3.4 Data preparation and weighting

Survey data were compiled, cleaned, and imported into Stata statistical programming software for weighting and analysis.

1 CoreLogic is a real estate data aggregator. See https://www.corelogic.com for more information.

2 The USPVDB had complete data on LSS installations through the end of 2021 when the sample was prepared.

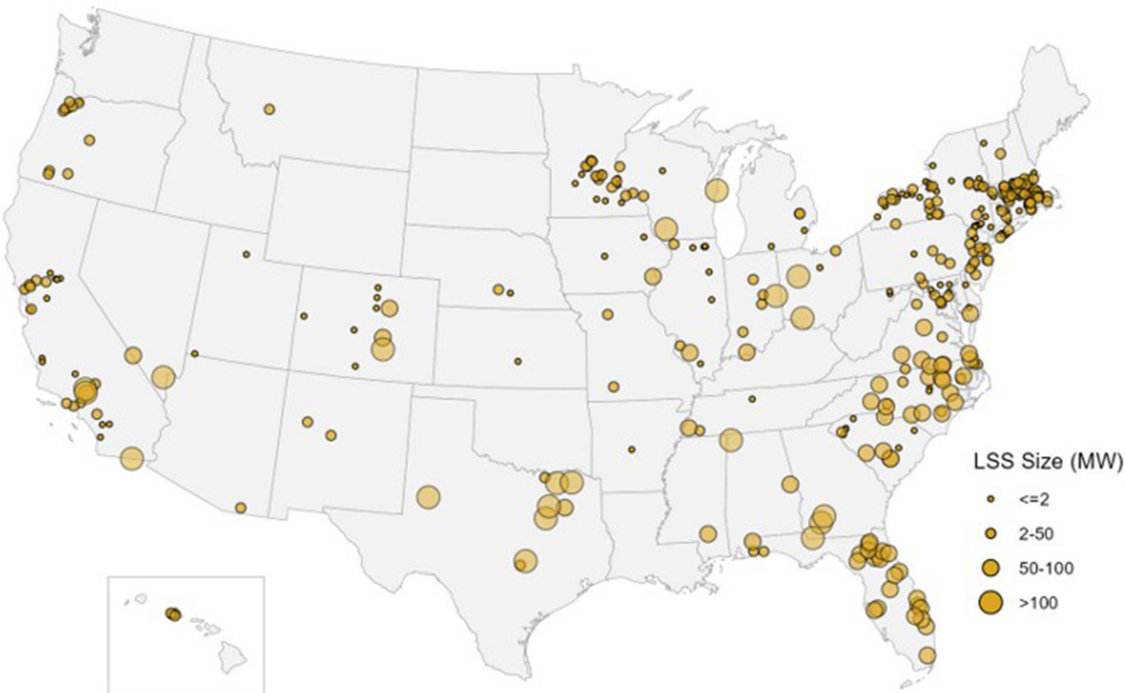

FIGURE 1
Map of LSS projects from which survey responses were collected.

TABLE 1 Summary statistics of LSS projects included in sample.

Attribute	5th pct	25th pct	50th pct	75th pct	95th pct	Mean	*SD*
PV capacity (MWdc)	1	2.5	7	102.5	300	61.26	90.76
PV installed year	2017	2017	2019	2020	2021	2019	1.53
Distance from respondent (mi)	0.09	0.29	0.66	1.2	2.5	0.86	0.73

Given the intentional oversampling of some cohorts, and the fact that survey respondents differed slightly from the underlying population on several key demographic variables, we prepared sample weights by sampling stratum, gender, age, and education using American Community Survey (2022) census tract level demographic data (US Census Bureau, 2023). Weighting followed the iterative raking method (Deming, 1943; Battaglia et al., 2004, 2009). Because the weighting method resulted in some extreme variation in sampling weights, we trimmed maximum weight values to be no larger than the median plus five times the interquartile range as outlined in Potter and Zheng (Potter and Zheng, 2015).

Descriptive statistics utilize weighted data while the regression analysis is un-weighted (using controlling variables instead).

3.5 Analysis methods

We first present a series of summary and descriptive statistics on residents' support for additional LSS in their community. Bivariate polychoric[3] correlation tests were conducted to examine potential relationships between the "LSS support" variable and a variety of potential independent variables.

The regression analysis similarly utilizes "LSS support" as the dependent variable. This variable represents the response to the question, "How strongly do you support or oppose development of [additional large-scale solar projects] in or near your community?", with five response options ranging from "strongly oppose" to "strongly support."

We ran regressions using both ordered logit and linear (ordinary least squares) techniques. Both versions performed similarly and generated similar intuitions and outcomes. For simplicity, we present only linear regression results in the main text, but include ordered logit results tables in the Supplementary material.

3 Polychoric correlation measures the level of agreement (correlation) between ordinal variables (ordered categorical data) like Likert scales and binned data, therefore it is well suited for these survey data. However, polychoric correlation tests assume variables have a normal distribution; where there is a skewed distribution the test is performed sub-optimally.

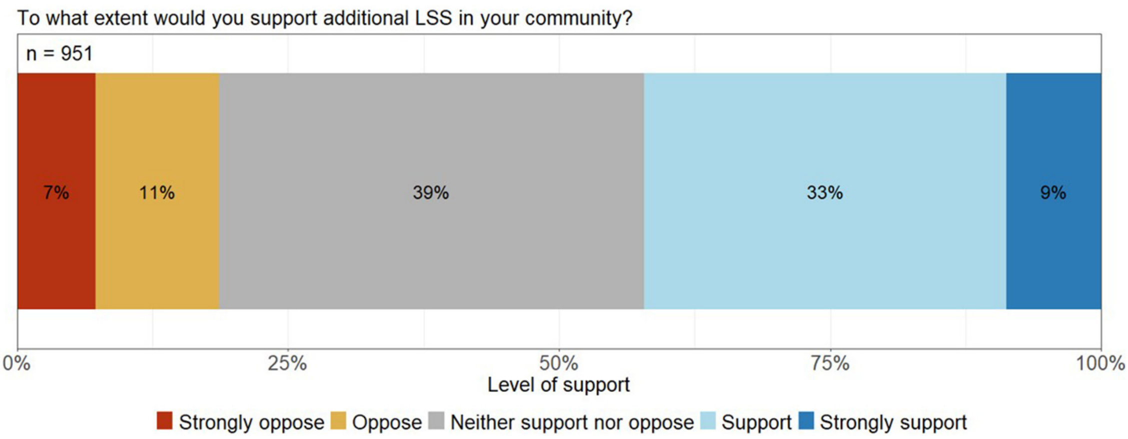

FIGURE 2
Weighted distribution of responses to the question: "How strongly do you support or oppose additional large-scale solar projects in or near your community?"

3.6 Model development and specification

We ultimately developed two models to examine a range of covariates that may influence support. Model 1 ("Objective") uses only variables that can be directly measured and describe either the LSS project (e.g., capacity; installation year), the respondent (e.g., age; gender), or their residence (e.g., distance from respondent to the LSS facility; whether they have solar on their home; when they moved into the home relative to the LSS installation). Model 2 ("Subjective + Objective") adds variables related to the respondents' personal perceptions, opinions, and experiences (e.g., perceptions of the project's economic impacts; quality of life impacts; visual impacts; energy, environment, and climate perspectives). The formulation of these two models aligns somewhat with that of Haac et al. (2019). Independent variable definitions, descriptions, distributions, and response categories (levels) can be found in Supplementary Table S2.

Because our survey instrument contained over 50 questions and a vast number of variables, we selected only a key subset of variables to be included in the final models. Possible independent variables to include were initially identified via the literature review (described in Section 2). We developed numerous versions of the models using different combinations of independent variables for the same dependent variable, and then selected the best model *post-hoc* to maximize accuracy and minimize overspecification, endogeneity, and collinearity. To do this, we calculated the Akaike Information Criterion (AIC) for each model in order to compare model accuracy and parsimony, where the lowest AIC values represent higher accuracy and lower complexity (Akaike, 1974; Goodenough et al., 2012). Independent variable inclusion and exclusion in the final models was derived through this iterative approach of subsetting different combinations of independent variables and comparing the effect on AIC (Goodenough et al., 2012).

Furthermore, the relative importance of each independent variable in the models can be compared using change in (or delta) AIC (ΔAIC; Akaike, 1974; Goodenough et al., 2012; Haac et al., 2019), which represents the effect on the overall model fit when that variable is removed from the regression (Haac et al., 2019). Higher ΔAIC values represent more important and influential variables in model quality. The ΔAIC metric is especially useful for comparing categorical variables, in that it provides a value for the effect of the entire variable rather than individual levels (categories) of that variable.

Independent variables were tested for collinearity using both correlation matrices and variance inflation factor (VIF). A VIF between 1 and 5 indicates that independent variables are moderately correlated. Many studies use a VIF of 10 to indicate excessive collinearity, while others have cautioned for more (or less) conservative thresholds (see, e.g., Cohen et al., 2002; O'Brien, 2007; Daoud, 2017; Shrestha, 2020). This study employs a maximum VIF of 4 for independent variable inclusion.

4 Results

4.1 Summary statistics

Figure 2 presents weighted summary statistics for the dependent variable: "support for additional LSS in or near your community." Roughly 43% would "support" or "strongly support" additional LSS in or near their community; 39% would neither support or oppose, and 18% would "oppose" or "strongly oppose" it. It is worth noting that respondents' attitudes about their local LSS facility are highly correlated with their level of support for additional LSS.

One's attitude about a nearby LSS facility—or support for additional LSS—may be influenced by a variety of objective and subjective aspects. We explore these possible correlations and their relative importance in the following sections. A vast number of additional weighted univariate and bivariate summary statistics (and distributions) examining these survey data are available in Rand et al. (2024a).

4.2 Bivariate polychoric correlations with support

We use polychoric correlation tests (utilizing weighted data) to examine the variables that may be related to respondents' support

TABLE 2 Weighted polychoric correlations of "support additional LSS" with select independent variables.

Variables	Correlation with "support for additional LSS"	
	Correlation Coeff.	Strength
Objective variables		
Distance from LSS	0.13	Very weak
Size of LSS project	−0.26	Weak
LSS installation year	−0.11	Very weak
Respondent age	−0.02	Very weak
Number of LSS projects within 5 miles	−0.09	Very weak
Subjective variables		
Familiarity with local LSS project	0.28	Weak
Planning process fairness (perceived)	0.37	Weak
Appropriate comm. engagement	−0.27	Weak
Improves community quality of life	0.62	Strong
Conflicts with local interests/priorities	−0.49	Moderate
Improves landscape aesthetics	0.56	Moderate
Global environmental impact	0.59	Moderate
Climate change impact	0.58	Moderate
Property value impact	−0.54	Moderate

See Supplementary Table S2 for variable descriptions and response categories.

for future LSS in their community. We define the strength of correlation coefficients as follows: 0.0 to <0.2 = Very Weak. 0.2 to <0.4 = Weak. 0.4 to <0.6 = Moderate. 0.6 to <0.8 = Strong. 0.8 to <1.0 = Very Strong. Some variables that may be influential were excluded from polychoric correlations either because they could not be logically ordered (e.g., type of LSS site) or were binary (e.g., "Do you have solar panels on your home?"). Variable definitions and (unweighted) distributions can be found in Supplementary Table S2.

In comparing the polychoric correlation coefficients in Table 2, it is immediately clear that the subjective variables are much more strongly correlated with "support" than the objective variables, which tend to have only weak correlations. Of the subjective variables, respondents' perceptions of their local project's impacts on community quality of life, climate change, global environmental impact, landscape aesthetics, and the local project's impact on residential property values were most strongly correlated with level of support for additional LSS.

In order to examine additional variables (such as those that could not be included in polychoric correlations), and also to disentangle collinearity or competing effects of the variables in Table 2, we employ multivariate regressions in the following sections.

4.3 Multivariate regression analysis

Table 3 presents the results of the unweighted Objective and Subjective linear regression models with "support for additional LSS in or near your community" as the dependent variable. Both models are estimated using the same 946 respondents. For both models we include coefficients, standard errors, and *p*-values for each variable (and for each *level* of categorical variables). In addition, we include the change in AIC (ΔAIC) for each independent variable when it is removed from the model, which provides an indicator of the relative importance of each variable. That relative importance is further illustrated in Figure 3 (for the Subjective model). A more detailed description of each independent variable is included in Supplementary Table S2.

The models are unweighted, but sample stratification (e.g., distance from respondent to LSS, agrivoltaic) variables are included as independent variables to control for unequal probability of selection. In addition, demographic variables are included in the model to account for potential non-response bias and because they may be correlated with the dependent variable.

For some variables (e.g., respondent's distance from LSS project; LSS capacity, number of LSS projects within 5 miles of respondent), although we had continuous data values, we opted to use binned categories in the model. Using a continuous independent variable in the model would assume a constant relationship to the dependent variable across all values of the independent variable. Bins more effectively parameterize the variable, allowing us to separately evaluate the relationship to the dependent variable in each bin independently from the other bins. In addition, in the case of the "LSS capacity" and "distance" variables, the bins used in analysis align with those used for oversampling, which allows those variables to control for unequal probability of selection.

Relying on objective measures alone explained relatively little variation ($R^2 = 0.2$) in respondents' levels of support for additional LSS in or near their community, whereas incorporating a suite of subjective variables based on respondents' experience, perceptions, and sentiments improved the model's explanatory power substantially ($R^2 = 0.57$).

In the Objective model, the LSS capacity (MW) was the most important independent variable (ΔAIC = 33.3), with respondents living near larger projects (and especially those over 50 MW) correlating to lower support for additional LSS. This variable was followed by whether the respondent had solar on their home (ΔAIC = 19.8; those with solar on their homes are more supportive of additional LSS), and when the respondent moved into their home relative to the LSS construction (ΔAIC = 12.0; those moving in either after, or within 5 years prior to, their local LSS project's construction are more supportive of additional LSS than those with a longer tenure in their current home). Respondents living near LSS projects sited on certain land cover types ("shrub/scrub" and "agriculture") tended to have lower support compared to those near LSS projects on "other" land types. Similarly, those near more-recently constructed LSS projects were less supportive of additional LSS. Finally, those with an educational attainment of at least "some college" tended to be more supportive, as did those who lived more than ¼ mile away from their local LSS project, though the relative importance of each of those variables (ΔAIC of 4.1 and 3.3,

TABLE 3 OLS regression model results for respondents' level of support for additional LSS in or near their community (model also includes controls for gender, age, and region—not shown).

DV: support for additional LSS		Model 1: objective only (linear)				Model 2: subjective + objective (linear)			
N		946				946			
***R*²**		0.2				0.57			
AIC		2,873.1				2,314.6			
Variable	Level	Coef.	*SE*	*P* > *t*	ΔAIC	Coef.	SE	*P* > *t*	ΔAIC
Objective variables									
LSS capacity (MW)	(1–2)				33.28				7.475
	2–50	**−0.257**	**0.096**	**0.007****		**−0.175**	**0.071**	**0.014***	
	50–100	**−0.883**	**0.161**	**0.000*****		**−0.387**	**0.122**	**0.001****	
	>100	**−0.692**	**0.145**	**0.000*****		**−0.199**	**0.111**	**0.074•**	
Distance from LSS to respondent's residence	(0–0.25)				3.345				−5.317
	0.25–0.5	**0.237**	**0.111**	**0.033****		0.017	0.085	0.845	
	0.5–1	**0.218**	**0.103**	**0.034***		−0.016	0.080	0.838	
	1–2	**0.206**	**0.118**	**0.081•**		−0.026	0.092	0.78	
	2–3	**0.451**	**0.145**	**0.002****		0.135	0.114	0.237	
Number of LSS within 5 miles of residence	(1)				−1.771				0.878
	2	−0.093	0.098	0.342		**−0.156**	**0.074**	**0.034***	
	3+	−0.136	0.096	0.156		−0.089	0.072	0.213	
LSS install year		**−0.074**	**0.030**	**0.012***	4.482	−0.024	0.022	0.283	−0.786
Primary residence	(No)				−1.532				−1.866
	Yes	−0.155	0.230	0.501		0.061	0.171	0.721	
Move-in period	(>5 years prior)				12.037				1.083
	1–5 years prior	**0.375**	**0.113**	**0.001****		**0.180**	**0.084**	**0.032***	
	Same year or after	**0.316**	**0.118**	**0.007****		−0.006	0.089	0.947	
Education level	(No college)				4.076				4.663
	Some college or more	**0.248**	**0.102**	**0.015***		**0.192**	**0.076**	**0.012***	
Solar on home	(No)				19.802				6.068
	Yes	**0.535**	**0.116**	**0.000*****		**0.243**	**0.088**	**0.006****	
Agrivoltaic	(No)				−1.994				−1.983
	Yes	0.008	0.107	0.938		−0.010	0.080	0.899	
Prior land cover	(Other)				8.671				−4.520
	Agricultural	**−0.280**	**0.138**	**0.043***		−0.100	0.103	0.333	
	Forest	−0.265	0.175	0.129		−0.151	0.130	0.245	
	Grassland	0.266	0.228	0.243		0.106	0.171	0.535	
	Contaminated/disturbed	−0.023	0.145	0.873		−0.109	0.108	0.316	
	Shrub/Scrub	**−0.513**	**0.284**	**0.071•**		−0.263	0.213	0.217	
Subjective variables									
Perceived fairness of LSS planning process						0.032	0.051	0.532	−1.588
Appropriate level of community engagement in planning process						**−0.109**	**0.029**	**0.000*****	12.722
Respondent is aware of other LSS projects in development						0.060	0.081	0.46	−1.426
Project's impact on community quality of life						**0.249**	**0.043**	**0.000*****	32.748
Project conflicts with local interests/priorities						**−0.157**	**0.039**	**0.000*****	15.207

(Continued)

TABLE 3 (Continued)

Subjective variables					
Project's impact on landscape aesthetics		**0.192**	**0.043**	**0.000*** **	18.267
Project's impact on global environmental health		**0.124**	**0.046**	**0.007** **	5.577
Project helps limit climate change		**0.143**	**0.035**	**0.000*** **	15.609
Familiarity with project	(See it every day)				17.104
	See it occasionally	**0.178**	**0.077**	**0.021***	
	Rarely see it	−0.035	0.085	0.684	
	Didn't know it existed	**0.352**	**0.095**	**0.000*** **	
Comm. hosts fair share of undesirable land uses	(About its fair share)				0.946
	More than its fair share	**−0.131**	**0.075**	**0.081•**	
	Less than its fair share	0.062	0.082	0.451	
Project's effect on local property values	(No effect)				18.116
	Increased	−0.041	0.133	0.756	
	Decreased	**−0.391**	**0.085**	**0.000*** **	

•p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001. Bold indicates values that are statistically significant (p < 0.1).

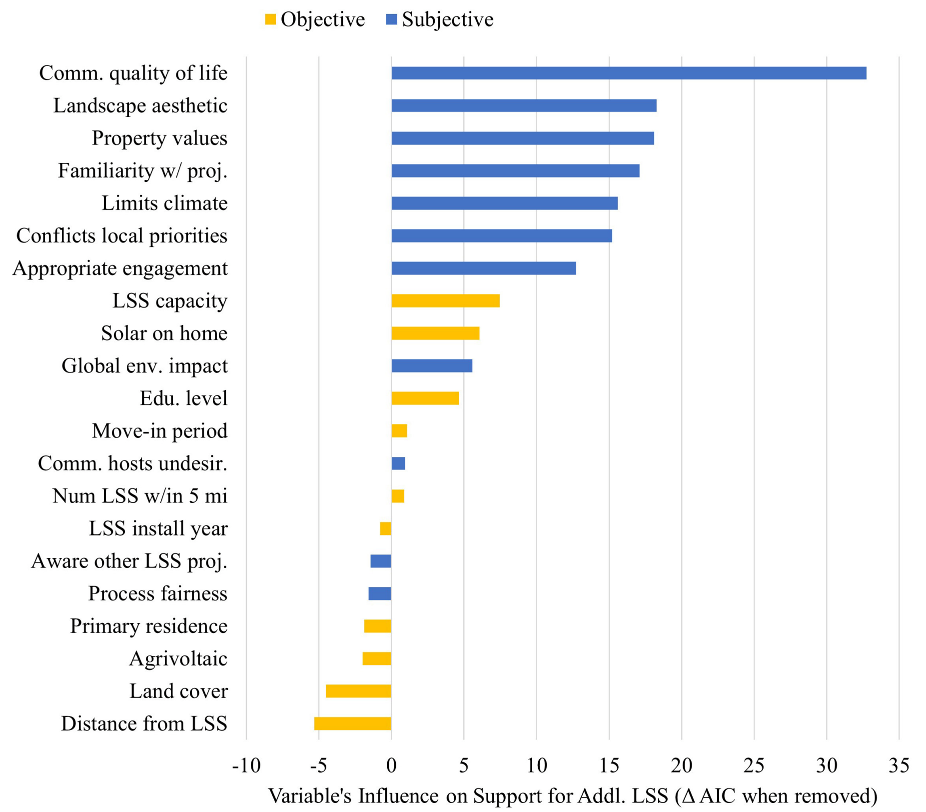

FIGURE 3
ΔAIC when each variable is removed from the model, for Subjective model. Higher ΔAIC values represent more influential variables in terms of model quality.

respectively) is nearly an order of magnitude less than that of the LSS capacity.

In the Subjective model, subjective variables vastly outweigh objective variables in importance: the top 7 variables in terms of ΔAIC magnitude are all subjective. The most important variable in this model is respondents' perceptions regarding their local LSS project's impact on "community quality of life" (ΔAIC = 32.7). The second most important variable is the perceived impact of the existing LSS project on landscape aesthetics (ΔAIC = 18.3), followed by respondents' sentiments about whether and how the local project impacted local property values (ΔAIC = 18.1), their familiarity with the local LSS project (ΔAIC = 17.1), their beliefs about whether the local project helps limit climate change (ΔAIC = 15.6), whether the local project conflicts with local interests and priorities (ΔAIC = 15.2), and their preferences for the appropriate level of community involvement in siting and permitting future LSS projects (ΔAIC = 12.7). Several objective variables remain statistically significant in the Subjective model, such as the LSS capacity, whether the respondent has solar on their home, and their education level. Notably, the respondents' distance from the LSS plant is no longer significant, as it is supplanted by the more precise subjective question of their "familiarity" with the project. It is also noteworthy that the objective measure of the number of LSS projects within 5 miles of the respondent's address is significant in the Subjective model (with those living in proximity to two projects being less supportive of additional LSS), while it was not significant in the objective model.

5 Discussion

By sampling a random, stratified, national cross-section of LSS neighbors, this survey provides unique breadth, rigor, and insights into these host community perceptions to inform future LSS development in the U.S.

Overall, LSS neighbors in the U.S. generally have positive (43%) or neutral (42%) attitudes about their local project, with a smaller fraction (15%) having negative attitudes. These proportions are roughly similar when asking these existing LSS neighbors' support for additional LSS in or near their communities, with roughly 42% supporting additional LSS, 39% neutral or unsure, and 18% opposing it. Existing LSS neighbors are more likely to support additional LSS than to oppose it by more than a 2:1 ratio.

Importantly, we find that this support for additional LSS is influenced by a variety of factors. While some objective measures are important and significant, subjective sentiments and perceptions of respondents are much more informative. This broad finding in and of itself is important: while objective factors are easier to measure, quantify, and—in some cases—mitigate, support hinges more so upon these subjective sentiments that are less easily quantified by interested parties. In the following discussion, we highlight and discuss some of the key findings from "Model 2," which included both subjective and objective independent variables.

5.1 Objective variables and level of support

Although objective variables contributed less than subjective variables in explaining the differences in support for more LSS in the future, several variables were statistically significant and/or surprising and therefore worthy of discussion.

Overall, we find relatively mixed results with regard to physical attributes of the LSS projects themselves. **LSS Capacity (MW; ΔAIC = 7.5)** was significant and relatively important. We find reduced support for additional LSS among neighbors living near projects >2 MW, compared to those living near 1-2 MW projects. But, somewhat surprisingly, the coefficients of the three LSS capacity groups are not monotonically ordered. Therefore, it may not be the case that larger projects always correlate with lower support in a linear relationship. This adds nuance to common preconceptions and hypotheses, which posited that there would be reduced support around larger projects; most prior literature had only compared LSS with residential or community-scale solar rather than examining support across different-sized LSS projects (e.g., Cousse, 2021; Nilson and Stedman, 2022). Meanwhile, the respondents' **distance from the LSS project (ΔAIC = −5.3)** was surprisingly not significant in the full subjective model, which builds upon some prior literature showing mixed effects of proximity (e.g., Carlisle et al., 2016; Hoen et al., 2019; Konisky et al., 2020; Spangler et al., 2024). The null finding with regard to proximity serves to further refute the NIMBY hypothesis (i.e., we find those who reside closer to existing LSS are not any less supportive of additional LSS).

We do, however, find a clear and consistent trend of stronger support for additional LSS among respondents who have **residential solar (ΔAIC = 6.1)** on their own home. This finding complements that of O'Shaughnessy et al. (2023), who found that nearby non-residential solar installations promote the adoption of residential solar. Our finding suggests that the influence goes in both directions: residential solar adopters are also more likely to support additional LSS nearby.

We find mixed results regarding the **number of nearby LSS projects (ΔAIC = 0.9)**. Although support was lower among residents living within 5 miles of two LSS projects compared to those living near only one, this trend does not hold among those living near 3 or more projects. This finding suggests that there may be a cumulative impact on neighbors' perceptions as more LSS projects are constructed; we had expected to find this impact more definitively. Ours is the first study to examine this effect, but future research should continue to monitor and assess this as more projects come online. Longitudinal research designs could be particularly valuable in assessing these potential cumulative impacts.

The **LSS install year** was not significant, so we do not necessarily see evidence of support increasing over time with lived experience. Unlike what Hoen et al. (2019) observed for wind, residents' **move-in period** does not provide strong evidence for Tiebout sorting amongst LSS neighbors. The **prior land use**/land cover where the LSS project was sited is also not significantly related to support, nor was whether the nearby project was designated as **agrivoltaic**. However, our sample size of the latter was relatively small and therefore limited in statistical power to uncover potential effects.

5.2 Subjective variables and level of support

The perceived impact of the nearby project on **community quality of life (ΔAIC = 32.7)** was—by far—the most important variable in explaining support for additional LSS. When thinking about additional solar in or near their communities, existing solar neighbors are concerned about impacts to social cohesion and quality of life across their community. Similarly, perceptions about whether the local project conflicts with **local interests and priorities (ΔAIC = 15.2)** were also strongly influential in explaining support. Taken together, these two findings support notions that LSS support and opposition is not necessarily selfishly motivated; instead, it is rooted in residents' perceptions about how well the projects align or fits with the community, their identity, and their sense of place (Devine-Wright, 2009; Gamper-Rabindran and Ash, 2024). These results suggest that greater attention be placed on participatory efforts intended to define community values, identities, and priorities, as well as determining how LSS development might align or conflict with those values.

Perceived impacts to **landscape aesthetics (ΔAIC = 18.3)** were the second most important variable in the model. This aligns with prior research demonstrating the salience of visual impacts on support for LSS (Carlisle et al., 2016; Crawford et al., 2022; Bessette et al., 2024), but LSS developers should take note that this is not necessarily the top concern of residents, as they might have previously assumed (Nilson et al., 2024a). Taken together with other significant variables in this model, we interpret that this visual impact could represent more than just an aesthetic preference, but also what it means for how their community will change. Further examination of this variable also illustrates how respondents navigate trade-offs with the perceived pros and cons of hosting LSS: nearly 1/3 of respondents who reported that their local project "worsened" landscape aesthetics would still support additional LSS around their community.

In addition, the perceived impact of LSS projects on residential **property values (ΔAIC = 18.1)** remains a top concern among neighboring residents. The relatively mixed and nuanced results from prior empirical analyses on this potential impact (Al-Hamoodah et al., 2018; Gaur and Lang, 2020; Elmallah et al., 2023), coupled with the fact it remains a top concern, suggest a need for additional study. Overall, it is clear that without adequate protections for property values, existing LSS neighbors are less likely to support additional LSS.

Respondents' level of **familiarity with their local LSS project (ΔAIC = 17.1)** was also very important in explaining support for additional LSS. Those who did not know their local LSS project existed (prior to receiving our survey) and those who only saw the project occasionally were more supportive of additional LSS compared with those who saw the local project every day. This finding may also suggest that a cumulative impact could emerge as more LSS projects are installed across the U.S. and familiarity increases, potentially reducing support for more LSS. More generally, we find "familiarity" to be a more valuable and reliable indicator than simply relying on respondents' distance from their nearby LSS project as a proxy for familiarity (as most prior literature has done), which was not significant.

LSS neighbors' perceptions about the impact of their local project on **climate change (ΔAIC = 15.6) and global environmental health (ΔAIC = 5.6)** were both significant, though the former was much more important in the model. This aligns with prior findings, that climate and environmental concerns correspond to LSS support (Carlisle et al., 2014, 2016; Pagliuca et al., 2022).

Respondents' sentiments about the most **appropriate way for the public to be engaged in LSS planning (ΔAIC = 12.7)** was also highly influential, with those seeking more public involvement in the process generally being less supportive of LSS. This finding captures that some respondents feel that they do not have a meaningful say in LSS permitting processes, and therefore would not support additional LSS. This suggests that offering LSS neighbors more decision-making power could make them more likely to support additional LSS, though the result could also be interpreted to suggest that those opposing additional LSS seek more decision-making power to reject proposed projects. Yet, surprisingly, we did not find **planning process fairness (ΔAIC = −1.6)** perceptions to be significantly related to support for LSS. This was unexpected, given the predominance of procedural justice in shaping attitudes and support in prior literature (e.g., Carlisle et al., 2015; Firestone et al., 2018; Crawford et al., 2022; Bessette et al., 2024; Hoesch et al., 2025). It should be noted that only a relatively small fraction of our sample was aware of the local LSS project prior to its construction—and those who were unaware did not answer this question in our survey[4]—so we may have lacked power to analyze this rigorously. The low fraction of LSS neighbors that were aware of the project prior to construction does suggest that there is substantial room for improvement in community engagement and participation during LSS planning and development phases.

Finally, although a relatively small ΔAIC, sentiments about whether the community hosts a **fair share (ΔAIC = 0.9)** of undesirable land uses were marginally significant, with those perceiving that their community hosts "more than its fair share" of undesirable land uses being less supportive of additional LSS. This finding again supports the theories of place-fit and place-protection (Devine-Wright, 2009) by suggesting that opposition may not be about LSS specifically, but might take locally-unwanted land-uses into consideration. In addition, this could suggest a perception among solar neighbors of distributional injustice as it relates to hosting unwanted land uses.

6 Conclusion and policy implications

6.1 Conclusion

The rapid deployment of LSS in recent years is widely forecasted to accelerate in the near- to medium-term, according to both analyst projections (Seel et al., 2024) and transmission interconnection queues (Rand et al., 2024b). Prior research has demonstrated the myriad ways in which LSS facilities interact with the communities hosting them, and the positive and negative perceptions that result from those interactions. Continuing the rapid and widespread deployment of LSS in the U.S. is contingent upon sustained support from these host communities, yet LSS developers report community opposition as a leading driver of project delays and cancellations in recent years (Nilson et al., 2024a).

Enabling, fostering, and enhancing positive outcomes for host communities, project developers, and society more broadly as these projects are developed and deployed is the responsibility of a wide variety of actors, including but not limited to federal and

4 When weighted to represent the true population of solar neighbors, we estimated that only 17% of respondents were aware prior to construction.

state policymakers, local elected officials, project developers, power purchasers and financiers, community-based organizations, and community-members themselves. This research provides valuable insights for future LSS projects that can be utilized by all of these actors to improve outcomes.

Overall, we find most LSS neighbors are neutral or supportive of additional LSS in or near their communities, but that support is influenced by a variety of factors. A few objective measures—such as the size of the project nearest the respondent, the respondent's education level, and whether they have solar on their own home—are important and significant, but subjective sentiments and perceptions of respondents are much more informative. For example, perceptions about how LSS helps or hinders community quality of life, landscape aesthetics, residential property values, climate change, and community interests and priorities were especially salient. In addition, respondents' familiarity with their local project was influential: seeing the project more frequently generally corresponded to lower support for additional LSS. Broadly, we find evidence to reject the NIMBY hypothesis, and, conversely, more evidence to support the relationship between LSS support and community values, identity, sense of place, and protection of that place.

This study made numerous novel and important methodological contributions to aid in understanding the factors relating to support for additional LSS projects among those with direct lived experience. As a large, nationally representative, and spatially explicit (only including neighbors within 3 miles of LSS) survey, it offers rigor and external validity lacking in previous research. It is among the first to examine and control for numerous important variables, including, e.g., the age of the LSS project, the number of LSS projects within 5 miles of the respondent's home, when the respondent moved into the area relative to LSS construction, whether the respondent has residential solar on their own rooftop, the type of LSS project (e.g., greenfield vs. agrivoltaics), the prior land use, the respondent's level of familiarity with their nearby LSS project, and a variety of other important perceptions, beliefs, and sentiments of the respondents.

Our study also highlights additional research gaps that should be pursued. Future research should continue to examine the effect of cumulative impacts, especially as more LSS projects are built, more individuals interact with them, and existing neighbors gain additional years of experience living near LSS. Future research should also continue to examine community sentiments about land use changes and innovative LSS types like agrivoltaics, for which this study did not uncover significant findings but qualitative and anecdotal evidence suggests could be highly salient (Pascaris et al., 2022; Bessette et al., 2024). Perhaps most importantly, future research should examine LSS sentiments through longitudinal research designs, rather than the cross-sectional design employed here, to track changes and trends over time with experience and continued LSS deployment. And finally, more research to quantify and "objectify" the various subjective variables might be valuable such that they could be compared among projects, tested, and reduced. For example, there is a large body of work examining landscape aesthetic impacts (Rodrigues et al., 2010; Ioannidis and Koutsoyiannis, 2020) that might help to quantify the degree to which an LSS impacts the local aesthetics, which could potentially be mitigated to reduce this concern. As well, a quantification of how much local engagement occurs during siting and permitting (Nilson et al., 2024b) might allow that to be tested and improved in other projects.

6.2 Policy implications

Most existing LSS neighbors either support or feel neutral about additional LSS in or near their communities, with only 18% opposing it. This finding may support communities and local decision-makers being approached to host new LSS projects: in general, those with lived experience do not express major reservations.

More specifically, in the U.S., there are ongoing policy discussions around "permitting reforms" designed to reduce timelines and streamline the permitting of clean energy projects (Bozuwa and Mulvaney, 2023; National Academies of Sciences, Engineering, and Medicine, 2023; Nilson et al., 2024b). This has manifested in some states by preempting local authority over the siting and permitting of large renewable energy facilities (NYSERDA, 2021; Bozuwa and Mulvaney, 2023; Anderson and Johnson, 2024; Nilson et al., 2024b). As LSS siting and permitting authority becomes more centralized and top-down, understanding how to enhance meaningful community engagement, align with communities' values, interests, and identities, minimize community conflict, incorporate community aesthetic feedback into project design, address property value concerns, and support community quality of life becomes all the more important.

In addition, decision-makers should consider possible cumulative impacts with LSS and other infrastructure development: There may be a threshold of development where the first few projects are supported but additional development may lead to increased opposition. Local residents express concerns about hosting more than their fair share of unwanted infrastructure.

Finally, it is critical to extend all of these considerations beyond *direct, abutting* neighbors of LSS projects, which are most likely to be consulted (and compensated) but may be few in number. We included residents living up to three miles away from LSS projects in our sample, and found that impacts and concerns extend across this distance. Importantly, one's distance from an LSS project is not a reliable indicator of one's familiarity, of their perceived impacts, nor of their support for additional LSS.

Data availability statement

The datasets presented in this article are not readily available because the data used in this study is confidential and protected, and therefore not able to be shared. Questions about the datasets should be directed to Joseph Rand, jrand@lbl.gov.

Ethics statement

The studies involving humans were approved by Human and Animal Research Committee (HARC) at

Lawrence Berkeley National Laboratory. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JR: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Writing – original draft, Writing – review & editing. KH: Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. RN: Conceptualization, Methodology, Writing – review & editing. BH: Conceptualization, Funding acquisition, Methodology, Project administration, Writing – review & editing. SM: Conceptualization, Investigation, Methodology, Writing – review & editing. DB: Conceptualization, Methodology, Writing – review & editing. JW: Conceptualization, Methodology, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. The work described in this article was funded by the U.S. Department of Energy's Solar Energy Technologies Office under Contract No. DE-AC02-05CH11231.

Acknowledgments

We are grateful to our survey respondents who offered their insights and perspectives that made this article possible, especially the six respondents who donated extra time to pilot our survey instrument and provide feedback. The authors also thank Matto Mildenberger, Jeremy Firestone, and Stephanie Kane for providing feedback at various stages during this research, as well as the peer-reviewers, whose comments helped refine and strengthen this paper.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsuep.2025.1579170/full#supplementary-material

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