Public Attitudes Regarding Large-Scale Solar Energy Development in the U.S.

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Abstract

Using data collected from both a National sample as well as an oversample in U.S. Southwest, we examine public attitudes toward the construction of utility-scale solar facilities in the U.S. as well as development in one's own county. Our multivariate analyses assess demographic and socio-psychological factors as well as context in terms of proximity of proposed project by considering the effect of predictors for respondents living in the Southwest versus those from a National sample. We find that the predictors, and impact of the predictors, related to support and opposition to solar development vary in terms of psychological and physical distance. Overall, for respondents living in the U.S. Southwest we find that environmentalism, belief that developers receive too many incentives, and trust in project developers to be significantly related to support and opposition to solar development, in general. When Southwest respondents consider large-scale solar development in their county, the influence of these variables changes so that property value race, and age only yield influence. Differential effects occur for respondents of our National sample. We believe our findings to be relevant for those outside the U.S. due to the considerable growth PV solar has experienced in the last decade, especially in China, Japan, Germany, and the U.S.

Key words: public opinion; solar energy, renewable energy; NIMBY; place attachment; facility siting; public acceptance

Introduction

The need for sustainable energy production has become increasingly apparent in recent years. The U.S. ranks 11th in energy use per capita and 2nd in overall energy use (World Bank)¹. With the majority of U.S. energy derived from fossil fuels and the majority of greenhouse gases coming from the burning of fossil fuels for energy, the possibility that renewable resources may help meet our energy needs and simultaneously mitigate climate change is increasingly salient. Rising levels of greenhouse gases and subsequent impacts on climate hasten the necessity for renewable energy technologies such as solar energy to replace CO₂ emitting ones. However, public concern over the environment has fallen, reaching a twenty-year low in 2010 (Gallup 2010), though a majority of the public still believes that global warming is real, imminent, and the result of human behavior (Scruggs and Benegal 2012).

While utility-scale solar electricity generating facilities are not yet widespread in the U.S., solar energy is a promising source of energy to help alleviate the growing dependence on fossil fuel-based energy. The U.S. Energy Information Administration forecasts solar electricity generation to increase by almost ten percent annually through 2035 (EIA, 2012, p. 90). Studies suggest that most of the American public supports solar energy development and the public is willing to pay more for clean energy production in order to decrease the production of energy from fossil fuels (Farhar 2003). The Obama administration has vowed to make renewable energy a larger portion of the nation's energy portfolio, as evidenced by its work to establish 17 solar energy zones in six Southwestern states--California, Nevada, New Mexico, Arizona, Utah, and Colorado (Cart 2012). Still, even with widespread and

¹ World Bank data are from 2012 as 2013 data are incomplete.

growing support toward solar, development of utility-scale solar is often stymied due to a variety of obstacles including cost, efficiency, and regulations (Montgomery 2013).

The President's renewable energy policies are not without controversy, mostly due to the expedited nature of the permitting process. Many environmental and conservation groups worry about the impacts of solar facilities on rare desert plants and animals (Cart 2012). In the San Luis Valley of Colorado, local residents sided with environmental groups to oppose a concentrated solar power (CSP) facility due to the impact the project would have on the local ecosystem, especially with regards to transmission line siting, and despite recognizing other benefits of solar power for the environment (Farhar et al. 2010). This example is not an isolated case; despite widespread support for renewable energy, including solar, specific projects are often met with strong opposition (Klick and Smith 2009). As Devine-Wright states, "It is widely recognized that public acceptability often poses a barrier towards renewable energy development" (2005, p. 125). Thus, a fundamental aspect of developing and expanding renewable energy such as solar is to understand factors affecting public attitudes toward the resource in general, as well as those perhaps specific to place and geography.

This research focuses specifically on the public's attitudes toward utility-scale² solar energy development in the U.S. First, we consider the level of support for utility-scale solar energy development both generally and in terms of proximity between the proposed project and the location of the respondents. Second, we discuss and assess the factors associated with greater support or opposition to large-scale solar development, again considering proximity of proposed project and geographic location of the respondents. We utilize data from both a U.S. National telephone survey with an oversample of residents in five southwestern states (Utah, Arizona, California, New Mexico, and Nevada). These states were selected because they are likely to have large-scale solar facilities due to the sheer abundance of sunlight as well as the specific topographic requirements (flat terrain, low foliage cover) of utility-scale solar facilities.

Previous Research

² Large-scale solar facilities or utility-scale solar facilities are different from residential rooftop solar, solar panels on commercial or public buildings, and widespread installation of panels on public infrastructure such as utility poles. For the purposes of this study, each large-scale solar facility is intended to power thousands of homes and businesses, requiring significant land-coverage in the hundreds or thousands of acres per project, depending on specific installation size.

Scholarly attention regarding public attitudes towards energy development is not new, especially in the U.S. and Western Europe (Ansolabehere 2007; Ansolabehere and Konisky 2009; Sovacool 2009; Van der Horst 2007; Walker 1995; Wüstenhagen, Wolsink, Burer 2007). Moreover, scholarly attention on public attitudes toward wind and wind siting controversies, more specifically, has grown in recent years (Bell et al. 2005; Ladenburg 2008; Klick and Smith 2010; Krohn, Damborg 1999; Swofford and Slattery 2010; Wolsink 2000, 2007; Warren, Lumsden, O'Dowd and Birnie 2005; Warren and McFadyen 2010). Overall, studies demonstrate that respondents generally support renewable energy development (Bell et al. 2005; Devine-Wright 2005; Klick and Smith 2010; Warren et al. 2005; Wolsink 2000), especially when compared to other energy sources such as nuclear (McGowan and Sauter 2005). While the public's support of renewable energy has been found to increase with upticks in gas prices, support for renewable energy has been mostly stable, except for a recent dip in overall support between 2011 and 2013 (Gallup 2013; McGowan and Sauter 2005; Smith 2002) as well as a drop in support for government funding towards alternative energy, especially among Republicans (Pew 2012). Among different renewable energy types, solar tends to be the most positively regarded (Gallup 2013; Greenberg 2009); and wind to be the most polarizing (DTI Scottish Executive et al. 2003). However, few studies in any countries examine public attitudes towards utility scale solar energy development by itself.

Much of the existing scholarly research considering support or opposition to energy sources focuses on support for that energy source in a specific location. As a result, there is a great deal of literature that considers opposition to nuclear, wind, or coal in terms of a NIMBY (Not In My Backyard) framework. Dear (1992) defines NIMBYs as "residents who want to protect their turf. More formally, NIMBY refers to the protectionist attitudes of and oppositional tactics adopted by community groups facing an unwelcome development in their neighborhood" (p 288). However, the NIMBY approach is not without critics. Current scholars consider it a pejorative and rather simplistic label that homogenizes opposition. In fact, the NIMBY theory suggests that opposition is based on ignorance or irrationality but scholars have actually found that opposition can be both very informed (Petts 1997) and rational (Gross 2007). Moreover, NIMBY fails to explain opposition for projects by locals based simply on proximity (Jones and Eiser 2009). More recent literature on support and opposition of renewable energy looks beyond NIMBY and considers a variety of other explanations built upon a psychological environmental theoretical framework. Thus, such research considers the relationship between support and opposition to renewable energy and demographic factors, socio-psychological factors (knowledge, direct experience, environmental and political beliefs,

place attachment); and contextual factors (technology type and scale, institutional structure, and incentives). Specifically, research results show support and opposition toward renewable energy vary according to demographic variables such as age, income, education, and gender (Firestone and Kempton 2007; Ladenburg 2010). Devine-Wright (2008) cites several studies conducted in the UK that demonstrate the significant impact of age on support for renewable energy, although there are contradictory findings regarding the nature of the relationship. For example, older individuals are more opposed to or less willing to pay for renewable energy than younger individuals (MORI Social Research Institute for Regen SW 2003; see also Ottman 1993; Vorkinn and Riese 2001; Zarnikau 2003) while other studies find a U-shaped relationship where both younger and older respondents are less opposed to renewable energy than are middle-aged cohorts. Still others show older respondents are less opposed to nuclear energy than are younger respondents (Populus 2005; ICM Research for BBC Newsnight 2005). Research considering the impact of sex also produces mixed results. While some research finds women to be more environmentally concerned (Mohai 1992) and supportive of renewables than men, men tend to demonstrate greater awareness and greater support for solar, nuclear, and wind (Brody 1984; Corner et al. 2011; DTI Scottish Executive et al. 2003; Klick and Smith 2010). Income and class have both been found to be positively correlated with support for renewable, nuclear, and wind energy (Corner et al. 2011; Firestone and Kempton 2007; MORI Social Research for Regen SW 2004).

Party identification and political ideology are well known predictors of environmental opinions. Democrats and liberals typically support policies protecting the environment, while Republicans and conservatives generally oppose them (Dunlap and Van Liere 1978; Guber 2003; Jones and Dunlap 1992; Michaud et al. 2008; Smith 2002). While some research finds ideology to be significantly related to support for renewable energy, other research finds no significant relationship, implying that renewable energy has not yet been equated with environmentalism as defined by the literature. In the UK, Populus (2005) finds that 37% of individuals indicating support for the Conservative party are supportive of new nuclear power stations versus only 12% of Labour supporters and 14% Liberal Democrats. Klick and Smith (2010) find in their embedded experiment that party identification is not related to either of the two wind support questions included in their survey ($R = -.04$ for both relationships) and ideology is not related to the initial wind question ($R = -.02$) and is only weakly related to the second ($R = -.11$, $p < .02$). The authors suggest that because wind has not yet been adopted by a major political party or ideological camp, the public should not possess well-developed partisan or ideological opinions about it. While we concur with this assessment,

we suspect there to be ideological opinions about solar in the U.S. due as a result of the very strong position that President Obama took on renewable energy in general during the 2008 election, as well as the much publicized problems associated with Solyndra, a solar panel company for which the Obama administration provided government loan guarantees. In particular, once news broke of Solyndra's financial failures, partisan criticism surrounding Obama's push for government investment in Solyndra grew as many GOP leaders in Congress accused Obama of rushing the loan and wasting taxpayer money (New York Times 2011). We believe such events can create an ideological divide in terms of solar.

Beyond party identification and political ideology there is evidence that environmental beliefs are also significantly related to support for renewable energy (Ansolabehere 2007; Corner 2011; Hansla et al. 2008). For example, Hansla et al. (2008) find that attitude toward green electricity is positively associated with willingness to pay for it. Spence et al. (2010) find that general environmental concern and concerns about climate change are positively linked with evaluations of renewables and negatively linked with evaluations of nuclear power. Likewise, Corner et al. (2011) find that those who are more concerned about climate change and energy security and possess higher environmental values are less likely to favor nuclear power; however this relationship is reversed when respondents are allowed to express their dislike for nuclear power at the same time as their conditional support for it.

Psychologists and political scientists studying persuasion consider the role that pre-existing beliefs have on accepting messages. Zaller's (1992) Receive-Accept-Sample model and those whose work builds on it (Alvarez and Brehm, 2002; Carlisle et al. 2010; Delli Carpini and Keeter 1996; Smith 1989, 2002) demonstrate a strong relationship between one's likelihood to accept persuasive messages consistent with his/her ideologies and values and to reject messages that are inconsistent. Carlisle et al. (2010) find that with regard to offshore oil drilling, prior beliefs influence the likelihood that people will accept or reject reports of scientific studies so that they accept those that support their beliefs and reject those that contradict them. As Sarewitz (2011) argues, people filter information through pre-existing beliefs instead of information being the primary factor in determining degrees of support for renewable energy projects. Through this filtering process, information loses its original meaning and is molded to support one's deeply held beliefs. In other words, one's belief about climate change or the role of government policies regarding CO₂ emissions are greater factors than the role of information in determining one's support or opposition to renewable energy projects. We consider belief about climate change in our analyses.

Many scholars have found value in using place attachment to explain support and opposition to particular renewable energy developments and proposals (Devine-Wright 2009; Devine-Wright and Howes 2010; Ellis et al. 2007; Firestone 2009; Khan 2004; Ladenburg 2010; Soerensen 2003). Devine-Wright (2007) argues that place attachment, or the “positive emotional bonds between people and valued environments, can serve to motivate both public support and opposition to proposed technology developments” (p. 7). Devine-Wright and Howe’s (2010) work illustrates the differential responses of individuals living in different communities. In particular, they find that residents of Llandudno, Wales consider an offshore wind farm as a threat to the town and being “monstrously damaging” whereas residents of Colwyn Bay, about 5 miles southeast of Llandudno, consider such a development to be more beneficial due to the fact that the residents consider their town to be in decline and thus, the town might benefit from such “industrialization” as a result of the project (Devine-Wright and Howes 2010, p. 276). Other socio-psychological factors that scholars have considered include income and price of electric bill (Ansolabehere 2007).

Contextual factors have proven to be particularly relevant to explaining support and opposition to renewable energy. In particular, studies have found that factors related to a proposal’s size and scope of the particular technology is significantly related to support and opposition. For example, research has found that larger projects are less likely to garner public support (Lee et al. 1989; AIM 1993; Wolsink 1989; Sustainable Energy Ireland 2003). The visibility of a project is also considered related, especially with regard to both onshore and offshore wind developments, to public support so that projects that are out of view tend to garner greater public acceptance (Brittan 2002; Jones and Eiser 2010; Phadke 2010; Warren et. al. 2010; Wolsink 2007). Other contextual factors related to public support include the extent and timing of public engagement in the decision making process (Cotton and Devine-Wright 2010; Hindmarsh 2010; Wüstenhagen et al. 2007; Breukers and Wolsink 2007; Devine-Wright 2005; Jobert et al. 2007; Wolsink 2007, 2010); distrust of project and project sponsors (Smith and Marquez 2000; Gross 2007; Haggett 2010) and ignoring local siting concerns (Barry et al. 2008; Sovacool 2009); lack of community “ownership” of a project (Warren and McFadyen 2010); land access and habitat preservation concerns (Phadke 2012); incentives and willingness to pay (Bergmann et al. 2006, 2008).

The literature thus provides a solid framework for understanding factors that might play a role in influencing public perceptions about and support for solar energy, in particular utility-scale photovoltaic solar. In this study, we consider a variety of the environmental psychology explanations, in combination with demographic

and socio-psychological factors. A unique aspect of our research design is the two samples: a nationally representative sample of households, and a sample restricted to residents of Southwestern states. This design allows us to test the effect of “proximity” in three ways. First, we can compare the level of support for large-scale solar for respondents living in the U.S. Southwest versus those living elsewhere. Second, we can compare the responses of two different measures of support for solar, one that measures general support and one that measures support for solar in a locale more proximate to the respondent. Finally, we can compare the nature of the effect that our predictor variables have under the different circumstances—support for solar in general versus support for solar nearby (in one’s county) *and* between those living in the Southwest versus those living elsewhere. Our purpose for considering the data in this manner is based on the fact that the U.S. Southwest is the most likely locale for utility-scale solar developments and respondents living there might be more or less supportive of these developments. As well, different factors or the nature of the impact of factors might differ for respondents living in the Southwest and those living elsewhere. This design also matches contextual factors of other countries that are large in terms of geographic size but where the solar resource may be concentrated in a specific geographical area. Thus, our research questions are as follows:

- 1: How supportive are Americans of large-scale solar facilities?
- 2: Does support for large-scale solar facilities differ when the survey item is described as proposing a large-scale facility be built proximate to the respondent (“your county”)?
- 3: What factors predict support for large-scale solar facilities and do those factors or nature of the impact differ for those living in the U.S. Southwest versus those living elsewhere or whether the facility is proposed as proximate to the respondent (“your county”)?

Data

To examine public opinion about solar energy, we use data from a dual-frame (land-line and cell phone) random digit dial telephone survey conducted by the University of Idaho’s Social Science Research Unit, using samples purchased from Survey Sampling International. The National sample includes 619 completed interviews, and the Southwest sample includes 405 completed interviews from residents of Arizona, California, New Mexico, Nevada, and Utah. That sample is stratified by state. Data are weighted to account for the complex sample design (dual-frame and stratified random samples). Calls began 3 April 2012 and continued until 21 June 2012.

The final response rate for the National sample was 8.1% with a cooperation rate of 19.1%. The final response rate for the Southwest sample was 5.6% with a cooperation rate of 26.1%.³ The response rate for this study was low, despite numerous attempts to reach each household (each number attempted six to eight times). We expect this low response rate was due in part to the lack of awareness about large scale solar facilities as many of the interviewer-recorded comments cite this as a reason for refusing the survey. It is worth noting, however, that break-off rates once surveys began (i.e., people choosing to end the survey prematurely) were low, indicating that respondents found the survey interesting enough to finish it, once they got into answering the questions.

Dependent Variables

To gauge general public support for utility-scale solar projects we use the following question, “How strongly do you support or oppose the construction of large solar facilities in the U.S.?” Answer categories are based on five-category Likert scale from 1 (strongly oppose) to 5 (strongly support). We also use a second dependent variable that frames the project as proposed proximate to the respondent. It asks, “Suppose the construction of a large solar facility was planned for your county. How strongly would you support or oppose its construction?” Answer categories also include a five-category Likert scale ranging from 1 (strongly oppose) to 5 (strongly support).

Independent Variables

Our independent variables⁴ for our regression include several demographic/background variables: urban, suburban, and rural (each dummy coded); race; and education; socio-psychological factors including: political ideology; perception of the seriousness of climate change, used as a proxy for environmentalism; whether solar facilities are seen as a symbol of local, state, or federal government commitments to renewable energy, whether respondents believe that solar facilities do not release greenhouse gases, whether respondents believe solar facilities do not release pollutants, whether respondents believe that solar facilities often include low-cost government leases, whether respondents believe that there are too many government incentives for solar energy development, how much trust respondents have in solar energy companies, whether respondents believe solar energy is more expensive

³ When we compare the response and cooperation rates, one can see that with National sample, it was hard to convince people to do the survey. The Southwest sample was hard to get in touch with people, but those whom we contacted had a much higher willingness to do the survey. For comparison, the refusal rate for National was 32.7 and the refusal rate for southwest was 15.8—half that of National, which could speak to survey salience (see Groves, Presser & Dipko 2004; Heberlein & Baumgartner 1978).

⁴ Coding of independent variables are included in the Appendix.

than other forms of electricity, the extent to which the respondent believes that building a large-scale solar facility will decrease his/her property value, as a measure of place attachment and the extent to which the respondent believes a large-scale solar facility will spoil the scenery, also a measure of place attachment. To examine contextual aspects by assessing the effect that “proximity” of a proposed project will have on support, we analyze the National and Southwest samples separately. We also consider proximity by asking the extent of support for large-scale solar development in the U.S. (gauging support in a general sense) versus support for solar when framed as being proposed for their own county (a more proximate locale), and again consider whether the change in how the question is framed alters the level of support for large-scale solar development or perhaps changes the nature of the effect of particular variables on levels of support for respondents of our two different samples.

Support for Solar

We now turn to an examination of the public support for solar power. We begin by considering both support for utility-scale solar power construction in general (in the U.S.) and support for solar power construction in one’s county. In looking at Figures 1 and 2 one can see that there is little difference between respondents from the National sample and those in the Southwest sample. Indeed any differences are slight and fail to reach statistical significance according to t-tests. Figure 1 shows that an overwhelming majority of respondents from both samples support the construction of large solar facilities in the U.S. More specifically, 80% of the Southwest and 82% of respondents from the Southwest and National samples, respectively, moderately or strongly support the construction of such facilities. A very small proportion of respondents in both samples oppose the construction of large solar facilities in the U.S with slightly more respondents in the Southwest (10%) opposing construction than in the National sample (4%). Yet, again, such differences are modest and fail to reach statistical significance.

[INSERT FIGURE 1 ABOUT HERE]

Figure 2 shows frequency of responses about support for a large solar facility if it was planned to be built in one’s own county. According to NIMBY literature, one would expect that support for such development to drop in this situation since a NIMBY response would be one that opposes construction of such a facility in one’s proverbial backyard (in one’s county, in this case). Moreover, according to a NIMBY approach, one might also suspect support for solar construction to decline more in the Southwestern sample than the National sample due to the fact that large utility-scale facilities are much more likely to be built in the Southwest than in other places. As a result,

Southwestern respondents would seem more likely to oppose construction since such developments are more likely to be built more proximate to their “backyard” than respondents living elsewhere. In comparing the results, we do indeed see that the level of support for solar construction in a general sense (Figure 1) declines when respondents consider large solar construction in their county (Figure 2). However, the level of support (moderate and strong support) declines for both the Southwest and National respondents but the changes are not statistically significant. Likewise, the difference in support between the Southwest and National sample is smaller in Figure 2 than in Figure 1 but again, differences are not statistically significant. Thus, we can see that respondents in the Southwest are not any less supportive of solar being built in their “backyards,” where it is most likely to be built, than those living elsewhere and are only slightly more opposed than are respondents from the National sample. In fact, the difference in opposition between the two groups of respondents is smaller when considering construction of large-scale solar in one’s county than when considering large solar in general. The lack of statistically significant differences, therefore, demonstrates a lack of support for a NIMBY-based explanation. Finally, it is worth noting that overwhelming majorities of respondents of both samples support the construction of large solar facilities both in a general sense as well as when such proposals are hypothetically planned for their county.

[INSERT FIGURE 2 ABOUT HERE]

To develop a better understanding of the sources of support for large-scale solar facilities, we estimate a set of binary probit models using two different measures of support: general support for solar and support for solar in one’s county. Additionally, since we believe there are empirical and theoretical reasons that the independent variables will differentially affect levels of support for residents of the Southwestern states and those who live elsewhere, we estimate these models separately. Using separate probit equations to explore differences between two groups has been employed in other research and allows us to differentiate the way factors influence support or opposition to solar among the two groups based on geography. We used survey procedures SAS⁵ to conduct the statistical analyses.

We now turn our examination to the sources of support for large-scale solar. First, we consider a variety of items that characterize support and opposition to solar. The seven characteristics are frequently cited in public comments regarding solar energy development. As well, similar items have been used in similar research regarding

⁵ SAS, Version 9.2. 2013. SAS Institute, Inc. Cary, N.C.

support for wind power (Klick and Smith 2010). The answer categories were strongly believe, somewhat believe, neither believe nor disbelieve, somewhat disbelieve, strongly disbelieve.

How much do you trust or distrust the companies that are proposing to develop and build large solar facilities in the US?

How strongly do you believe or disbelieve that solar facilities are a symbol of local, state, and federal commitments to renewable energy?

How strongly do you believe or disbelieve that solar facility projects often include low cost government leases of public lands to private solar developers?

How strongly do you believe or disbelieve that large solar facilities are ugly and spoil the scenery?

How strongly do you believe or disbelieve that there are too many government incentives for solar energy development?

How strongly do you believe or disbelieve that solar energy is more expensive than electricity produced by other sources, such as coal?

How strongly do you believe or disbelieve building a large solar facility within view of your property will decrease the value of your property?

Figure 3 shows that overall, an overwhelming majority of Americans (90%) believe that solar development is a symbol of government commitment to renewable energy but also believe that large-scale solar will decrease property values (70%) and include low-cost leases to solar developers (90%). Americans are evenly split on whether they believe solar energy is more expensive to produce than other sources of energy. Finally, a majority (70%) of Americans do not believe there are too many government incentives for solar energy development and a slightly smaller majority (60%) trust the companies developing large-scale solar facilities.

[INSERT FIGURE 3 ABOUT HERE]

Here we begin our assessment of public support for large-scale solar construction in the U.S. We include both demographic and socio-psychological measures.⁶ The overall model likelihood ratio Chi-square statistic was 104.45 and was highly significant ($p < 0.0001$). The fit statistics in the model predicting support for solar development in the National sample are $R^2 = 0.26$ and $c = 0.837$. In the Southwest oversample, the likelihood ratio Chi-square statistic was 123.40, $p < 0.0001$, with a $R^2 = 0.43$ and $c = 0.992$. Thus, the fit statistics for both models show good fit and excellent discrimination.

⁶ Unfortunately, due to an error in the CATI system, data on respondent sex was not collected and thus cannot be included in our models.

The results of our first set of estimates, where we consider support for large-scale solar development in the U.S., are found in Table 1. In both the National sample (Model 1) and the Southwest sample (Model 2), it is striking that none of the demographic variables predict support for solar development. These findings are contrary to much of the research on environmental attitudes as well as literature on attitudes toward renewable energy. As the results demonstrate, urbanicity, age, race, and education all fail to register as significant predictors in both models.

For the socio-psychological predictors, several demonstrate statistical significance in the Southwest sample but only one is significant in the National sample. In the National sample, only solar as a symbol of government commitment to renewable energy ($p = 0.0079$) has a statistically significant effect on the level of support for solar energy development in the U.S. However, when we consider the effect of the independent variables in the Southwest model, six have statistically significant effects on support for solar development in the U.S. and all relationships are in the expected direction. These six variables include: whether solar energy is seen as a symbol of government commitment to renewable energy ($p = 0.0419$); the perception solar facilities receive low-cost leases ($p = 0.0197$); whether solar energy is perceived to be more expensive than other forms of electricity ($p < 0.0001$); the degree of trust in developers ($p = 0.0288$); the impact of solar facilities on property values ($p = 0.0200$); and the perceived seriousness of climate change ($p = 0.0039$). Turning to the parameter estimates for this Southwest model (Table 3) those who somewhat believe that solar energy is a symbol of local, state, or federal commitment to renewable energy are more likely to support solar development than those who strongly disbelieve of solar as a symbol of government commitment. Similarly, those who strongly or somewhat believe that solar development often involves low cost leases to solar companies are slightly less likely to support solar development than those who strongly disbelieve that developers receive low cost leases, while those who somewhat believe that developers receive low cost leases are actually more likely to support solar development than those who strongly believe that statement. Those who strongly or somewhat believe that solar is more expensive than other forms of energy are less likely to support solar development than those who strongly disbelieve that statement, as are those who somewhat disbelieve that statement. On the other hand, those who are neutral with respect to that statement are actually more likely to support solar development than those who strongly disbelieve that solar is more expensive. Those who trust companies developing solar tend to be more likely to support solar development, while those who somewhat distrust solar companies are less likely to support it than those who strongly distrust solar companies. It is worth noting that

two of our eight socio-psychological measures fail to demonstrate statistical significance: political ideology and whether respondents consider large-scale solar developments to spoil the scenery.

Next we turn to our analyses of support for solar in one's county in order to assess the effect of proximity of large-scale solar and whether the predictors of support vary based on respondents' location of residence. The global likelihood ratio statistic for the National sample had a Chi-square of 173.0275, $p < 0.001$. In the Southwest sample, the global likelihood ratio statistic Chi-square was 105.6953, $p < 0.0001$. The fit statistics for the models predicting support for solar development in one's own county were $R^2 = 0.40$ and $c = 0.90$ for the National sample and $R^2 = 0.39$ and $c = 0.89$, again showing excellent fit and discrimination (Table 4).

When predicting support for solar in one's own county, we consider the same predictors that we did above. In terms of our National sample, two demographic variables are statistically significant: urbanicity ($p = 0.0257$) and race (white verses all other, $p = 0.0288$). In particular, respondents living in rural areas are less supportive of solar development in their county than are those living in urban areas; no difference exists between those living in suburban vs. urban areas. Whites are more supportive of solar in their county than are non-whites, (Table 5). Looking at the socio-psychological variables and support for large-scale solar development in one's county, three variables in our National sample are statistically significant: political ideology ($p = 0.0051$); whether solar facilities are perceived to spoil the scenery ($p = 0.0027$); and level of trust in companies that develop solar ($p \leq .0001$). Political ideology has mixed results. Those who consider themselves moderates tend to support solar more than those who are very liberal. Additionally, those who strongly disagree that solar developments spoil the scenery are more likely to support solar than those who agree with this statement, while those who are neutral to the statement are actually less likely to support solar than those who agree with this statement. Individuals who put a great deal of trust in solar developers are more likely to support solar development in their county than those who do not, while those who are neutral with respect to trust in solar developers are actually less likely to support solar development in their county than those who do not trust the companies involved.

In the model using the results from the study of Southwest residents, three variables yield statistically significant impacts on the level of support for solar energy: race ($p = 0.0270$), age ($p = 0.0424$), and the impact on property values ($p = 0.0218$, Table 4). White respondents in the Southwest are more likely to support solar energy than non-white respondents, as are older residents. Those who strongly believe that solar facilities will reduce property values are less likely to support solar energy than those who strongly disbelieve (Table 6).

It is immediately apparent that some demographic variables (education, and age in most cases) have very little impact on levels of support for solar energy. Additionally, and contrary to our expectation, political ideology proves insignificant in our analyses for both the National and Southwest models in terms of support for solar in general and it only proves significant for our National sample with liberals more likely to support solar development in their county. We presumed that due to the criticism lobbed at President Obama by Republicans and conservatives in the recent past regarding Solyndra's financial failings and the U.S. Government's investment in the troubled company, respondents would conflate the two and thus negatively associate solar with their negative assessments of President Obama and Solyndra. This result does not appear to be the case. Therefore, in terms of general support for large-scale solar development we see that socio-psychological variables, especially environmental belief and trust in developers, play a much more significant role than does ideological belief. Thus, in terms of large-scale solar development in the U.S. it appears that support or opposition to solar is not an ideologically divided issue. However, the variable that has a statistically significant relationship to support for solar in a general sense is whether or not the respondent believes that solar energy is a symbol of government commitment to renewable energy. Those who see solar energy as a symbol of government commitment to renewable energy are more likely to support solar development than those who do not. This relationship, however fails to appear in terms of solar development in one's county for both the Southwest and National samples.

The degree to which respondents believe that climate change is a very serious problem demonstrates mixed results. The relationship between how strongly one believes in the seriousness of climate changes demonstrates a significant and positive impact on support for solar energy development in the U.S. but only for our Southwest sample. Similarly, the level of trust that respondents have for solar developers produces mixed results so that in terms of support for solar in the U.S. it is only significant for the Southwestern sample but not the National sample. However, in terms of support in for solar development in one's county, the effect is reversed so that the relationship is positive and significant for respondents in the National sample but insignificant for the Southwest Sample.

The measures of place attachment used in this study (effects on property value and whether solar facilities will spoil the scenery) also demonstrate mixed results across the models. In terms of support for solar when the question is phrased generally, only the effect on property value is significant and only for the National sample. However, when predicting support for solar in one's county, those who believe solar facilities spoil the scenery are less likely to support solar development in the National sample, and those who believe solar facilities decrease

property values are less likely to support solar in the Southwest sample. On the other hand, when predicting support for solar generally, the socio-psychological variables, such as the perception that solar developers receive too many government incentives or low cost leases, whether solar energy was seen as more expensive than other forms of electricity generating energy, and trust in developers are significant predictors of levels of support.

Discussion and Conclusion

The purpose of this study is to determine how strongly the public supports the development of large, utility-scale solar energy facilities both in general and in their own county as well as the factors that relate to support or opposition to those facilities. In general, the public overwhelmingly supports the development of large, utility-scale solar and support does not significantly differ when such developments are considered in a general sense or development is considered in the context of one's own county. Moreover, the level of support does not significantly differ between those living in the U.S. Southwest and those living elsewhere.

In considering the causes of support or opposition to solar energy development we come away with two key points. First, the predictors of support and opposition to solar development differ depending on whether we consider the National public or the Southwestern public. With solar energy development most likely to take place in the U.S. Southwest, it is important to understand the factors that relate to support or opposition. The debate about energy often occurs at a National level, but policy scholars would be remiss to omit the fact that local populations and even a small minority of a local population can stymie even the best-laid plans. What is true with regard to the development of other energy facilities, including wind, is that public opposition by a sometimes numerically small group of people cannot only delay but even altogether halt construction of a development, which is often referred to as the "democratic deficit" (Bell et al. 2005).

Second, while support for solar construction does not vary significantly when considering it in a general versus a local sense within the Southwestern sample, the predictors significantly related to support for large-scale solar development differ depending upon whether large-scale solar construction is differently framed. Many scholars have been trying to understand this "social gap" in renewable energy development and the factors that contribute to support and opposition to renewable energy projects, most apparently with regard to wind. In doing so, they have most notably moved away from the over-simplistic NIMBY explanation and instead moved toward other possible explanations that demonstrate that individuals support wind power but that support is perhaps conditional (Walker

1995; Sparkes and Kidner 1996). Again, Devine-Wright has advocated for understanding the idea of place attachment, which, in contrast to NIMBY, accepts the premise that locals could possibly be strongly in support of a large-scale energy infrastructure if it brings along with it benefits that are of meaning and value to a particular community. Haggett (2011) provides a comprehensive list of potential benefits:

These could include short term benefits, such as using local services for contractors; and longer term benefits, such [as] developing local infrastructure (such as transport links), invigorating [areas] with improved facilities, and setting up training schemes so that local people could be employed in the industry. It could include tangible benefits through monetary investment in local communities; and more intangible benefits, such as investing time in local communities, generating discussions around energy, and creating local pride and prestige for communities as trailblazing energy hosts.

Thus, the burden becomes shared wherein developers work with community rather than steam-rolling over them in order for development to occur and for communities to negotiate terms that might provide benefits that are of value to it.

These findings are of interest to all countries and localities that may be considering large-scale solar facilities as a technology. The U.S. is certainly not the only country far along in adopting and deploying solar, and it is not limited to Organisation for Economic Cooperation and Development (OECD) members. The International Energy Agency notes that global solar photovoltaic development grew by 37% in 2013 with much of the growth in Japan and China, and non-OECD generation capacity should exceed that of OECD capacity within ten years (International Energy Agency 2014). We stress that our research questions and specific survey questions are very relevant to solar development in any country and geographic region within it. The findings are of particular importance in a few areas. First, the solar resource for large-scale facilities may be concentrated in a very defined area within a much larger jurisdiction such as a state or province, as in the present study. Next, solar at this point is still a rapidly developing technology and significant government support for it is still necessary in most countries to ensure its viability; understanding the public's attitudes toward government investment or subsidization should be of interest. Likewise, trust in solar developers is also critical to ensure a project's success no matter the location. Place attachment and proximity to places of societal value are central concepts for public support of solar in any location. Finally, some findings from this study are posited as U.S. and Southwestern-specific but may be more generalizable as similar studies are done in other countries.

While our findings are in no way conclusive in terms of solar development, we do believe this to be a strong contribution to understanding support for utility-scale solar projects. We believe that more work can and should be done, both in the U.S. and other countries, to explore the variety of factors that contribute to support and

opposition. In particular we believe that more work considering place attachment in relation to support for solar facilities would be a promising direction; a survey in an area with a proposed or recently completed project would provide more insight. As well, we believe that exploring the range of benefits, both tangible and intangible, to be a possibly fruitful endeavor. Finally, scholars should explore the characteristics of the technology as well as perceived outcomes with respect to locals. A better understanding how locals think about the technology and perceived outcomes of such a facility will help developers work in concert with the community and negotiate a successful project.

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Ethical Standards

The research discussed in this paper complies with United States research ethics laws and regulations.

Appendix: Variable Coding

Urban		1 if Urban; 0 Otherwise
Suburban		1 if Suburban; 0 Otherwise
Rural		1 if Rural; 0 Otherwise
Race		1 if White/Caucasian; 0 otherwise
Education		1 = Less than HS; 2 = HS Graduate; 3 = Some college or Associate's degree; 4 = Bachelor's degree; 5 = Graduate or professional degree
Political Ideology	"In general, would you describe your political views as..."	1 = Very conservative; 2 = Conservative, 3 = Moderate; 4 = Liberal; 5 = Very Liberal
Seriousness of Climate Change	"In your view, how serious a problem is global climate change?"	1 = Not a problem; 2 = Slightly serious problem; 3 = Somewhat serious problem; 4 = Very serious problem
Symbol of Renewable Energy	"How strongly do you believe or disbelieve that solar facilities are a symbol of local, state, and federal commitments to renewable energy?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Emit Greenhouse Gases	"How strongly do you believe or disbelieve that solar facilities do not release greenhouse gases that contribute to climate change, such as carbon dioxide?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Emit Chemical Pollutants	"How strongly do you believe or disbelieve that solar facilities do not release chemical pollutants, such as mercury?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Low-cost Leases	"How strongly do you believe or disbelieve that solar facilities projects often include low cost government leases of public land to private solar developers?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Spoil the Scenery	"How strongly do you believe or disbelieve that large solar are ugly and spoil the scenery?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Government Incentives	"How strongly do you believe or disbelieve that there are too many government incentives for solar energy development?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
More Expensive	"How strongly do you believe or disbelieve that solar energy is more expensive than electricity produced by other sources, such as coal?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve
Distrust of Companies	"How much do you trust or distrust the companies that are proposing to develop and build large solar facilities in the U.S.?"	1 = Completely trust; 2 = Somewhat trust; 3 = Neither trust nor distrust; 4 = Somewhat distrust; 5 = Strongly distrust
Property Values	"How strongly do you believe or disbelieve that building a large solar facility within view of your property will decrease the value of your property?"	1 = Strongly believe; 2 = Somewhat believe; 3 = Neither believe nor disbelieve, 4 = Somewhat disbelieve; 5 = Strongly disbelieve

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Figure 1: How strongly do you support or oppose the construction of large solar facilities in the U.S.?

Figure 2: Suppose the construction of a large solar facility was planned for your county. How strongly would you support or oppose its construction?

Table 1: Main effects of the probit regression model predicting support for utility-scale solar construction in the U.S. for both the Southwest (SW) and National (Nat) samples

Variable	Model 1: Nat Wald χ^2 (d.f.)	Model 2: SW Wald χ^2 (d.f.)
<i>Demographic</i>		
Location	0.1353 (2)	1.8801 (2)
Race (White vs. Other)	0.2144 (1)	2.5830 (1)
Education	4.4932 (4)	5.9957 (4)
Age	0.0005 (1)	1.2429 (1)
<i>Socio-Psychological</i>		
Political Ideology (Conservative high)	6.9695 (4)	7.1923 (4)
Symbol of Gov't Commitment to Renewable Energy	13.8086 (4) **	9.9151 (4)*
Low Cost Leases from Government	2.6245 (4)	11.6997 (4)*
Spoil the Scenery	2.4363 (4)	1.9388 (4)
More Expensive	3.2895 (4)	45.0848 (4)***
Trust Developers	7.7203 (4)	10.8112 (4)*
Decrease Property Value	5.5949 (4)	11.6713 (4)*
Seriousness of Climate Change	3.8597 (4)	13.3540 (4)**

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 2: Parameter estimates for independent variables in the probit regression model predicting support for utility-scale solar construction in the U.S. for the National (Nat) sample

Variable	d.f.	Estimate	SE	Wald χ^2	P-value
<i>Intercept 1</i>	1	0.5188	0.4272	1.4754	0.2245
Location (Rural vs. Urban)	1	-0.0367	0.1542	0.0566	0.8120
Location (Suburban vs. Urban)	1	0.0513	0.1566	0.1072	0.7433
Race	1	0.1579	0.3411	0.2144	0.6433
Education (Less than HS vs. Grad Deg)	1	-0.5943	0.3577	2.7603	0.0966
Education (HS Grad vs. Grad Deg)	1	0.0488	0.2583	0.0357	0.8502
Education (Some Col vs. Grad Deg)	1	0.2427	0.2233	1.1817	0.2770
Education (Bachelors vs Grad Deg)	1	0.3782	0.2165	3.0517	0.0807
Age	1	0.000168	0.00742	0.0005	0.9820
Political Ideology (VC vs. VL)	1	-0.3426	0.3272	1.0967	0.2950
Political Ideology (SC vs. VL)	1	-0.2621	0.1828	2.0557	0.1516
Political Ideology (M vs. VL)	1	0.4946	0.2179	5.1519	0.0232
Political Ideology (SL vs. VL)	1	0.1022	0.2705	0.1428	0.7056
Symbol of Renew (StB vs. StD)	1	0.3503	0.2399	2.1323	0.1442
Symbol of Renew (SoB vs. StD)	1	0.4238	0.2346	3.2636	0.0708
Symbol of Renew (N vs. StD)	1	0.0314	0.3111	0.0102	0.9196
Symbol of Renew (SoD vs. StD)	1	0.4995	0.3780	1.7459	0.1864
Low Cost Leases (StB vs. StD)	1	0.0732	0.5569	0.0173	0.8954
Low Cost Leases (SoB vs. StD)	1	-0.3453	0.4111	0.7055	0.4010
Low Cost Leases (N vs. StD)	1	0.2998	0.3083	0.9460	0.3307
Low Cost Leases (SoD vs. StD)	1	-0.1628	0.2224	0.5359	0.4641
Spoil the Scenery (StB vs StD)	1	0.2663	0.2564	1.0791	0.2989
Spoil the Scenery (SoB vs StD)	1	0.2375	0.2654	0.8006	0.3709
Spoil the Scenery (N vs StD)	1	-0.2655	0.2780	0.9123	0.3395
Spoil the Scenery (SoD vs StD)	1	-0.1015	0.2134	0.2263	0.6343
More Expensive (StB vs StD)	1	0.2142	0.2527	0.7181	0.3968
More Expensive (SoB vs StD)	1	-0.0784	0.2127	0.1358	0.7125
More Expensive (N vs StD)	1	-0.0641	0.3173	0.0408	0.8400
More Expensive (SoD vs StD)	1	-0.3537	0.2483	2.0293	0.1543

Trust Developers (StB vs StD)	1	0.4918	0.3742	1.7276	0.1887
Trust Developers (SoB vs StD)	1	0.4698	0.2097	5.0171	0.0251
Trust Developers (N vs StD)	1	-0.1910	0.2275	0.7055	0.4010
Trust Developers (SoD vs StD)	1	-0.2767	0.2480	1.2455	0.2644
Decrease Property Values (StB vs. StD)	1	-0.4707	0.2162	4.7417	0.0294
Decrease Property Values (SoB vs. StD)	1	0.1216	0.2476	0.2410	0.6235
Decrease Property Values (N vs. StD)	1	0.1418	0.3584	0.1567	0.6922
Decrease Property Values (SoD vs. StD)	1	0.1418	0.4976	0.0812	0.7757
Ser. Clim. Chng (VS vs. NP)	1	0.3665	0.2093	3.0666	0.0799
Ser. Clim. Chng (SoS vs. NP)	1	-0.0370	0.1986	0.0346	0.8524
Ser. Clim. Chng (SoS vs. NP)	1	-0.1012	0.2390	0.1791	0.6721

Table 3: Parameter estimates for independent variables in the probit regression model predicting support for utility-scale solar construction in the U.S. for the Southwest (SW) sample

Variable	d.f.	Estimate	SE	Wald χ^2	P-value
<i>Intercept 1</i>	1	1.3586	0.3676	13.6571	0.0002
Location (Rural vs. Urban)	1	0.1796	0.3360	0.2856	0.5930
Location (Suburban vs. Urban)	1	0.2826	0.2300	1.5103	0.2191
Race	1	0.9286	0.5778	2.5830	0.1080
Education (Less than HS vs. Grad Deg)	1	0.9551	0.7953	1.4424	0.2297
Education (HS Grad vs. Grad Deg)	1	-0.1270	0.6690	0.0360	0.8495
Education (Some Col vs. Grad Deg)	1	-0.7228	0.4062	3.1663	0.0752
Education (Bachelors vs Grad Deg)	1	-0.2519	0.3276	0.5910	0.4420
Age	1	0.000116	0.000104	1.2429	0.2649
Political Ideology (VC vs. VL)	1	0.7661	0.5515	1.9293	0.1648
Political Ideology (SC vs. VL)	1	0.6461	0.3312	3.8050	0.0511
Political Ideology (M vs. VL)	1	0.2070	0.3304	0.3927	0.5309
Political Ideology (SL vs. VL)	1	-0.1880	0.4565	0.1697	0.6804
Symbol of Renew (StB vs. StD)	1	0.0451	0.3471	0.0169	0.8966
Symbol of Renew (SoB vs. StD)	1	0.9059	0.3353	7.2972	0.0069
Symbol of Renew (N vs. StD)	1	-0.1702	0.4479	0.1444	0.7039
Symbol of Renew (SoD vs. StD)	1	0.2774	0.3840	0.5218	0.4701
Low Cost Leases (StB vs. StD)	1	-0.8636	0.6866	1.5819	0.2085
Low Cost Leases (SoB vs. StD)	1	-0.3711	0.4793	0.5996	0.4387
Low Cost Leases (N vs. StD)	1	0.7113	0.4073	3.0504	0.0807
Low Cost Leases (SoD vs. StD)	1	0.8339	0.3407	5.9926	0.0144
Spoil the Scenery (StB vs StD)	1	0.0502	0.3525	0.0203	0.8868
Spoil the Scenery (SoB vs StD)	1	-0.2121	0.3505	0.3662	0.5451
Spoil the Scenery (N vs StD)	1	-0.3445	0.3316	1.0793	0.2988
Spoil the Scenery (SoD vs StD)	1	-0.1405	0.2814	0.2494	0.6175
More Expensive (StB vs StD)	1	-1.6139	0.3870	17.3871	<.0001
More Expensive (SoB vs StD)	1	-1.8154	0.3846	22.2856	<.0001
More Expensive (N vs StD)	1	4.8984	0.7327	44.6880	<.0001
More Expensive (SoD vs StD)	1	-1.2147	0.5707	4.5300	0.0333

Trust Developers (StB vs StD)	1	0.5840	0.6281	0.8645	0.3525
Trust Developers (SoB vs StD)	1	0.2557	0.3497	0.5349	0.4645
Trust Developers (N vs StD)	1	0.4125	0.3613	1.3031	0.2536
Trust Developers (SoD vs StD)	1	-1.1178	0.3726	8.9986	0.0027
Decrease Property Values (StB vs. StD)	1	0.7579	0.4909	2.3836	0.1226
Decrease Property Values (SoB vs. StD)	1	-0.2985	0.4813	0.3847	0.5351
Decrease Property Values (N vs. StD)	1	0.6716	0.4238	2.5110	0.1131
Decrease Property Values (SoD vs. StD)	1	-0.4128	0.4537	0.8276	0.3630
Ser. Clim. Chng (VS vs. NP)	1	1.2155	0.3536	11.8144	0.0006
Ser. Clim. Chng (SoS vs. NP)	1	-0.0831	0.3063	0.0736	0.7862
Ser. Clim. Chng (SoS vs. NP)	1	-0.6088	0.3062	3.9530	0.0468

Table 4: Main effects of the probit regression model predicting support for utility-scale solar construction in one's county for both the Southwest (SW) and National (Nat) samples

Variable	Model 1: Nat Wald χ^2 (d.f.)	Model 2: SW Wald χ^2 (d.f.)
<i>Demographic</i>		
Location	7.3235 (2)*	3.4437 (2)
Race (White vs. Other)	4.7811 (1)*	4.8882 (1)*
Education	8.6506 (4)	6.0426 (4)
Age	1.2176 (1)	4.1173 (1)*
<i>Socio-Psychological</i>		
Political Ideology (Conservative high)	14.8300 (4)**	4.5206 (4)
Symbol of Gov't Commitment to Renewable Energy	7.2745 (4)	2.0610 (4)
Low Cost Leases from Government	4.3247 (4)	4.2089 (4)
Spoil the Scenery	16.2191 (4)**	1.8980 (4)
More Expensive	2.7231 (4)	9.2437 (4)
Trust Developers	44.8051 (4)***	4.4726 (4)
Decrease Property Value	7.2218 (4)	11.4612 (4)*
Seriousness of Climate Change	7.1513 (3)	7.3500 (3)

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 5: Parameter estimates for independent variables in the probit regression model predicting support for utility-scale solar construction in one's own county for the National (Nat) sample

Variable	d.f.	Estimate	SE	Wald χ^2	P-value
<i>Intercept 1</i>	1	0.8663	0.4546	3.6312	0.0567
Location (Rural vs. Urban)	1	-0.5800	0.2160	7.2146	0.0072
Location (Suburban vs. Urban)	1	0.0638	0.1657	0.1484	0.7001
Race	1	0.7358	0.3365	4.7811	0.0288
Education (Less than HS vs. Grad Deg)	1	0.1594	0.6292	0.0642	0.8000
Education (HS Grad vs. Grad Deg)	1	0.0679	0.3268	0.0432	0.8353
Education (Some Col vs. Grad Deg)	1	0.5001	0.3111	2.5838	0.1080
Education (Bachelors vs Grad Deg)	1	-0.4439	0.2529	3.0823	0.0791
Age	1	0.00799	0.00724	1.2176	0.2698
Political Ideology (VC vs. VL)	1	0.1592	0.3908	0.1660	0.6837
Political Ideology (SC vs. VL)	1	-0.0852	0.2374	0.1288	0.7197
Political Ideology (M vs. VL)	1	0.8348	0.2239	13.9016	0.0002
Political Ideology (SL vs. VL)	1	-0.1838	0.2790	0.4341	0.5100
Symbol of Renew (StB vs. StD)	1	0.4165	0.2506	2.7622	0.0965
Symbol of Renew (SoB vs. StD)	1	-0.1124	0.2312	0.2361	0.6270
Symbol of Renew (N vs. StD)	1	-0.1624	0.3098	0.2748	0.6001
Symbol of Renew (SoD vs. StD)	1	0.6710	0.4509	2.2149	0.1367
Low Cost Leases (StB vs. StD)	1	-0.7022	0.6704	1.0972	0.2949
Low Cost Leases (SoB vs. StD)	1	0.5264	0.4738	1.2346	0.2665
Low Cost Leases (N vs. StD)	1	-0.1920	0.2852	0.4534	0.5007
Low Cost Leases (SoD vs. StD)	1	0.00208	0.2456	0.0001	0.9933
Spoil the Scenery (StB vs StD)	1	1.2159	0.3557	11.6840	0.0006
Spoil the Scenery (SoB vs StD)	1	-0.1011	0.3181	0.1011	0.7505
Spoil the Scenery (N vs StD)	1	-0.8867	0.3017	8.6398	0.0033
Spoil the Scenery (SoD vs StD)	1	-0.3289	0.2176	2.2852	0.1306
More Expensive (StB vs StD)	1	-0.3343	0.2690	1.5442	0.2140
More Expensive (SoB vs StD)	1	0.1070	0.2371	0.2038	0.6517
More Expensive (N vs StD)	1	-0.0224	0.4060	0.0030	0.9560
More Expensive (SoD vs StD)	1	0.00600	0.2944	0.0004	0.9837

Trust Developers (StB vs StD)	1	4.3234	0.7034	37.7811	<.0001
Trust Developers (SoB vs StD)	1	-0.4506	0.2739	2.7066	0.0999
Trust Developers (N vs StD)	1	-1.0905	0.2465	19.5768	<.0001
Trust Developers (SoD vs StD)	1	-0.9093	0.3148	8.3420	0.0039
Decrease Property Values (StB vs. StD)	1	-0.5535	0.2521	4.8209	0.0281
Decrease Property Values (SoB vs. StD)	1	0.4200	0.3172	1.7530	0.1855
Decrease Property Values (N vs. StD)	1	0.3729	0.4121	0.8188	0.3655
Decrease Property Values (SoD vs. StD)	1	-0.2242	0.4467	0.2520	0.6157
Ser. Clim. Chng (VS vs. NP)	1	0.6300	0.2528	6.2095	0.0127
Ser. Clim. Chng (SoS vs. NP)	1	0.0188	0.2191	0.0074	0.9316
Ser. Clim. Chng (SoS vs. NP)	1	-0.3061	0.2506	1.4929	0.2218

Table 6: Parameter estimates for independent variables in the probit regression model predicting support for utility-scale solar construction in one's own county for the Southwest (SW) sample

Variable	d.f.	Estimate	SE	Wald χ^2	P-value
<i>Intercept 1</i>	1	0.4558	0.3553	1.6457	0.1995
Location (Rural vs. Urban)	1	-0.3403	0.3047	1.2467	0.2642
Location (Suburban vs. Urban)	1	0.3936	0.2733	2.0738	0.1498
Race	1	0.8150	0.3686	4.8882	0.0270
Education (Less than HS vs. Grad Deg)	1	-0.4972	0.6824	0.5308	0.4663
Education (HS Grad vs. Grad Deg)	1	0.3847	0.5102	0.5686	0.4508
Education (Some Col vs. Grad Deg)	1	-0.4034	0.3313	1.4827	0.2234
Education (Bachelors vs Grad Deg)	1	0.7591	0.4407	2.9663	0.0850
Age	1	0.000254	0.000125	4.1173	0.0424
Political Ideology (VC vs. VL)	1	-0.5605	0.5970	0.8813	0.3478
Political Ideology (SC vs. VL)	1	0.5141	0.3639	1.9958	0.1577
Political Ideology (M vs. VL)	1	0.2131	0.2919	0.5330	0.4653
Political Ideology (SL vs. VL)	1	0.4942	0.4477	1.2186	0.2696
Symbol of Renew (StB vs. StD)	1	0.0692	0.3354	0.0426	0.8364
Symbol of Renew (SoB vs. StD)	1	0.3695	0.3055	1.4629	0.2265
Symbol of Renew (N vs. StD)	1	0.0512	0.5337	0.0092	0.9236
Symbol of Renew (SoD vs. StD)	1	0.0448	0.3838	0.0136	0.9072
Low Cost Leases (StB vs. StD)	1	-0.0135	0.5199	0.0007	0.9792
Low Cost Leases (SoB vs. StD)	1	-0.3647	0.4909	0.5518	0.4576
Low Cost Leases (N vs. StD)	1	0.3492	0.4320	0.6535	0.4189
Low Cost Leases (SoD vs. StD)	1	0.3416	0.3331	1.0520	0.3050
Spoil the Scenery (StB vs StD)	1	0.1543	0.3456	0.1993	0.6553
Spoil the Scenery (SoB vs StD)	1	-0.2095	0.3342	0.3931	0.5307
Spoil the Scenery (N vs StD)	1	0.1318	0.4194	0.0988	0.7533
Spoil the Scenery (SoD vs StD)	1	-0.3399	0.3052	1.2404	0.2654
More Expensive (StB vs StD)	1	-0.4598	0.3201	2.0625	0.1510
More Expensive (SoB vs StD)	1	-0.1552	0.3691	0.1767	0.6742
More Expensive (N vs StD)	1	0.9948	0.4657	4.5635	0.0327
More Expensive (SoD vs StD)	1	0.0554	0.4848	0.0131	0.9090

Trust Developers (StB vs StD)	1	0.9748	0.7555	1.6647	0.1970
Trust Developers (SoB vs StD)	1	0.0319	0.3252	0.0096	0.9218
Trust Developers (N vs StD)	1	-0.0806	0.3864	0.0435	0.8349
Trust Developers (SoD vs StD)	1	-0.7224	0.3796	3.6224	0.0570
Decrease Property Values (StB vs. StD)	1	0.1629	0.4488	0.1318	0.7165
Decrease Property Values (SoB vs. StD)	1	0.5808	0.4377	1.7602	0.1846
Decrease Property Values (N vs. StD)	1	0.0155	0.5251	0.0009	0.9764
Decrease Property Values (SoD vs. StD)	1	0.0319	0.4181	0.0058	0.9391