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Daniel P. Wolf
Public Utilities Commission
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Dear Mr. Wolf:

In our October 1, 2014 response to the Commission's September 8, 2014 Notice for Comment in this docket, Fresh Energy (and other joint commenters) filed preliminary survey research conducted by Dr. Steve Hoffman, Chair of the Political Science Department, and Dr. Angela High-Pippert, Associate Professor, Department of Political Science, University of St. Thomas.[1] Since then, Dr. Hoffman and Dr. High-Pippert have conducted another survey and provided results analysis. Their analysis, *Attitudes and Preferences Towards Community Solar Initiatives*, is attached to follow-up on the information provided in our October comments.

Sincerely,

/s/ Allen Gleckner
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[1] *See* Appendices II & III. Appendix IV provides credentials for Dr. Hoffman and Dr. High-Pippert.

Attitudes and Preferences Towards Community Solar Initiatives

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I. Introduction

In order to better understand the issues associated with the recruitment and retention of residential subscribers in a shared solar project, two surveys of prospective participants were undertaken in partnership with a number of Minnesota- and Colorado-based private and non-profit organizations. These partners included MN Community Solar, Clean Energy Resource Teams (CERTs), MN Interfaith Power and Light (MN/IPL), Minnesota Renewable Energy Society (MRES), Izaak Walton League (Midwest Office), and Colorado State University Extension Service (CSUE).

The first of the surveys raised three basic questions: 1) factors preventing the adoption of individual residential solar systems (see Appendix A for these results); 2) factors motivating participation in a community solar initiative; and 3) the trustworthiness of various sources of information. Responses to this survey are presented in Part I of this report.[1]

The second survey involved more specific questions regarding community solar initiatives, including: 1) preferences regarding project features; 2) preferences regarding project location; 3) willingness to pay for either preferred features and/or locations; and 4) requirements regarding alternative financial models. Responses to this survey are presented in Part II of this report.

With the exception of MN/IPL, where responses were gathered using an in-person paper instrument, the surveys were administered electronically using Survey Monkey. Surveys were sent to individuals on distribution lists maintained by each of the partners either as part of a regular electronic mailing or as a stand-alone request to participate in the survey. A follow-up request was sent a week after the initial request. Response rates varied by organization (Table 1). Survey 1 was conducted in late 2013 and early 2014. Survey 2 was administered in the fall of 2014.

The individuals who responded to this survey represent a broad mix of respondents, including those displaying certain affinities such as religious or environmental concerns. As such, these respondents would more likely be *early adopters* relative to the general population in that they have already either expressed interest in the technology or demonstrate an

[1] A single survey was administered by CSUE that combined the separate surveys for Minnesota participants.

orientation, i.e., an 'environmental' or 'green energy' sensibility, that would likely favorably predispose them towards adoption.

II. Key Findings

- Both individual and community benefits of shared solar are significant factors in the adoption decision (pp. 4-5).

- The opportunity to partner with neighbors and/or members of an affinity group are relatively less significant motivating factors in the adoption decision (p. 5).

- Neighbors and members of an affinity group are the most trusted sources of information regarding community solar projects (p. 6).

- Differences regarding locational preferences were observed for projects located inside versus outside of one's community (pp. 9-10).

- Respondents expressed relatively stronger preferences for negative assets such as brownfield sites being used for community solar projects, particularly for projects located inside their community (pp. 11-12).

- Respondents expressed relatively stronger preferences for projects located on highly visible community assets such as school or church roofs, particularly for projects located inside their community (pp. 11-12).

- While various locational and project attributes are preferred, little willingness-to-pay for preferred locations or attributes is observed (pp. 12-14).

- Interest in participation drops rapidly beyond a 10-year payback period (p. 14).

- The likelihood of participation decreases markedly with the prospect of rising monthly bills (pp. 15-16).

III. Survey Results for Round 1 Survey

A total of 537 individuals completed the survey, the majority being associated with one of the partner environmental organizations (Table 1). Respondents were spread across age categories, with more than half (55 percent) falling into the age ranges of 45-54 and 55-64. Both men and women were well-represented in this sample, at 57 percent and 43 percent, respectively. More than two-thirds (68 percent) of Minnesota respondents received their electricity from an investor owned utility, while far fewer respondents were serviced by co-operative utilities (19 percent) or municipal utilities (13 percent).

TABLE 1
Number of Respondents by Partner

Partner	Total n of Responses	% of Total Responses
MN Community Solar	173	32 %
CERTs	153	29 %
Fresh Energy	67	13 %
IWL (MN Division)	51	10 %
CSUE	48	9 %
MRES	26	5 %
MN IPL	19	4 %
Total	**537**	

The survey addressed two critical questions, the first being those factors that might affect an individual's decision to participate in a community solar project. Three categories of motivating factors were specified, including three personal factors, namely, the ability to use 'cutting edge technology', the opportunity to achieve energy independence, and personal economic benefit. A second set of what might be referred to as 'local', though socially distant, benefits included generalized environmental benefits of shared solar, perceived local energy use, and whether or not Minnesota companies would build and/or maintain the system.

Finally, two factors relevant to the community-building benefits of such systems were included, i.e., the opportunity to partner with either neighbors or members of a particular affinity group such as a faith community or business association.

As seen in Table 3, the individual benefits of shared solar are clearly significant in the adoption decision. An overwhelming majority of respondents (85 percent) understood energy independence as being either a very important or important determinant of their decision while three-quarters of the respondents ranked 'personal economic benefit' as being very important or important.[2]

TABLE 3
Individual Benefits of Shared Solar

	Very Important			**Not at all Important**
Ability to achieve energy independence	60%	25%	10%	4%
Personal economic benefit	43%	32%	20%	4%
Ability to use leading-edge technology	27%	34%	24%	13%

While personal benefits weighed heavily in the adoption decision, respondents also expressed strong interest in both generic environmental benefits and a general sense of community benefit that is associated with a shared solar project. Indeed, only a very small percentage of respondents are *not* motivated, at least to some extent, by the prospect of bringing home the benefits of shared solar, either in the form of locally produced energy that would also be locally consumed [3] or by having Minnesota or Colorado companies, presumably employing Minnesota or Colorado residents, build and/or maintain the technology (Table 4).

[2] This factor speaks more to the *perceptions* of respondents rather than the reality of a shared solar project in that there is no direct relationship between a subscriber's participation in a project and the consumption of the electrons flowing from that project.

[3] Again, given the grid-connected nature of shared solar projects, this speaks more to perceptions than actual practice.

TABLE 4
'Local-ness' Benefits

	Very Important			Not at all Important
Environmental benefits	72%	20%	5%	3%
Energy to be used locally	47%	32%	14%	6%
Minnesota companies will build and maintain system	41%	37%	18%	3%

The final set of motivating factors concerns the community-building opportunities embedded in a shared solar initiative. Taken together with the above-noted results, Table 5 indicates that the appeal of 'local' benefits is bound up with an abstract sense of community, one rooted in a comfortable distance from *specific* individuals or communities. That is, instead of seeing community solar as an opportunity for higher levels of civic engagement or public partnering, even these early potential adopters are not highly motivated by the community-building opportunities represented by shared solar. While there are a sizable number of respondents that do seem eager to work with their neighbors or members of an affinity group, the number of respondents seeing community-building opportunities as 'very important' is much less than those that place an emphasis on either personal economic benefits or a more distant sense of community.

TABLE 5
Community-Building Benefits

	Very Important			Not at all Important
Opportunity to partner with neighbors	26%	37%	26%	10%
Opportunity to partner with members of affinity groups	17%	28%	31%	22%

The final element of the survey dealt with an issue of long-standing interest to researchers in this field, namely, the trustworthiness of information offered by various sources. Prior research has shown that peers and near-peers are often the most trusted source of information when it comes to the diffusion of new technologies or practices; conversely, distant and/or expert-dominated sources of information are the least trusted sources (Hoffman and High-Pippert, 2010). The results from the present survey reinforce these conclusions (Table 6). Thus, individuals representing either an investor-owned utility or a local installer are burdened by a heavy dose of suspicion. Spokespersons from a cooperative or municipal utility fare somewhat better, perhaps reflecting the same sort of 'distant nearness' seen in the earlier discussion on motivations for participation. At the same time, while respondents may not express much of a desire to work directly with neighbors or affinity groups, they nonetheless trust, more than any other source, the information they receive from these same sources.

TABLE 6
Trustworthiness of Information Sources

	Very Trustworthy			**Not at all Trustworthy**
Someone speaking for an affinity group	27%	51%	18%	2%
Neighbor with some experience in solar energy	22%	43%	29%	4%
Spokesperson from a local unit of government	10%	45%	36%	7%
Spokesperson from a municipal or cooperative utility	17%	47%	27%	7%
Local installer or contractor	16%	49%	30%	2%
Positive media coverage	9%	36%	39%	12%
Spokesperson from an investor owned utility	7%	32%	41%	19%

III. Second Round Survey Results

Following the completion of the initial survey, a second survey was undertaken in collaboration with Fresh Energy, Clean Energy Resource Teams, and the Colorado State University Extension Service.[4] A total of 131 responses were collected (Table 7)[5].

TABLE 7
Respondent affiliation

Partner	N of Responses	% of Respondents
CERTs	46	35%
FE	37	28%
CSUE	48	37%
Total	**131**	

The survey addressed a number of issues critical to the future success of shared solar initiatives, including preferences for specific attributes and the location of a given project and a potential participant's willingness-to-pay a premium for these attributes. Respondents were also asked to consider the two most common methods of financing shared solar initiatives, i.e., a *lump-sum*, up-front payment method and a *pay-as-you-go* subscription, and the impact of various payback periods and percent changes in their monthly bill on their participation decision.

[4] There were a number of differences between the Minnesota and Colorado surveys. First, the Colorado survey included questions drawn from an earlier survey of Minnesota residents. Second, the Minnesota version of the present survey included questions regarding projects both *inside* and *outside* of the respondent's community, a distinction not included in the Colorado survey. Second, the Fresh Energy survey was divided into two pools, one asking the questions in reference to "neighborhood" and the other in reference to "community". This was done on the assumption that the former denotes a more proximate location while the latter evokes a potentially more distant or less immediate sense of space and that proximity might well influence attitudes towards a proposed initiative. Given the small number of responses, 13 in the case of "neighborhood" and 24 for "community", the FE responses are combined in the present analysis.

[5] No record was kept regarding whether or not the individuals responding to this survey also completed the first survey.

Characteristics of Respondents

Ninety-two percent of the respondents reported living in single-family housing units and unlike most 'average' Americans, some eleven percent reported owning an electric vehicle (EV), though a smaller six percent report such ownership in Colorado. Overall, seventy percent of the respondents received their electricity from an investor owned utility, while twenty-two and nine percent were serviced by co-operative utilities or municipal utilities, respectively.[6] Respondents were also economically advantaged, with almost one-third reporting household incomes of more than $100,000 annually (Table 8).

TABLE 8
Characteristics of Respondents

Housing:	Single Family unit	92%
	Multi-family unit	8%
Electric Vehicle owner:	Yes	11%
	No	89%
Electric Utility provider:	IOU	70%
	Co-op	22%
	Muni	9%
Household Income:	< $ 40,000	12%
	$41 – 60,000	11%
	$61 – 80,000	25%
	$81 – 100,000	20%
	> $100,000	30%

Location and Site Characteristics

Location is a critical feature of any community solar project, beginning with the question of whether to select a location within or outside of the geographic borders of a subscriber's community. In the former, proximity between the location of the project and the location of the subscribers may create a greater sense of 'ownership' at both the individual and community

[6] A greater percentage of residents were serviced by local public providers compared to investor owned utilities in Colorado than was the case in Minnesota.

level. This, in turn, may encourage participation by providing a sense of shared community benefit that can be extended to one's neighbors with minimal effort while avoiding unwanted partnering activities. Proximity may also encourage the use of 'social assets' such as neighborhood schools, churches, mosques, synagogues, and so on as project sites. Indeed, even if the structures or sites associated with these institutions are not suitable as project sites, an array of formal community-based organizations, as well more informal groups such as book clubs, garden clubs, and so on, can serve as potentially valuable 'recruitment centers' by developers or aggregators seeking subscribers to a community solar project (Hoffman and High-Pippert 2005, 2010).

Alternatively, subscribers may be located some distance from the site upon which the panels are located. Such an arrangement could allow a subscriber to act upon highly individualistic motives, including environmental or economic agendas, while avoiding unwanted or minimally attractive requirements for social engagement. Developers may also find distance between subscribers and projects beneficial in that it expands the scope of potential sites beyond those proximate to specific communities or neighborhoods. However, increasing the physical distance between a community and the actual project site may inhibit the use of social assets as recruitment centers while weakening the social appeal of a solar garden.

In order to understand the significance of place in the participation decision, Minnesota respondents were asked to consider projects located both inside and outside of their community and/or neighborhood. Although CSUE respondents were not asked to distinguish amongst such projects, their locational preferences are reported as well. As can be seen in Table 9, there are a number of observable differences regarding projects located inside versus outside of a community. First, respondents are generally more concerned about affinity in the case of 'inside' projects. Second, respondents are also much more sensitive about the nature of the spatially-proximate projects. Thus, while none of the proximity factors were generally ranked as being very important, respondents were nonetheless much more likely to be *relatively* indifferent to the project site, the size of the project, the distance to one's residence and the visibility of the project from the street if the project was outside of their immediate neighborhood or community.

TABLE 9

Factors Influencing Decision Whether to Participate in a Community Solar Project

Shaded values indicate a 10% or greater difference

	Very Important			Not at all Important
Project Site[7]				
Inside Community	17%	27%	23%	32%
Outside Community	17%	16%	20%	47%
CSUE	13%	22%	38%	27%
Owned/Operated by your group				
Inside Community	9%	26%	33%	33%
Outside Community	9%	16%	26%	49%
CSUE	17%	28%	34%	21%
Size of Project				
Inside Community	10%	32%	23%	35%
Outside Community	11%	26%	19%	44%
CSUE	NA			
Distance to your residence				
Inside Community	7%	19%	30%	44%
Outside Community	5%	19%	20%	56%
CSUE	13%	24%	30%	33%
Visibility from street				
Inside Community	9%	14%	38%	40%
Outside Community	10%	10%	23%	57%
CSUE	2%	28%	21%	49%
Whether located in your community				
Inside Community	9%	23%	27%	41%
Outside Community	5%	21%	21%	45%
CSUE	17%	22%	24%	37%

[7] The project site was specified as a commercial building, school, etc.

Table 10 further refines the locational question by considering a variety of potential host sites. Again, Minnesota respondents were asked to consider projects located both inside and outside of their community; CSUE respondents were not asked to distinguish amongst projects on this basis. Similar to the more generic locational issues discussed in Table 9, responses are distinguishable on the basis of whether projects are located inside or outside of one's own community. Given this factor, respondents expressed relatively stronger preferences for negative assets such as brownfield sites being turned into something productive and for projects located on highly visible social assets such as school or church roofs. The latter finding offers the strong possibility of using important neighborhood or public assets as a means of securing acceptance of and/or participation in a project.

TABLE 10

Preferred Location for a Community Solar Project
Inside/Outside of Community
Shaded values indicate a 10% or greater difference

	Strongly Prefer			**Makes No Difference**
Small commercial roof				
Inside Community	17%	26%	21%	36%
Outside Community	14%	18%	19%	49%
CSUE	15%	30%	13%	41%
Church roof				
Inside Community	29%	22%	17%	32%
Outside Community	16%	21%	19%	43%
CSUE	16%	20%	11%	53%
School roof				
Inside Community	48%	20%	8%	23%
Outside Community	36%	23%	10%	30%
CSUE	26%	33%	7%	35%

Large Commercial roof				
Inside Community	29%	21%	21%	25%
Outside Community	23%	15%	20%	41%
CSUE	18%	27%	14%	41%
Empty city lot				
Inside Community	21%	14%	32%	33%
Outside Community	11%	21%	21%	46%
CSUE	25%	23%	20%	32%
Farm field				
Inside Community	7%	22%	26%	38%
Outside Community	4%	18%	19%	56%
CSUE	19%	7%	28%	47%
Brownfield site				
Inside Community	40%	26%	9%	23%
Outside Community	29%	25%	14%	31%
CSUE	49%	22%	7%	22%

Willingness to Pay

A preference for something does not, of course, necessarily translate into a willingness to pay for these preferences, a fact clearly demonstrated in Table 11. Thus, even though strong preferences were expressed for projects located on a brownfield site or on a school roof, an overwhelming percentage of respondents indicated that they would be unwilling to pay any greater amount for a project no matter the nature of the site.

Respondents were also asked about their willingness to pay for a project that guaranteed access to low-income households. Less than ten percent of respondents indicate a willingness to pay a great deal more for such access. While a higher percentage of respondents indicated some willingness to pay a modest premium, they were overwhelmed by those indicating that they would pay only slightly more and, in most cases, by those unwilling to pay *any* additional amount.

TABLE 11

Willingness to Pay for a Project Inside/Outside of Community

	Would Pay a Great Deal More			Would Not Pay Any More
Low Income Access				
Inside Community	12%	34%	24%	29%
Outside Community	12%	28%	25%	35%
CSUE	4%	21%	42%	33%
Church roof				
Inside Community	4%	17%	22%	56%
Outside Community	3%	14%	20%	63%
CSUE	2%	0%	13%	85%
School roof				
Inside Community	6%	28%	32%	33%
Outside Community	4%	27%	27%	41%
CSUE	0%	6%	34%	60%
Large commercial roof				
Inside Community	2%	10%	21%	63%
Outside Community	1%	11%	20%	66%
CSUE	0%	0%	19%	81%
Small commercial roof				
Inside Community	1%	7%	19%	69%
Outside Community	1%	9%	23%	65%
CSUE	0%	0%	17%	83%
Empty city lot				
Inside Community	1%	10%	23%	65%
Outside Community	1%	8%	20%	70%
CSUE	0%	4%	28%	68%
Farm field				
Inside Community	1%	9%	15%	68%
Outside Community	1%	8%	18%	71%

CSUE	2%	4%	15%	79%
Brownfield site				
Inside Community	6%	20%	28%	43%
Outside Community	9%	17%	25%	48%
CSUE	0%	17%	37%	46%

Financial Models for Community Solar Projects

Two types of project financing were considered in the survey: a) lump-sum or up-front financing that requires a subscriber to front the developer an amount of money with a specified pay-back period or b) a pay-as-you-go method that, depending upon the terms of the contract, allows a subscriber to 'opt-out' after a given period of time. In the former, the most important contingency is the number of years a subscriber will accept as a condition of participation; in the latter, the percent change in a subscriber's bill is the controlling factor.

The results displayed in Table 12 clearly demonstrate the importance of a relatively quick pay-back period in the participation decision: while some 80 percent of the respondents indicate a very strong interest in a project with a payback of ten years or less, only 28 percent had a strong interest in a project with a payback period of between 11 and 15 years. Conversely, the percentage indicating a lack of interest increased as the payback period stretched further into the future.

TABLE 12

Required Lump-sum Payback Period

	Very LIKELY to be interested			**Very UNLIKELY to be interested**
6 – 10 years	76%	12%	6%	4%
11 – 15 years	37%	46%	10%	7%
16 – 20 years	14%	34%	28%	24%
21 – 25 years	5%	22%	22%	51%

26 – 30 years	3%	11%	25%	62%

The most influential factors in regards to the required pay back are primarily economic in character, the most important of these being the size of the initial investment and the change in the monthly bill, a perhaps unsurprising finding given the importance attached to the personal economic benefit provided by a project. Importantly, however, respondents also attached a high level of significance to the perceived environmental benefit of the project (Table 13).

TABLE 13

Factors Affecting Required Payback Period
CERTs and FE only [8]

	Very Important			**Very Unimportant**
Size of current bill	25%	27%	30%	18%
Size of initial investment	73%	13%	9%	5%
Change in monthly bill	40%	32%	19%	9%
Environmental benefit of project	77%	16%	5%	2%

A similar finding is evident with regards to the required changes in bills when using the pay-as-you-go method. As seen in Table 14, the likelihood of being interested in a project decreases smoothly and markedly with the prospect of rising monthly bills. Thus, while more than eight out of ten respondents were very likely to be interested in participating should their bills *decrease* by five to eight percent, only one in ten would likely be interested if their bill would *increase* by a similar amount. As was the case with the payback period, financial factors, leavened by a concern with the potential environmental benefit associated with a project, were of greatest concern when assessing the required percent change in one's bill (Table 15).

[8] This question was not included in the Colorado survey; the results presented in both Table 8 and Table 10 are therefore limited to Fresh Energy and CERTs respondents only. Table 13? Table 15? Not sure about these table references.

TABLE 14

Required Percent Change in Bill
With Pay-as-you-go Method

	Very LIKELY to be interested			Very UNLIKELY to be interested
5 – 8% increase	25%	16%	29%	30%
1 – 4% increase	38%	26%	21%	16%
No change	57%	21%	7%	15%
1 – 4 % decrease	68%	21%	6%	5%
5 – 8% decrease	79%	11%	5%	5%

TABLE 15

Factors Affecting Pay-as-you-go Method
CERTs and FE only

	Very Important			Very Unimportant
Size of current bill	22%	34%	26%	18%
Size of initial investment	70%	17%	7%	5%
Change in monthly bill	38%	38%	11%	12%
Environmental benefit of project	68%	22%	7%	5%

IV. Conclusion

As noted above, the respondents to this survey possess characteristics that set them apart from the general population. Also, given their membership in organizations that advocate on behalf of 'green energy' options and/or work to involve individuals in

environmentally beneficial energy activities and programs, it is reasonable to assume that respondents would be early adopters and hence, particularly receptive to programs perceived to advance their environmental values (Rogers 1983, 1995). This would, of course, be problematic if the findings presented above were to serve as a guidepost for the creation of messages with appeal to the general public. However, given that awareness and knowledge of shared solar initiatives is minimal amongst the general public, marketers and developers must make their appeals to precisely the sorts of individuals who responded to this survey, at least if they are to follow the well-worn path of innovation and diffusion characteristic of most emerging technologies (Berkowitz 1996; Rice 2009; Rogers 1983 and 1995; Weatherford 1982).

In this regard, while financial factors are clearly of great importance in affecting how even this pool of early adopters think about community solar projects, it is worth recalling that the respondents to these surveys placed a great deal of emphasis on the perceived environmental benefits of a community solar project and whether or not locally generated energy being brought to a community by local companies and workers was also relatively important. Also, while there is a rather low degree of importance attached to 'community' as a locational variable, respondents were nonetheless attracted to the idea of using local assets as project sites. To the extent that a sense of 'community pride' exists, it might well be activated by seeing, or knowing that, solar panels are sitting atop the roof of the local elementary school. When combined with a personal environmental agenda or the realization that personal economic benefits are available through participation, such a feeling could be enough to move an individual to become a subscriber. Failing their own participation, such a person might at least to speak positively about the project to a neighbor or acquaintance, which, in turn, might be enough to solicit participation by that other person.

In other words, while economics is never far from a potential subscriber's mind, the participation decision cannot be said to rest *solely* on the purely personal facts of investment and return. Instead, a mix of factors is implicated, including those that speak to both a sense of community and environmental benefit. While it would be naïve to think that people will abandon any concern with personal gain in deciding whether or not to subscribe to a project, it is equally naïve to ignore their sense of attachment to and concern for those that share a

common space or sense of community. If altruism does not *dictate* participation, it certainly plays a role in the overall decision process, a fact that developers and advocates should remember when constructing the messages that will inform their recruitment and advertising campaigns.

References

Berkowitz, Bill. 1996. "Personal and Community Sustainability." *American Journal of Community Psychology*. Volume 24, Number 4: 441-459.

Hoffman, Steven M. and Angela High-Pippert. 2010. "From Private Lives to Collective Action: Recruitment and Participation Incentives for a Community Energy Program." *Energy Policy, Special Section: Carbon Reduction at a Community Scale.* Yacob Mulugetta, Tim Jackson, and Dan van der Horst, eds. Volume 38, Issue 12. Pp. 7567-74.

Hoffman, Steven M. and Angela High-Pippert. 2005. "Community Energy: A Social Architecture for an Alternative Energy Future." *Bulletin of Science, Technology and Society.* Volume 25, Number 5: 387-401.

Rice, Ronald. 2009. "Diffusion of Innovations: Integration and Media-related Extension of this Communication Keyword." Paper presented at the annual meeting of the International Communications Association. Chicago, IL.

Rogers, Everett M. 1983, 1995. *Diffusion of Innovations.* New York, NY: The Free Press.

Weatherford, M. Stephen. 1982. "Interpersonal Networks and Political Behaviour." *American Journal of Political Science.* Volume 26, Number 1: 117-143.

Appendix A

Factors Inhibiting the Installation of a Residential Rooftop Solar Energy System

The first question in the initial survey concerned the relative importance of obstacles inhibiting the installation of an individual residential solar energy system. A variety of what might be termed 'hassle factors' were specified, including a perceived lack of knowledge about how a solar energy system works, the inability to maintain a system, and an unwillingness to enter into a contract with the relevant utility. Since a strong argument for community solar projects is that the vast majority of residential roofs in the United States are poorly suited for solar panels, suitability of property, i.e. excessive shading, size, orientation, was also included as a potential factor.

Table A-1 demonstrates the importance of these factors. Suitability of property ranks highest amongst this set of concerns followed by the complexity of the contract and the difficulty of maintaining a system.[9] Other "competency issues", such as the dealing with installers and lack of knowledge about the workings of the system, are less worrisome.

TABLE A-1
Importance of 'Hassle Factors'

	Very Important			**Not at all Important**
Suitability of property	49%	20%	15%	15%
Difficulty of maintaining system	26%	27%	25%	19%
Complexity of contract	29%	31%	24%	13%
Lack of knowledge about how system works	15%	22%	27%	34%
Dealing with installers	9%	23%	31%	35%

[9] Percentages may not add up to 100 percent due to rounding errors and/or "no opinion" responses throughout the survey.

Respondents were also asked to assess a number of uncertainties confronting the adoption decision. The assumption here is that when a factor is rated as 'not at all important' the respondent has a high degree of certainty regarding this issue. Thus, forty-five percent of the respondents indicating that uncertainty regarding the environmental benefits associated with the adoption of a solar system was 'not at all important' means that they are confident that these benefits will, in fact, be realized.

For many respondents, an extremely high degree of confidence was expressed regarding the environmental benefits that are perceived to be associated with the adoption of solar energy. On the other hand, both the need to change their existing home infrastructure and the payback period that one can expect in reference to the adoption decision represent important sources of uncertainty (Table A-1).

TABLE A-2
Uncertainty of:

	Very Important			**Not at all Important**
Payback period	27%	32%	26%	16%
Changing existing infrastructure	21%	29%	27%	20%
Environmental benefit	9%	16%	27%	45%