“Searching for Solar: Applying the Path of Least Resistance, a Case Study of Solar Gardens in Farmington and Lakeville, MN”

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Abstract

This study investigates solar garden siting decision-making processes to examine why there are currently three solar gardens in Farmington, MN and no solar gardens in Lakeville, MN. As previous environmental justice literature has demonstrated, energy facilities are often distributed unequally across the landscape, placing greater burdens on low-income, minority communities--a siting pattern known as the Path of Least Resistance. With the recent growth of renewable energy across southern Minnesota, there remains limited knowledge on the solar garden siting process, and specifically whether there are any distributional or procedural injustices present in the siting process. Therefore, utilizing a common environmental justice framework, the Path of Least Resistance, we evaluated the political ability of citizens to resist solar garden sitings in order to answer our research questions: Do citizens in Farmington and Lakeville view solar gardens as locally undesirable land uses (LULUs)? And to what extent does differentiated political ability to resist solar garden sitings explain the development of three solar gardens in Farmington, MN and the lack of solar gardens in Lakeville, MN? To address this question, we conducted twenty-five semi-structured interviews with Farmington and Lakeville residents and decision-makers, as well as solar experts to determine the citizens' sentiments regarding solar gardens and how decision-makers decide where to site solar gardens. Based on patterns identified in the interviews, most Farmington and Lakeville residents do not view solar gardens as undesirable land uses. Additionally, we discovered that decision-makers site solar gardens based on land value and availability and utility company coverage. Finally, we saw no evidence of differentiated political ability to resist solar garden sitings between Farmington and Lakeville, and therefore determined that the siting process for solar gardens does not appear to follow the Path of Least Resistance.

Introduction

In 2007, Minnesota passed the "Next Generation Energy Act," mandating that Xcel Energy, the largest investor owned utility company serving Minnesota, reach 30% renewable energy by 2020 and that all other utility companies reach 25% renewable energy by 2025 (Laws of Minnesota, Chapter 136, Article 1, n.p.). In 2009, this project received even more support through the federal American Recovery and Reinvestment Act, improving the terms of federal loans for renewable energy projects (Moritsugu and Piatt, n.p.). Thus, solar, wind, and other renewable energy has recently increased dramatically in Minnesota with renewable electricity production tripling from 7% in 2006 to 22% in 2016 (MN Commerce Department, 4).

With this increase in renewable energy, there are now 2,549 solar installations in Minnesota (MN Commerce Department, n.p.; (See Appendix Figure 1) and solar capacity has increased from one megawatt (MW) in 2009 to 246 MW in 2016, with now over 700 MW in 2018 (MN Commerce Department, 9; See Figure 2). Solar energy has increased both in large-scale projects as well as small residential and commercial solar arrays, including community solar gardens (MN Commerce Department, 10-14). Community solar gardens are solar arrays connected to the utility grid with multiple subscribers who receive credit on their electric bills for the electricity created by the solar garden (Solar Gardens, n.p.). The 2013 "Solar Energy Jobs Act" particularly incentivized solar garden development because it created Minnesota's Community Solar Garden program to provide residents and business owners access to solar energy without having their own panels. Xcel Energy administers the Community Solar Garden program and has plans for seven new community solar gardens in Minnesota (Solar gardens growing in Minnesota, n.p.). This 2013 "Solar Energy Jobs Act" also extended the rebate program for solar and lifted old net metering rules about solar gardens, which put an artificial cap on solar development. In addition to the 2007 "Next Generation Energy Act," this 2013 legislation provided further incentive for solar garden development, contributing to Minnesota's expanding renewable energy landscape.

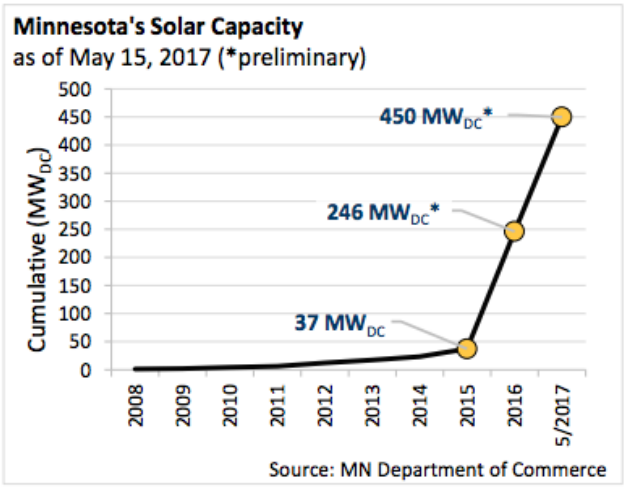

Figure 2: Minnesota's Solar Capacity (http://mn.gov/commerce-stat/pdfs/2016-renewable-energy-update.pdf)

As the number of renewable energy facilities increase, it is important to understand the decision-making process behind how and where these facilities are sited. Historically, energy facility sitings have created environmental justice concerns when the facilities produce negative environmental and health effects. To evaluate the siting of hazardous waste facilities, environmental justice case studies commonly utilize the Path of Least Resistance theory: which claims that environmental hazards are typically sited in communities with the least political power to resist (Bullard, 3). To our knowledge, however, no studies have examined whether the Path of Least Resistance applies to the siting of renewable energy facilities, meaning whether renewable energy facilities are sited in communities with the least ability to resist.

We addressed this gap in the literature by applying the Path of Least Resistance to Farmington, MN--a city with three solar gardens nearby--and Lakeville, MN--a city with no solar gardens. Specifically, we asked: *To what extent does differentiated political ability to resist solar garden sitings explain the development of three solar gardens in Farmington, MN and the lack of solar gardens in Lakeville, MN?* To answer this question, we interviewed residents from Farmington and Lakeville to gauge public sentiments about solar gardens--specifically we asked: *Do citizens in Farmington and Lakeville view solar gardens as locally undesirable land uses (LULUs)?* We also interviewed Farmington and Lakeville decision-makers and solar garden experts to determine the solar garden siting process in these cities. Through this project, we aim to contribute to environmental justice literature by exploring a new and relatively unexamined field: solar garden development in Minnesota.

Research Questions

Do citizens in Farmington and Lakeville view solar gardens as locally undesirable land uses (LULUs)? If so, to what extent does differentiated political ability to resist solar garden sitings explain the development of three solar gardens in Farmington, MN and the lack of solar gardens in Lakeville, MN?

Literature Review

Environmental Justice and the Path of Least Resistance Theory

As renewable energy sites spread rapidly across Minnesota and the world, studies must address important questions, including: Are these facilities undesirable land uses? Why are facilities sited where they are? To explore these questions, we use an environmental justice framework, specifically the Path of Least Resistance theory, which scholars have not yet applied to renewable energy facility sitings.

To begin, we define justice as an equitable distribution of social goods and burdens, created by full social and political recognition of all groups, and participation by all groups in an accessible decision-making procedure. Justice measures how society distributes "various rights, goods, and liberties" and defines and regulates "social and economic equality and inequality" (Schlosberg, 12). This definition of justice stems primarily from *A Theory of Justice* by John Rawls, who focuses solely on distributive justice or the "distribution of goods in a society, and the best principles by which to distribute those goods" (Schlosberg, 3). David Schlosberg, an environmental justice ethicist, argues that by focusing only on distributive justice, Rawls fails to account for the social and political context creating distributive injustices (Schlosberg, 14). Therefore, he expands on Rawls' definition to include recognition and procedural justice. Recognition justice entails that all groups are equally acknowledged in the social and political realms (Schlosberg, 14). A decision-making process that fails to recognize marginalized groups and their voices not only "inflicts damage to oppressed individuals and communities in the political and cultural realms" (Schlosberg, 14), but also is less likely to create equitable distributions of goods and harms. Likewise, procedural justice refers to "fair and equitable institutional processes of a state" (Schlosberg, 25) which allows for adequate participation in the decision-making process. Furthermore, participation is "often seen as the tool to achieve both distributional equity and political recognition" (Schlosberg, 26). Thus, we include recognition and procedural justice in our overall definition of justice to better understand not only whether the distribution of goods and burdens is equitable but also to understand how these distributions are determined (Schlossberg, 15).

With this definition of justice, we therefore define environmental justice as the idea that environmental goods and burdens should be distributed equitably across the landscape and that facility decision-making processes should adequately recognize and include all groups to ensure that no group faces disproportionate environmental burdens. Thus, environmental justice case studies can evaluate the three types of justice--distributive, recognition, and procedural justice--to determine whether the distribution of environmental benefits and harms are just.

For example, the United Church of Christ's seminal environmental justice paper, "Toxic Wastes and Race in the United States" (1987), studied distributive justice by determining the relationship between hazardous waste facility locations, and the racial and socioeconomic demographics of the host community (United Church of Christ, xii). Using zip codes to determine the location of hazardous facilities and demographic data on the surrounding communities, they determined that communities with the most hazardous waste facilities also had the most residents of color. Likewise, they found that the average percentage of racial minorities in communities with facilities was three times greater than the average percentage of racial minorities in communities without facilities (United Church of Christ, xiii).

Twenty years later, seminal environmental justice scholar Robert Bullard revisited this paper in "Toxic Wastes and Race at Twenty: Why race still matters after all of these years" (2007). Using updated methodologies, 2000 census data about community demographics, and the EPA's spatial data on the locations of facilities, Bullard et al. determined that, on average, host neighborhoods of hazardous waste facilities are 56% people of color whereas non--host areas are 30% people of color (Bullard et al., 43; See Appendix Table 1). Bullard et al. therefore claimed that this racial demographic disparity illustrates that facility sitings follow the Path of Least Resistance or the theory that environmental hazards are typically sited in communities with the least political power to resist.

Bullard first coined this term, The Path of Least Resistance, in his earlier book *Dumping in Dixie* (1990). In this book, Bullard described five African American communities faced with environmental burdens, concluding that "black and poor communities have been disproportionately burdened with these types of externalities" (Bullard, 3). In *Dumping in Dixie*, Bullard claimed that the disproportionate sitings of LULUs in low-income communities of color demonstrate that LULUs typically end up in communities with the least political, monetary, and social capital to resist burdens.

Like *Dumping in Dixie*, Luke Cole and Sheila Foster's book *From the Ground Up* (2000) focused on patterns of racial discrimination and the political economy of environmental decision-making within communities that leads to environmental injustices. Specifically, Cole and Foster highlight that when private sectors choose a site for the location of a proposed facility, the "siting process focuses on industrial, or rural, communities, many of which are populated predominantly by people of color," (Cole and Foster, 71). Cole and Foster explain that, "because land values are lower in heavily industrial and rural communities than in white suburbs, these areas are attractive to industries that are seeking to reduce the cost of doing business," (Cole and Foster, 71). Thus, while decisions to site facilities in areas with lower land values may make economic sense, marginalized populations tend to live in areas with lower land values and therefore disproportionately face environmental threats. In addition, Cole and Foster explain how these communities are presumed to pose little threat of political resistance because of their subordinate socioeconomic, and often racial, status (Cole and Foster, 71), meaning that companies perceive them as communities of least resistance.

Thus, foundational environmental justice literature has provided quantitative and qualitative evidence of environmental injustice. The methodologies and conceptual frameworks first developed in this literature has since been applied to various types of LULUs, including polluted water supplies, hazardous air pollution, sitings of treatment, storage, and disposal facilities (TSDFs), sitings of power generating facilities, and poor distribution of essential facilities (Agyeman et al., 2002).

Testing the Path of Least Resistance Theory

Despite robust evidence supporting the Path of Least Resistance theory, some scholars have critiqued it, hypothesizing instead that facilities are not sited in low-income neighborhoods of color but rather that low-income residents and/or people of color move in after facility sitings, a theory known as "post-siting demographic change" (Mohai and Saha, 2) or "minority move-in" (Pastor et al., 1). Been and Gupta (1997) analyzed these theories, hypothesizing that property values would drop when undesirable facilities are sited in a neighborhood. These lowered property values would then cause both outmigration of wealthier residents and in turn make housing more affordable and accessible for low-income people and for people of color, groups often discriminated against in the housing market. Been and Gupta therefore posit that "over time, the undesirability of the facility would cause the neighborhood to become poorer and populated by higher percentages of racial and ethnic minorities than it had been prior to the siting" (Been and Gupta, 6-7). To test this theory, they conducted a nationwide study of the 544 communities hosting TSDFs, comparing community demographics before the facilities were sited with community demographics after the siting (Been and Gupta, 8-9). They found that the communities hosting the facilities are currently, and have always been, disproportionately communities of color and found no evidence that a substantial change in community composition occurred after a facility siting. Thus, they did not find support for the minority move-in hypothesis because, following the siting of a TSDF, there were no changes in the racial, ethnic, or socioeconomic characteristics of host neighborhoods (Been and Gupta, 29).

Similar to Been and Gupta, Cole and Foster--in addition to their work on the Path of Least Resistance--also addressed whether market dynamics resulting in minority move-in solely create facility distributions, asking "which came first, the waste facilities or the poor people of color?" (Cole and Foster, 62). Although they recognize that asking this question contributes an important dialogue to environmental justice literature, they argue "there is inconclusive empirical support to date for the 'market dynamics' explanation for racial or economic disparities in the distribution of hazardous waste facilities" (Cole and Foster, 60). Furthermore, they critique the market dynamics argument because "the implications of this alternative causal account is that where market dynamics produce current distributions, this fact renders the outcomes somehow more benign. This implication stands on its own terms, however, only if the market is unaffected by racial discrimination and other unjust processes" (Cole and Foster, 61). Additionally, they note that markets do not exist outside of--and rather are determined by--their social and political contexts. Finally, they argue that "even if one could establish that 'market dynamics,' and not the siting process itself, produce racially disparate outcomes, this would not tell us whether such market forces are just or illicit" (Cole and Foster, 63). Thus, Cole and Foster critique the minority move-in hypothesis because it undermines the actual impacts of distributive injustices and fails to include structural patterns, such as racial discrimination and income-barriers, which influence how the market operates.

Pastor et al. (2001) continued to examine the disproportionate siting and minority move-in hypotheses in Los Angeles counties, by comparing the TSDF siting dates and addresses with changes in census tract socio-economic and racial variables, specifically: percent minority, percent African American, percent Latino, household income, home value, median rent, percent college educated, percent single family housing, population density, percent blue collar, and percent manufacturing employment. While Pastor et al. found a significant increase in minority move-in for one of the two ten-year periods they studied, overall their t-tests of the socioeconomic and racial variables indicated that disproportionate siting seemed more explanatory than minority move-in, and that areas undergoing community ethnic composition transition are as vulnerable as already established communities of color. These findings support the Path of Least Resistance theory because they suggest both that communities of color are more likely to have a facility sited in their community and that weakened social capital through changing community composition increases likelihood for facility sitings.

Similarly, Mohai and Saha (2015) also compared the minority move-in theory to the Path of Least Resistance. Employing methodology similar to Been and Gupta (1997), they used GIS data of hazardous waste facility locations and compared the racial demographics of the host communities before and after the facility sitings. Mohai and Saha determined that communities of color receive more facilities than predominantly white communities, and there is little evidence that hazardous waste facility sitings cause "white move-out and minority move-in" (Mohai and Saha, 16). This study rebuts the minority move-in theory and contributes to the extensive literature that claims the Path of Least Resistance theory best explains where environmental burdens will be placed. Although environmental justice scholars constantly test which of these hypotheses best explain uneven distributions of environmental burdens, these theories are not mutually exclusive; rather it is possible LULUs are sited in low-income communities of color *and* after their sitings, more low-income people of color move in.

While these studies found that community demographics most strongly determine whether a community is more or less likely to be subject to environmental burdens, some scholars have emphasized the importance of a community's political power in their ability to resist an undesirable land use. For example, Saha and Mohai (2005) examined political and public opinion changes in Michigan communities between the 1960s and 1990s. They found both an increase in general public opposition to hazardous waste facilities (Saha and Mohai, 625) coupled with new siting laws and policies that shifted the power from the local level to state and federal agencies. This political change created a situation in which "delaying permit approvals… requires considerable technical, legal, and financial resources that often are available only to affluent, politically well-connected communities" (Saha and Mohai, 625). These changes made political resistance and mobilization much more difficult in low-income communities. The general increase in public concern, in conjunction with new siting laws which disadvantaged marginalized communities, caused an increase in unequal sitings predominantly in low-income communities of color. Specifically, in the 1950s, there were only two facilities in Michigan but by the 1980s there were eight facilities (Saha and Mohai, 630). Saha and Mohai also found evidence that these sitings increasingly followed the Path of Least Resistance with a 55.28% increase in the percentage of non-white people located within one mile of the hazardous waste facility between 1950 and 1990, and an increase in 16.3% in the percentage of families below the poverty level that live within one mile of the facility between 1970 and 1990 (Saha and Mohai, 631- 635). This study therefore provides evidence for the Path of Least Resistance, specifically

that a community's political ability to resist sitings dictates the distribution of environmental burdens.

Based on the studies we have already synthesized, facility sitings appear to be influenced by three factors: racial demographics of a community, socioeconomic status of a community, and political power of a community. In his 1995 study, James Hamilton sought to investigate these three factors and evaluate whether one variable has a greater influence than the others. He specifically examined political power, economic profits, and racial prejudice to see how these three factors influence decisions to expand an already existing hazardous waste facility (Hamilton, 107). Using indicators such as voter turnout, median household income, and nonwhite population, Hamilton developed a model that predicts the estimated probability that the existing hazardous waste facility in a given zip code will face an expansion. He found a negative correlation between voter turnout--a measure of political power--and facility expansion, meaning as voter turnout rate increases in the county, the likelihood of facility expansion decreases (Hamilton, 125). Hamilton also found that voter turnout was a more significant predictor than median household income and non-white population in whether or not a hazardous waste facility would be expanded in a community (Hamilton, 127). Using the estimated probability that in any given zip code, the probability of expansion is 0.359 units, he used his model to estimate how the individual factors would change this probability (Hamilton, 126). If voter turnout increased by one standard deviation, the probability of facility expansion would change by 0.096 units, whereas if the non-white population percentage changed by one standard deviation, the probability of expansion would change only by 0.059 units (Hamilton, 126). While Hamilton found that an increase by one standard deviation of median household income would change the probability of facility expansion by 0.147 units, these results were not statistically significant (Hamilton 126-127). These findings contribute to the Path of Least Resistance theory by suggesting that the political activity and political power of a community significantly influence the siting of hazardous waste facilities.

From these studies scholars have demonstrated the efficacy of the Path of Least Resistance theory for describing how LULUs are sited across the landscape, leaving the question: what other cases can the Path of Least Resistance theory explain?

Energy Justice

Applying these basic principles of environmental justice to the energy landscape, Benjamin Sovacool and Michael Dworkin define energy justice as "a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making" (Sovacool and Dworkin, 436). Focusing on the distribution of costs and benefits of the energy system as well as the procedures used to make decisions, an energy-just world "promotes happiness, welfare, freedom, equity, and due process for both producers and consumers" by distributing "the environmental and social hazards associated with energy production and use without discrimination" (Sovacool and Dworkin, 437). Finally, energy justice ensures that "access to energy systems and services is equitable" and guarantees that "energy procedures are fair and that stakeholders have access to information and participation in energy decision-making" (Sovacool and Dworkin, 437).

In contrast with this vision of an equitable, energy-just world, scholars have found that race and socioeconomic status correlate with who is impacted by the externalities and burdens posed by energy facilities (Hernández, 151). Places deemed "energy sacrifice zones" face "an unfortunate byproduct of high demand for energy coupled with the lack of comprehensive

energy policy designed to protect areas that generate the energy sources modern society takes for granted" (Hernández, 152). These energy sacrifice zones--typically created by the negative externalities of nuclear, coal, oil, gas, biomass/incineration, and hydroelectric methods--disproportionately impact low-income communities of color (Hernández, 152). For example, the federal government has solicited every Native American nation, offering millions of dollars if the tribe hosts a nuclear waste facility (Brook, 106). Given that over 31% of Native Americans living on reservations are below the federal poverty line (United States Department of Commerce, n.p.), it is therefore unsurprising that these reservations host a disproportionate number of nuclear facilities, which inevitably cause environmental and health harms (Brook, 107). While, on the surface, this fact alone does not imply energy injustice and instead could demonstrate a willing partnership, many contend that "the money offered by the government or the corporations for this 'toxic trade' is often more akin to bribery or blackmail than to payment for services rendered" (Brook, 106). After centuries of genocide, losing land sovereignty, living in extreme poverty, and facing prejudice from the US government and citizens alike (Dunbar-Ortiz, 2), Native American communities face particular vulnerability and therefore the disproportionate sitings and subsequent negative externalities represent energy injustice.

Likewise, 68% of African-Americans live within 30 miles of a coal-fired power plant whereas only 56% of the white population lives within 30 miles of these plants (U.S. Census, 200). These energy sacrifice zones undermine racial and economic equity and illustrate environmental and energy injustice. Due to the similarities between the sitings of hazardous waste facilities and hazardous energy facilities, future energy justice literature should address whether the disparate sitings of energy facilities can be explained by the Path of Least Resistance theory.

Energy Justice Applied to Renewable Energy

Although energy justice historically has focused on the fossil fuel economy, the recent increase in renewable energy requires examination through an energy justice lens to ensure the facility sitings do not create or perpetuate injustice. Specifically, scholars should use the environmental justice Path of Least Resistance theory to examine the public perception and siting processes of renewable energy facilities to determine whether there are injustices present.

Scholars in the renewable energy justice field have primarily focused on the public perception of wind farms to gauge whether or not these facilities are viewed as a positive or negative addition to the landscape. Groth and Vogt (2014) utilized the energy justice framework and used public opinion to determine how residents perceive the wind farms and therefore to investigate procedural injustices present in the siting of renewable energy facilities. Thus, Groth and Vogt measured public responses to increases in renewable energy in Michigan, specifically examining changes in attitudes after the creation of The Clean Renewable and Efficient Energy Act in 2008, which created a Wind Energy Resource Zone board to identify regions within the state with the highest wind potential (Groth and Vogt, 1). Focusing on Huron county, one of the regions chosen by the Resource Zone board with highest wind potential, Groth and Vogt evaluated public perception of the wind farms and ascertained which costs and benefits influenced the public's support or resistance for wind farm development. Through this research, Groth and Vogt found that 29% of people surveyed had a negative shift in perception after wind farm development in their area. This finding demonstrates that although residents may initially view new renewable energy facilities positively, this opinion can change to opposition over time (Groth and Vogt, 4). In addition, Groth and Vogt found that the majority of residents did not

engage in public meetings about the siting process, illustrating a disconnect between the decision-makers in the siting process and the neighbors of the wind farms, thereby highlighting potential procedural injustices. Therefore, Groth and Vogt suggest changes to the siting process, especially regarding community engagement, to reduce the injustices in renewable energy facility sitings. This report further emphasizes the importance of studying the siting process of renewable energy facilities, giving particular focus to the potential injustices that could arise and unequally burden a specific group of people over another.

To contribute to debates about pre- and post acceptance opinions of affected residents, Wilson and Dyke (2016) conducted a case study in Cornwall, UK, to determine community perceptions of wind farms. Interviewing residents to assess their views on wind farms before and after wind farm development, Wilson and Dyke found that community opinion changed dramatically over time (Wilson and Dyke, 287). Specifically, unlike Groth and Vogt who found initial support for the wind farms which eventually changed to opposition, Wilson and Dyke found that initially the community opposed the wind farms but eventually became accustomed to the wind farms and now support them. This study casts doubt on Groth and Vogt's findings about public perception of wind farms, highlighting that there exists debate about whether wind farms are considered LULUs and illustrating the need for continued research about public opinion on renewable energy facilities.

In 2016, Songsore and Buzzelli continued the investigation of public perception of wind farms, specifically looking at wind energy development in Ontario, Canada following the Province's Green Energy and Green Economy Act of 2009 (Songsore and Buzzelli, 1). Focusing on the human health and environmental justice impacts of wind turbines, they tracked the number of times keywords surrounding wind energy development appeared in local newspapers before and after the Green Economy Act to examine public perception of wind turbines. In their analysis of newspapers, they found procedural injustices due to multiple factors: the lack of public participation in turbine siting decisions; Ontario's neglect of community health concerns; Ontario's prioritization of wind energy business over human well-being; lack of municipal planning control in turbine decisions; and unfair siting of turbines in ways that compromise the health of Ontarians (Songsore and Buzzelli, 11). Communities also felt that they were being treated as experiments. For example many community members stated that "a very real danger exists" and "in the haste to embrace clean technology, legitimate concerns are being brushed aside" (Songsore and Buzzelli, 11). Due to the uncertainty surrounding the potential health risks, such as the acoustic effects, associated with wind turbines, residents felt at-risk and requested further research to ensure they would not experience any negative impacts (Songsore and Buzzelli, 7). Without verification that there exist no health risks associated with wind turbines, the decision-makers failed to take residents' concerns seriously and did not adequately include the residents and their opinions in the decision-making process, thereby demonstrating procedural injustice. Given the opposition by the community members, Songsore and Buzzelli demonstrate that some communities perceive wind farms as LULUs and contribute to our understanding of public perception regarding renewable energy facilities.

Investigating whether there are energy injustices posed by renewable energy facilities requires an understanding of whether the public supports or opposes these facilities and whether the facilities pose any negative externalities. Despite attempts by these initial studies to address this gap in the literature, wind energy scholars have not reached consensus on whether renewable energy facilities are uniformly viewed as LULUs, and future research should continue to study this topic.

In addition to evaluating public perception and procedural injustices in the siting of wind farms, more recent studies have begun to investigate distributional injustices with regards to wind farms. For example, a Swedish study conducted in 2017 by Liljenfeldt and Pettersson analyzed whether it is easier to build wind farms in economically marginalized communities than in communities with higher socioeconomic status in Sweden. Statistically evaluating whether wind farm proposals are more likely to be approved or rejected based on the socioeconomic background of the neighboring community, Liljenfeldt and Pettersson found "a higher likelihood of rejection in areas with more highly educated people and people working in the private sector, compared to a higher likelihood of approval in areas with more unemployed people" (Liljenfeldt and Pettersson, 648). Specifically, they found that, on average, communities that rejected wind turbines had 18.9% people who had received higher education as compared with only 16.5% people who received higher education in communities that accepted wind turbines. Additionally, 59.67% of residents in communities that rejected wind turbines worked in the private sector, whereas only 55.44% of residents in communities that accepted wind turbines worked in the private sector. Finally, unemployment was 10.72% for communities that rejected wind turbines as compared with an unemployment rate of 12.97% in communities that accepted wind turbines (Liljenfeldt and Pettersson, 654). Although these numbers do not necessarily indicate a causal relationship between community demographics and wind turbine sitings, Liljenfeldt and Pettersson identified a correlation between a community's socioeconomic status and wind turbine sitings--specifically that poorer communities may receive more wind turbines and therefore, if negative externalities exist, more environmental burdens. This research highlights possible distributional justice issues associated with renewable energy facilities, warranting further research to better understand whether disproportionate wind farm sitings occur globally and what, if any, negative externalities exist.

These studies highlight that environmental justice concerns are not limited to only typical environmentally hazardous facilities but can also be applied to renewable energy facility sitings. Notably, Groth and Vogt (2014), Wilson and Dyke (2016), and Songsore and Buzzelli (2016), analyzed public perception and participation in decision-making processes as their main indicator of procedural injustice, rather than highlighting the decision-making process itself or identifying other externalities associated with the implementation of these facilities. In focusing on public perception of wind farms, these studies demonstrate the initial investigation into the environmental justice implications of renewable energy, specifically finding that nearby residents sometimes express opposition. These findings demonstrate the need to continue studying possible procedural and distributional injustices that may arise as renewable energy facilities continue to spread across the landscape, particularly by studying the under-researched renewable energy siting processes.

Although most renewable energy justice literature has studied wind farms, some authors have recently begun to investigate solar garden sitings and how they may contribute to the ongoing investigation of whether renewable energy facility sitings pose injustices. For example, Yenneti and Day (2015) conducted a case study evaluating the procedural justice issues with the implementation of the Charanka solar park in Gujarat, India. Interviewing people living near the solar park, they used thematic analysis methods to identify recurring themes and patterns in the data--a methodology similar to how Songsore and Buzzelli analyzed themes in newspaper language to evaluate public perception of wind farms. By tracking the frequency of key words, phrases, and sentiments to identify overall trends in their data, authors of qualitative studies can quantify and legitimize their qualitative data.

Thus through these methods, Yenneti and Day found three recurring patterns throughout the interviews in how community members felt about the solar park: 1) they were not provided adequate information about the solar park, 2) they were not consulted about the siting decision and therefore felt disenfranchised, and 3) those most affected by the solar park--namely the landless poor farmers--were not adequately represented in the decision-making processes (Yenneti and Day, 668-670). These themes indicate that the community felt they had not been adequately included in decision-making processes, and therefore the solar gardens negatively impacted already marginalized people with low socioeconomic status by both removing viable grazing land and making them feel powerless (Yenneti and Day, 671). Exclusion from the decision-making process of facility sitings represents a form of procedural injustice, wherein stakeholders do not have an adequate opportunity to partake in and have their voices heard in the political processes.

Yenneti and Day continued this study in 2016 to evaluate how community members felt the Charanka solar park negatively impacted them. They conducted in-depth, semi-structured interviews with community members, asking questions about 1) the interviewee, 2) their relationship to and knowledge of the solar park, and 3) their perspectives about the siting procedures and how they felt about the final outcome (Yenneti and Day, 35). They then used the same thematic analysis methodology and found that villagers felt the solar park decreased access to viable land for grazing, particularly impacting the pastoralist Rabari community and landless agriculturalists (Yenneti and Day, 40-43). While siting a solar garden on marginalized farm land may indicate that the siting decision was based on economic rationale, the solar garden's effect on the already marginalized community indicates that "large scale renewable energy developments, although seen as environmentally good, also have the potential to damage a community's well-being," and especially may harm communities with lower socioeconomic or political statuses who have the least ability to resist (Yenneti and Day, 35). Furthermore, because marginalized communities tend to live in areas with lower land value, solar garden sitings could both make economic sense and disproportionately affect vulnerable populations.

In addition, this siting process displays recognition and procedural injustices because decision-makers failed to adequately include the impacted community in the siting process. Although no one had legal rights of private ownership over this marginal farmland, the community did have usage rights. Community members and government officials alike indicated that community members did not know they were giving up their usage rights when they agreed to host the solar garden, because they could not read the language of the agreement they signed, and trusted administrative officials' false verbal assurances of providing usage rights after construction of the solar garden (Yenneti and Day, 96). Thus, Yenneti and Day's case studies suggest that energy injustices exist in renewable energy facility sitings and highlight that future research should continue to investigate the possible negative effects of the solar garden siting process.

In conclusion, while the Path of Least Resistance theory has proven to be a useful way to explain where hazardous waste facilities are sited, it has yet to be extended to the sitings of renewable energy facilities, specifically solar gardens. As Songsore and Buzzelli and Yenneti and Day point out, renewable energy facilities may disproportionately impact already marginalized communities. Yet, these renewable energy studies focus mostly on procedural justice as measured by public perception and participation, and focus mostly on wind. Thus, renewable energy scholars have yet to examine the solar garden siting process or how decision-makers place these facilities in the landscape. Without addressing the siting process, the

literature thus far has failed to fully evaluate the potential distributional injustices present in the emerging renewable energy landscape. In order to gain a complete picture of all the potential injustices in how these facilities are sited, research must examine what specific factors influence where these facilities are placed. Thus, there exists a gap in the literature: why are solar gardens sited where they are sited? To address this unanswered energy justice question, we utilize Bullard's Path of Least Resistance theory to conduct a case study evaluating the influence of political ability to resist decisions regarding the siting of solar gardens in Southern Minnesota.

Methodology

Case Selection Methodology

Environmental justice research often utilizes a case study methodology which involves an intensive study of a single unit of analysis, such as a person, household, neighborhood, or city, in order to extrapolate to a larger class of similar units (Kanazawa, 235; Smith, 1). Case studies, "the most well-known qualitative strategy" (Kanazawa, 215), allow researchers to see the phenomenon in its context to explore its complexity. As few studies have investigated our research questions about whether solar garden are LULUs and what the siting process entails, a case study methodology best suits our research because it allows us to test the complexity of the Path of Least Resistance theory, explore a new topic in-depth, and create generalizable hypotheses for future research to test.

Building off previous environmental justice case studies, we identified variables that are common in LULU siting decision cases, such as public opinion about the facility and how the decision-making process engages the public. Finally, we studied solar garden siting decisions at a city level to better understand why there exist disproportionate solar garden sitings between Farmington and Lakeville.

First, in order to identify solar garden locations in Southern Minnesota, we used the Energy Information Administration's ("Profile Data", n.p.) energy map and focused on areas that appear to have the greatest concentration of solar gardens. We then compiled information on land size, population, population density, and median annual household income of all the cities that have solar gardens (See Appendix Table 2) and decided to conduct a case study on Farmington, as it has three solar gardens. Finally, we wanted to compare Farmington to a demographically similar city and found Lakeville, which has no solar gardens (See Table 3).

Chart of Farmington and Lakeville Basic Information

Town	Number of Solar Gardens	Median Annual Income	Population	Population Density (People per Square mile)	Racial Demographics
Farmington	3 (Farmington Holdco Solar Garden, Empire Solar Garden, Ursa Community Solar Garden)	$87,925	22,656	986 people per square mile	89.8% white
Lakeville	NONE	$95,130	61,938	1,192.4 people per square mile	89.31% white

Table 3: Farmington and Lakeville Demographics and Solar Gardens

While Farmington and Lakeville have similar median annual incomes ($87,925 and $95,310, respectively), Farmington has a population of 22,656 while Lakeville's population is 61,938--three times the size of Farmington's population ("QuickFacts," n.p.). Additionally, the City of Farmington is 14.69 square miles and the City of Lakeville is 36.06 square miles--almost double Farmington's size ("QuickFacts," np). Therefore, Farmington has a population density of 986 people/square mile and Lakeville has a population density of 1,192.4 people/square mile. Additionally, according to the 2010 census, Farmington is 89.8% white and Lakeville is 89.31%

white ("QuickFacts," n.p.). And most importantly, Farmington has three solar gardens while Lakeville has none (See Table 3; See Figure 3).

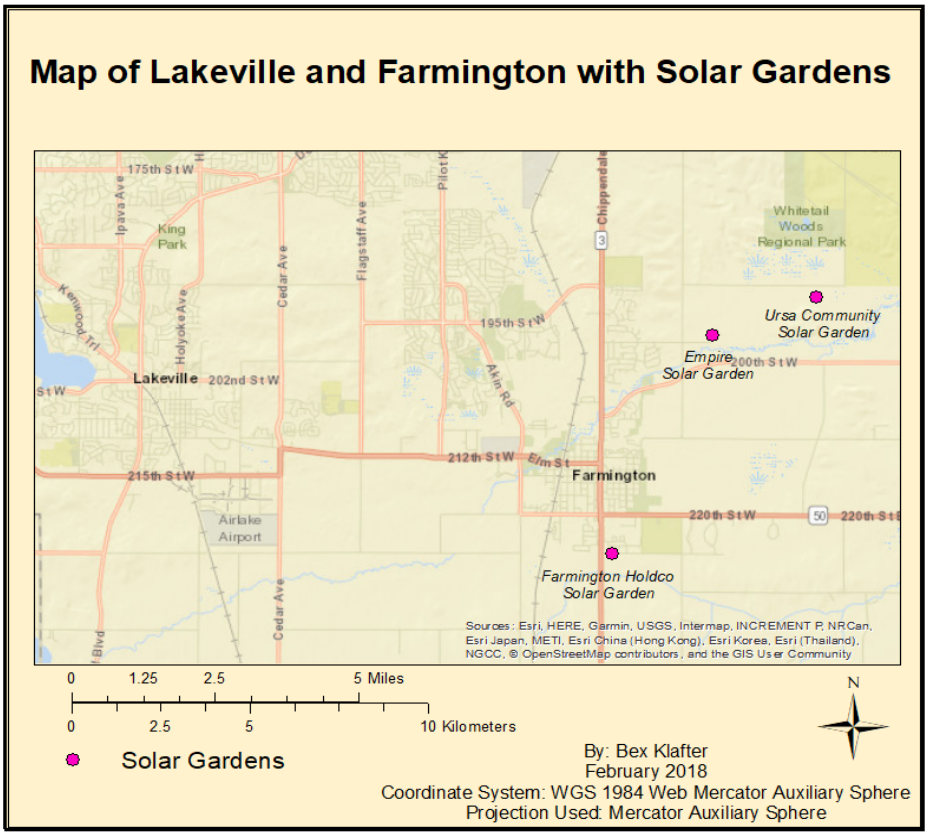

Figure 3: Map of Lakeville and Farmington with Solar Gardens

Due to the demographic similarity of these two cities, we chose to focus on another factor that has been proven to influence where facilities are sited: political power. We initially hypothesized that these cases would reflect the Path of Least Resistance because previous research found that renewable energy facilities are often conceptualized as LULUs and that political power strongly determines facility sitings. Our case study, unlike most environmental justice case studies that examine a typical environmental burden sited in an already marginalized community, allows us to test how far the Path of Least Resistance theory can extend to include "unlikely cases" (Kanazawa, 247). We particularly aimed to examine the efficacy of the Path of Least Resistance for explaining renewable energy sitings. Furthermore, unlike typical environmental justice case studies utilizing the Path of Least Resistance, we only looked at the political ability to resist, rather than financial or racial demographics and their impacts on the ability to resist.

As we began our research, we discovered more differences between Farmington and Lakeville than we initially knew about. For example, we quickly realized that Farmington is mostly in Xcel Energy territory whereas Lakeville is mostly in Dakota Electric territory. Likewise, while we knew based on the map that Lakeville is closer to I-35 and the Twin Cities than Farmington, talking to residents and decision-makers from Farmington and Lakeville elucidated that these geographic differences impact the community structure, communal character, and development plans and histories of the cities.

Finally, we discovered that although the energy map indicated that the three solar gardens were in Farmington, they are technically located in the surrounding Castle Rock and Empire Townships. Despite the technical political border between the townships and the city itself, Farmington takes credit for these solar gardens, and Empire and Castle Rock Township residents living near the solar gardens consider themselves Farmington residents. Located on the border of the political boundary, these solar gardens may reflect the edge effect, where facilities are located near the edge of a spatial unit so the effects extend beyond the community technically within the bounds. Although a surprising discovery, we determined that we should still compare Farmington and Lakeville to test the Path of Least Resistance given that the border between the

city and townships seem more like a bureaucratic distinction not reflected in the social communities and identities expressed by Farmington residents in their interviews.

Although these differences between Farmington and Lakeville complicate our research questions, the high median annual household incomes of $87,925 and $95,310 as compared with Minnesota's median annual household income of $65,599 ("Minnesota Household Income," n.p.) and the majority white racial demographics still make them comparable cities and useful cases to investigate and compare.

Data Collection Methodology

After we determined which cities we would focus on, we began learning about the decision-making processes in both cities to understand how solar garden siting decisions are made and see whether the citizens had a voice in the process. First, we conducted archival research of local newspaper articles to understand how popular Minnesotan media currently discusses solar gardens. This helped us identify the various perspectives in discussions about solar gardens and provided more information about how the process played out in other cities around Minnesota. We also examined meeting minutes from city council, Board of Education, and Planning Commission meetings in both cities and the townships. The meeting minutes allowed us to identify attendees of the meetings--including the landowners of the solar garden properties and the solar developers for each solar garden. We then conducted semi-structured interviews with the landowners of Farmington Holdco Solar Garden, Ursa Community Solar Garden, and Empire Solar Garden, as well as their respective solar developers: SolarStone Partners, Geronimo Energy, and Oak Leaf Energy Partners (See Appendix Interview Questions). We also interviewed a teacher and Facilities and Plant Planning Director from Lake Marion Elementary School in Lakeville who are working on installing rooftop solar on the school. These interviews allowed us to piece together each solar garden's siting process.

In addition to interviews conducted regarding the specific solar garden siting processes, we also conducted semi-structured interviews with Farmington and Lakeville residents to determine whether they view solar gardens as LULUs and how much involvement they had in the decision-making process. We also conducted semi-structured interviews with decision-makers to learn about the decision-making process, their read on how the public views solar gardens, and, since many are Farmington or Lakeville residents themselves, their opinions on solar gardens. Additionally, we talked to solar garden experts, many working in the solar industry through solar garden development, utility companies, and advocacy. These decision-makers and solar garden experts provided crucial institutional background for us to better understand the solar garden siting process in general, and begin to piece together what processes led to the discrepancy in solar gardens between Farmington and Lakeville (See Appendix Table 4).

Following the strategy explained by Robert Yin in his book *Case study research and applications: Design and methods*, we supplemented the findings from our interviews by using many "different sources of evidence" (Yin, 114-115), such as newspaper articles and meeting minutes. This common case study data analysis method is called triangulation, and involves using two or more sources of data to verify results. Triangulation allowed us to create a more robust narrative and gave us a better understanding of the general state of solar gardens in Southern Minnesota, Farmington and Lakeville's histories, differences between Farmington and Lakeville, and the siting processes for the three Farmington solar gardens. For our "multiple measures of the same phenomenon" (Yin, 116-117), we used meeting minutes and newspaper

articles related to the cities and the solar gardens, as well as interviews with nine residents, six decision-makers, and ten solar garden experts (See Appendix Table 5). We used these varied sources of evidence to determine whether residents view solar gardens as LULUs and whether the siting processes for the three solar gardens in Farmington illustrate the Path of Least Resistance. Thus, triangulation of multiple sources allowed us to establish more confidence in our conclusions than we could have achieved if we only examined one source of data because we found consistent results from among the varied sources of data.

To supplement our triangulation of the data, we utilized a common qualitative case study methodology, used by Yenneti and Day (2016), known as thematic analysis methodology which aims to pinpoint, examine, and record patterns or themes (Braun and Clarke, 79). We then followed the six phases of thematic analysis: familiarization with the data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report (Braun and Clarke, 86-94).

First, we familiarized ourselves with the data, including meeting minutes, newspaper articles, and interview transcriptions. Going through the data, we manually identified patterns in the data by generating a list of initial codes, meaning a list of words and phrases mentioned frequently throughout our data. To ensure intercoder reliability, two group members coded each interview and compared our results. The codes included words and phrases like "resistance," "support," "cost," "politics," "aesthetics," and "lack of knowledge." We then tallied each time a code word or phrase was mentioned. Once we generated a list of the codes with the number of times each code was mentioned, we grouped the codes into themes. These themes include, "Land Value and Availability," "Utilities," "City Character," "Public Sentiment," and "Politics." Each of these themes demonstrate the patterns identified in our data and help provide an explanation for our research question.

Results

Based on meeting minutes from Farmington and Lakeville city government meetings, newspaper articles, and the transcriptions of our interviews, we found that Farmington and Lakeville residents do not view solar gardens as LULUs, and the Path of Least Resistance does not explain the solar garden siting discrepancy between Farmington and Lakeville. Rather, we found that Farmington's lower land values and more available vacant land, due to less suburban development, along with more area in Xcel Energy territory, better explains why Farmington has three solar gardens and Lakeville has none. In this section, we outline the general solar garden siting process, describe the specific solar garden siting processes in Farmington and Lakeville, discuss the codes and frequency of mentions, and elaborate on our themes using quotations from our interviews to provide evidence for the answer to our research questions.

General Solar Garden Siting Process

The solar garden siting process typically begins with solar development companies who identify ideal land parcels for solar gardens and contact the owners. According to experts in solar garden development, these companies look for land not heavily used for other purposes--such as unproductive farmland. Additionally, the parcel should be close to a substation and ideally in Xcel Energy territory because Xcel Energy--the largest investor-owned utility company in Minnesota--has more resources, familiarity, and infrastructure for solar garden construction. If the landowner agrees to lease their land to the solar development company, the company approaches the city, county, or township governments and inquires about the rules, regulations,

and process to develop a solar garden in their jurisdiction. Then, depending on the region's ordinances, the solar development company applies for an Interim Use Permit (IUP) or a Conditional Use Permit. An IUP is required for land uses not consistent with the city's long term plan for an area or where the land use has a limited lifetime. On the other hand, a Conditional Use Permit is required for land uses generally compatible with a particular zoning district, but because of hazards inherent in the use itself or because of special problems that its proposed location may present, the use is allowed by permit only if the special concerns are addressed ("Information Memo Zoning Decisions," 4-5). The Planning Commission then hosts a public hearing to take testimonies from anyone who supports or opposes the project. If the solar developer adequately addresses these concerns, the Planning Commission approves the plan. The city council makes all final decisions regarding the solar garden and, if approved, the solar development company then submits documents for Xcel Energy to review their project. Xcel Energy then conducts engineering studies on the project to see whether the local distribution system can handle the solar garden with the current infrastructure. If the current infrastructure is unsuitable, they look at what they need to build in order to interconnect the solar garden to the grid. Then Xcel Energy inform the solar developers of the cost of interconnection and developers pay to interconnect the solar garden to the distribution system. Xcel Energy then assigns designers to work with solar developers on the solar garden layout. Once constructed, Xcel Energy tests the site before energizing the system to make sure there are no negative impacts to the local distribution grid. Using information from this general process, we were able to gain a more complete understanding of how the individual solar gardens were sited.

Solar Garden Siting Processes: Farmington and Lakeville

To understand why there are three solar gardens surrounding Farmington and none around Lakeville, we first must address the solar garden siting processes. These processes involve coordination between solar developers and utility companies and approval by local units of government which have zoning authority. As noted, there are three solar gardens surrounding Farmington and none around Lakeville. The Farmington Holdco Solar Garden is located in Castle Rock Township, while the Ursa Community Solar Garden and the Empire Solar Garden are located in Empire Township. While there are currently no solar gardens present in Lakeville, there is interest by residents to have rooftop solar on the schools in the district. The siting process for each solar garden is described in detail below, followed by more information regarding the proposed rooftop solar at Lake Marion Elementary School. In general, we found that the siting processes for these solar gardens did not display the Path of Least Resistance because very few neighboring residents opposed the projects, and we found no indication of less political power in Farmington than in Lakeville. Furthermore, the solar developers indicated that they chose the sites because of their low land value, otherwise marginal usage, and other criteria that allow for maximum solar garden efficiency.

a) Farmington Holdco Solar Garden Siting Process

One of the first solar gardens constructed in Minnesota, the Farmington Holdco Solar Garden (5 MW), was originally an abandoned tree farm owned by a Castle Rock resident. When the landowner began the process of removing the overgrown trees in 2015, he was immediately contacted by eight solar developers. Confused why the solar developers had solicited him and his land, rather than other nearby landowners with more farmland available, he learned that the companies had a scoring system for ideal solar garden development, which included criteria such

as good highway access; close to the metropolitan area; not a part of a farm program; without a mortgage on it; flat; good conditions for building the solar garden; near a three phase line to interconnect the solar garden with the electricity grid; and no other encumbrances on the property. His land earned a perfect score on these criteria.

Prior to these offers, the landowner had never considered developing a solar garden on his land because, as he stated in his interview "there were none. Nobody even talked about them. No one even knew anything about it." After reviewing the offers from solar development companies, however, he and his family decided, they were interested in developing a solar garden on their land. The landowner chose to work with the solar developer SolarStone Partners, who eventually sold the solar garden to NRG Energy.

Thus, on September 28, 2015, SolarStone Partners, submitted an application to the Castle Rock Township Planning Commission to amend the Zoning Ordinances to allow solar on the property. The Board of Supervisors reviewed the application during their meeting on October 13, 2015, which passed with four ayes and one board member--the solar garden landowner himself--abstaining from voting to avoid a conflict of interest. Then, on November 2, 2015, the Planning Commission held a public hearing to discuss the amendment to the zoning ordinance. The four present board members voted aye and on November 9, 2015 the Board of Supervisors adopted the new amendment to the zoning ordinance to allow for solar.

Following this change to the zoning ordinances, SolarStone Partners, submitted an IUP application for the "Farmington Holdco Project for Community Solar Garden," on 3100 225th St W. Soon after SolarStone Partners submitted their application to create the Farmington Holdco Solar Garden, the county enacted a moratorium on solar garden development which lasted six months. Having already submitted their application, however, the Castle Rock Township Planning Commission allowed them to continue with the solar garden development process.

On December 14, 2015 a representative from the Vermillion River Watershed Joint Powers Organization (VRWJPO) expressed concerns about the storm water management plan for the Farmington Holdco Solar Garden. Specifically, VRWJPO worried that the solar garden would affect the storm water runoff and therefore would impact the nearby sensitive trout habitat in the Vermillion River Watershed. To ameliorate this problem, SolarStone Partners, increased their environmental protection beyond the necessary level by placing the site more than 300 feet away from the watershed--over double the required buffer area needed for solar gardens. SolarStone Partners' Chief Development Officer explained that the solar garden actually improves the storm water runoff hydrology because the land would otherwise have been a corn and soybean farm, which poses more negative consequences for runoff and for the watershed than solar gardens. He compared a solar garden to land in a Conservation Reserve Program (CRP) because, under the solar garden, they "plant grasses and foliage that basically looks like [land in] CRP which is [in] better condition than an agricultural field which below the [crops] is an agricultural desert." Thus, SolarStone Partners, resolved these concerns and the permitting process continued.

On December 21, 2015, the Castle Rock Township hosted a public hearing for people to express their concerns. Most concerns focused on the availability of the surrounding land for potential future annexation into Farmington or the potential to build in the surrounding area. One neighbor sent a letter of opposition because he believed the solar garden would be an eyesore. After talking to the solar garden landowner, however, this resident decided that he would prefer a solar garden on that land rather than a housing development and therefore changed his stance and accepted the solar garden. The landowner described this resident initially opposing the project,

saying: “I think change is sometimes a little bit scary. He didn’t want the housing development either, I think in time he said ‘you know what, it’s not so bad.’ [He] and I have talked several times since then and it’s never come up and I haven’t heard a peep out of him. I know he was concerned about an eyesore, concerned about land values, that nobody would want to live next to it, and I think in time he has just absorbed that.” Thus, with no other opposition or alarming issues brought up during the public hearing, the Board of Supervisors approved both applications with four ayes.

With this approval from the Planning Commission it went for the last time to the Board of Supervisors on January 11, 2016 for its final approval, where they discussed the length of the permit as well as some of the issues that were surrounding the VRWJPO concerns. With all concerns out of the way, the four members of the Board of Supervisors approved the thirty-year permit with four ayes.

SolarStone Partners then applied to Xcel Energy for project approval. Once Xcel Energy conducted studies on the site and the cost of interconnecting the solar garden to the electricity grid, they granted SolarStone Partners approval, at which point SolarStone Partners then began construction around December 2016. The Farmington Holdco Solar Garden became interconnected to the grid in spring of 2017 and has since been in operation. The landowner and the Chief Development Officer from SolarStone Partners, stated that they did not receive any opposition to the project throughout its construction or since it went online last year.

b) Empire Solar Garden Siting Process

The Empire Solar Garden, located at 2540 197th Street in Empire Township, was first thought of around 2011 when Jason Willet, the Finance Director of Metropolitan Council (Met Council) Environmental Services saw an opportunity to install solar gardens on Met Council’s Wastewater Treatment Plant property. Met Council’s Wastewater Treatment Plant necessitates buffer space to avoid odor problems and, at this time, solar panels were becoming less expensive, so a solar garden seemed like an ideal use of the buffer land that otherwise could not be developed into any land use that could be impacted by the odor. In addition, according to Met Council’s Sustainable Operations Manager, they believed a solar garden “would provide an interesting opportunity to provide regional value in advancing regional energy and open up the opportunity for others to participate in community solar gardens.”

Thus, by 2015, Met Council was seriously considering building a solar garden on their property and therefore held conversations in the public library about solar gardens to allow the public to contribute to the discussion early on. Initially, Met Council wanted to own and operate the facility themselves, but according to the Sustainable Operations Manager, “It was going to be pretty expensive for us to do that and not enough of a cost savings on our energy bills to make it something that was a good business decision.” Instead, they decided to lease their land to Oak Leaf Energy Partners--a solar developer who would design, build, own, and operate the facility. On January 19, 2016, Mike McCabe, a representative from Oak Leaf Energy Partners, attended the Empire Township Planning Commission meeting and proposed an Interim Use Permit (IUP) for the solar garden to be located at Met Council’s Wastewater Treatment Plant. The IUP was approved with three ayes by the Empire Township Planning Commission. While Oak Leaf Energy Partners initially planned to construct a seven MW solar garden, due to Xcel Energy’s regulations and limitations set by the Public Utilities Commissioner, they had to reduce the solar garden to five, co-located single MW solar gardens --a practice no longer permitted. Once the Empire Township Planning Commission approved the IUP, construction of the Empire Solar

Garden began. As Oak Leaf Energy Partners focuses on financing the initial investment for solar garden projects, once the project reached the construction stage, they sold the solar garden to Cypress Creek Renewables, who still owns it today. Met Council's Sustainable Operations Manager explained that this change in ownership did not affect Met Council.

Although Cypress Creek Renewables and Met Council encountered a complaint regarding traffic when the construction crew was transporting supplies to the site, they rectified this complaint by changing the route they used and afterwards heard no other complaints. In total, construction lasted about six months. From when the IUP was first proposed in January of 2016 to when it went into operation in early 2017, there was constant activity on the project. Before the solar garden could begin operating, Oak Leaf Energy Partners finalized the permits, Cypress Creek Renewables finished construction, and had the site tested by Xcel Energy to ensure it could interconnect with the electricity grid properly. Now that the facility is running, Cypress Creek Renewables is currently working to plant native, pollinator-friendly landscaping, so the solar garden land can serve a dual purpose of producing energy and supporting pollinators.

c) Ursa Community Solar Garden Siting Process

The Ursa Community Solar Garden, a 41 acre plot located near Biscayne Avenue and 190th Street in Empire Township, had originally been marginal farmland. According to the landowner--who in total owns 4000 acres of farmland in Minnesota and South Dakota, including 350 acres by Farmington--the area that now hosts the Ursa Community Solar Garden is low and wet and not good for farming. Around 2015, many solar development companies approached the landowner about converting this farmland--in a remote, rural area surrounded by DNR wildlife areas--to solar gardens. The landowner originally expressed hesitation about developing a solar garden on his property because he did not know anything about it. He eventually decided to lease the land for a solar garden because he realized "it doesn't really hurt anything out there and it's a good investment for my kids' and grandkids' future." Additionally, he recognized that "that land is always going to be kind of low and wet . . . If it was top farmland, I probably would not have done it" Thus, he stated "the main thing for me boiled down to it's a good investment on that land. [It] makes good use of that land."

After deciding to allow solar garden development on his land, the landowner's sister's son-in-law, who works in the wind energy industry, advised him to choose Geronimo Energy as the solar developer. From here, Geronimo Energy took over the logistics of siting the solar garden. In April of 2016, they went to the Empire Township Board of Supervisors meeting to discuss constructing an additional access road, as the land is not easily accessible from the main road. We assume Geronimo Energy submitted an IUP application and that the Empire Township Planning Commission held a public hearing, but unfortunately the meeting minutes did not describe these events, the landowner knew nothing about this process, and a representative from Geronimo Energy could not legally provide us with these details.

Then, on May 17, 2016, a representative from Geronimo Energy went to the Empire Planning Commission meeting to discuss the amendments to their IUP since they were required to reduce the size of the solar array from their original proposal of a 10 MW solar garden to a 5 MW solar garden in order to adhere to Xcel Energy's guidelines. The Planning Commission approved this amendment and the IUP unanimously with five ayes, and because the changes to their application were so small, they did not hold another public hearing. Additionally, on June 7, 2016, the Board of Supervisors approved the access road use application, allowing Geronimo Energy improved access to the site for construction. On June 21, 2016, an addendum was made

to the Ursa Community Solar Garden application, with revised site and construction plans. The Empire Township Planning Commission and Board of Supervisors approved this addendum 5-0 in June of 2016. Unfortunately, we were unable to get more information about why Geronimo Energy had to submit this addendum because, again, the meeting minutes, landowner, and representative from Geronimo Energy did not provide this information.

Following this approval, Geronimo Energy began constructing the solar garden in June of 2016. The solar garden did not begin operating until February of 2017 because bad winter weather slowed construction. After Geronimo Energy built the solar garden, BHE Renewables bought it. We saw this type of transaction in all three of the solar garden siting processes we investigated where one solar development company initially invested in the project and then sold it to another solar development company to finish the development process and operate the facility. These changes in ownership had no impacts on the landowners.

Since the beginning of the Ursa Community Solar Garden project, no one has expressed any opposition to the solar garden because, according the landowner, "it's out in the middle of nowhere, so there's no neighbors out there to complain about it . . . people don't even know about it." The landowner continues to support hosting solar gardens on his land, even stating: "I'd turn the whole 350 acres into solar panels if I could! It would be less headaches for me! I just get a check in the mail once a year and then life is good."

d) Lakeville School Solar Garden Siting Process

Although Lakeville currently does not have any solar gardens, everyone we spoke with from Lakeville highlighted that the community supports solar energy. In fact, Lake Marion Elementary School is in the process of installing a rooftop solar project. A third through fifth grade teacher at Lake Marion first introduced the idea after attending a REcharge Labs course in November 2016 for teachers, which focused on using renewable energy in the classroom as a teaching tool. She explained that seminar inspired her, stating "I stood on the roof, took my picture with the solar panel and said 'I'm going to see this happen at my school.'" Thus, she taught her fifth grade classroom about solar gardens and they practiced their argument and critical thinking skills with a debate about the benefits and drawbacks of solar. The students also designed and created their own solar-powered fountains. After this class unit, the teacher and the students decided to bring the idea to the school board in May 2017. The students became ambassadors of the project, surveying parents about their feelings towards solar gardens, presenting to the Lakeville school board about the benefits of getting rooftop solar at Lake Marion, and even performing a song about solar energy.

While the Lakeville school board seemed interested in pursuing the project, there has been little progress since May 2017. The teacher hypothesizes that this stagnation has more to do with the recent change of the school board superintendent than opposition to the project. Although some school board members worried about the length of the contract and that taxpayers' money would go towards the project without their approval, the board seemed generally open to the idea. Additionally, Lakeville school board's Director of Facilities and Plant Planning, mentioned that putting solar panels on Lake Marion would cause an inequity between the schools, particularly because most of the schools are not in Xcel Energy territory, so it would be more challenging to connect solar panels to the energy grid. Although there has not been much progress in the last few months, the teacher is hopeful that the project will move forward soon.

In developing the narratives for these three solar garden siting processes and the proposed

rooftop solar in Lakeville, we began to learn about what factors influence the solar garden siting processes. We then compared this information with aggregated information from all the interviews to answer our research question.

Codes and Themes

From our interviews, we found that our top five most mentioned codes were: Xcel Energy (83 mentions), Quick Suburban Development (71 mentions), Land Use and Values (71 mentions), Support (67 mentions), and Resistance and Opposition (65 mentions) (See Table 6; for the top twenty codes see Appendix Table 7). We most frequently encountered these ideas in our interviews because we mostly asked questions about the differences between Farmington and Lakeville and about residents' opinions on solar gardens.

Ranking	***Codes***	***Sums***
1	**Xcel Energy**	**83**
2	**Quick suburban Development**	**71**
3	**Land Use And Values**	**71**
4	**Support**	**67**
5	**Resistance/opposition**	**65**

Table 6: Top Five Most Mentioned Codes

We then categorized these codes into five themes that encapsulated the patterns we saw in our data: Public Sentiment, Land Value and Availability, Utilities, City Character, and Politics (See Appendix Table 8). In this categorization, we found the most mentions about Public Sentiment (285 mentions) which makes sense as we asked our interviewees many questions about their own feelings towards solar gardens and about their read on general community sentiment towards solar gardens in Farmington and Lakeville. The next most mentioned theme was Utilities (268 mentions) which also makes sense as we talked to many decision-makers and solar experts and explicitly asked about utility companies and Xcel Energy's and Dakota Electric's role in the decision-making processes.

While each codes' and themes' frequency provides insight into what respondents talked about during their interview, we must note that we did not just code for voluntary mentions, but rather any time someone mentioned anything about the idea, including when prompted or not. Given the potential bias from this coding methodology, we only used the codes to indicate general trends in our data. The stronger, more accurate evidence is the specific quotations highlighted in our Explanation of Themes section (below) because we identified and categorized interviewees' responses to our question: "what do you see as the driving factor behind the discrepancy in solar gardens between Farmington and Lakeville?"

Explanation of Themes

In this section, we elaborate on each theme by using specific verbal evidence we heard in our interviews. Through this process, it becomes abundantly clear that Farmington and Lakeville residents do not view solar gardens as LULUs and that the main driving factor behind the solar garden discrepancy is the difference in land value and availability between Farmington and Lakeville.

a) Public Sentiment

Prior to starting our research, we hypothesized that the difference between the number of solar gardens in Farmington and Lakeville could be explained by the Path of Least Resistance, a theory which suggests that LULUs are placed in communities with the least political ability to resist. Based on this theory, we expected that Farmington and Lakeville residents, particularly those living near solar gardens, would express discontent about solar gardens. Specifically, we anticipated to hear evidence of "Not in My Backyard" (NIMBY) arguments regarding solar gardens, meaning that although residents may recognize the importance of renewable energy, they do not want the facilities sited near their homes.

In some interviews conducted early on, interviewees indicated that some citizens initially pushed back against the solar gardens, complaining about the glare and the aesthetics. In our interview with a reporter from *Bulletin Newspaper*, she said, "Really the only people who were giving their negative opinion of it were people who were going to be neighboring it and were worried about property values, or noise . . . they don't like that they are going to have to look at it from their window. There are just a lot of people who are pretty worried about the appearance to be honest." We also expected to see groups of the community who felt like they did not have a voice in the decision-making process, a typical sign that the siting process followed the Path of Least Resistance theory.

In talking to Farmington and Lakeville residents, however, we encountered mostly positive feelings towards solar gardens. When speaking with residents of Farmington who live next to the solar gardens, one citizen said, "I think they're great! They're environmentally friendly. They are not noisy. I am looking at it right now out my window . . . I don't hate that it's there. It's not ugly from where I'm looking at it, granted I have a cornfield in between us. So, you know, I mean I like it, I think it's a great option." Another citizen initially opposed the idea of a solar garden, because, "we are used to looking out and seeing trees . . . which is something that we have always enjoyed. So I think that we kind of equate the solar panels I guess [with] the opposite of nature." However after the solar gardens were constructed, she said, "I don't think that I even notice them." Similarly, the landowner of the Farmington Holdco Solar Garden explained that the one resident who initially opposed the solar garden because "he was concerned about an eyesore, concerned about land values, that nobody would want to live next to it" eventually stopped complaining about it.

Additionally, the Ursa Community Solar Garden landowner explained that he initially "wasn't in favor of it" because he "just didn't know anything about it." After learning more about solar gardens and what leasing his land to a solar development company for a solar garden would entail, he became strongly in favor. In fact, he said "I'd turn the whole 350 acres into solar panels if I could! It would be less headaches for me! I just get a check in the mail once a year and then life is good." Thus, from a solar garden landowner's perspective, solar gardens pose no negative externalities to the area and provide a consistent, easy source of income.

While most residents expressed a neutral or supportive viewpoint, there was one citizen--a strong proponent of nuclear energy--who expressed opposition to solar energy and spoke about the inefficiency of solar energy and the tax breaks incentivizing solar development. In the interview he said, "I tell people there [are] vastly better alternatives and if you would just take the tax incentives out of the equation they would just stop putting them up because it just doesn't make financial sense." Despite his opposition to solar energy, he still moved into his house in Farmington after the solar garden was sited, knowing of the solar garden's proximity to his

house. Furthermore, this Farmington resident opposed solar gardens for ideological and economic reasons but gave no indication that he experiences any negative externalities from the solar garden near his house. He therefore does not view the solar garden as a LULU.

Thus, we conclude that we did not find strong evidence in our data that citizens view solar gardens as LULUs, as no residents mentioned any negative externalities they faced from the solar garden siting and construction near their homes. The only potential negative externality we encountered was the VRWJPO's concerns about the storm water runoff effects from the Farmington Holdco Solar Garden on the sensitive trout habitat nearby. SolarStone Partners, however, resolved these concerns by incorporating environmental protective measures into their solar garden construction. Furthermore, VRWJPO was able to express these concerns at the public hearing and SolarStone Partners immediately modified their plans to ensure the solar garden would not create any negative externalities for the habitat, illustrating their willingness to recognize and incorporate public concerns. This example suggests that the solar garden siting process, at least for the Farmington Holdco Solar Garden, did not display procedural injustice.

We also determined that this particular case study does not reflect the Path of Least Resistance because citizens had the opportunity and political power to engage through public hearings, but chose not to. While some residents stated they did not know about the public hearings as they were happening, they expressed that they would not have participated even if they had known. As the landowner of the Farmington Holdco Solar Garden expressed, without us ever mentioning the Path of Least Resistance, "I don't think it is resistance. I don't think [Lakeville's] town board or anyone is resisting it." In contrast, in typical Path of Least Resistance cases the citizens do not have the opportunity, finances, and/or political power to resist, even though they might oppose the siting. Thus, we turned to other possible explanatory factors in our data to describe the discrepancy in where solar gardens are sited.

b) Land Value and Availability

Overwhelmingly, interviewees pointed to differences in land values, land use, and availability of vacant land as the most important factor determining why Farmington has three solar gardens nearby and Lakeville has none. Specifically, in fourteen of our twenty-five interviews, participants stated explicitly that they believed land value and availability was the most important determining factor in solar garden sitings. Both Farmington and Lakeville have high median annual household incomes and over the last 20 years have experienced rapid population growth of 16,403 and 36,111 additional people per city, respectively ("Community Profiles," n.p.; See Appendix Figures 4 and 5). Lakeville in particular is the fastest growing city in the metropolitan area (Hocken, 2). Closer to I-35 than Farmington, this quick suburban development in Lakeville has caused increased land value and leaves little room for solar garden development. As one Farmington resident stated: "Housing is booming much more in Lakeville than it is in Farmington. As you know if you can sell some empty land to a developer to build some houses, that person is going to pay vastly more for that land than what an electric company can probably afford to pay to put in solar panels. So I would guess that another deciding factor is that the builders will probably pay almost anything to own property in Lakeville whereas [that is] not so much the case in Farmington." Likewise, another Farmington resident reiterated this sentiment: "I think that Farmington has more available open land that can be utilized . . . I guess I don't drive through Lakeville and see open land." Although we heard from many interviewees that different land values drove the solar garden discrepancy, we were unable to find reputable

data for Farmington and Lakeville's respective land values to substantiate the claims we heard in our interviews.

Decision-makers in Farmington and Lakeville echoed that land value and availability most strongly determined solar garden sitings. For example, Lakeville's Planning Commissioner claimed "it's a matter of economics. It's simple land value. It really is. Well that, and the fact that the cities do expect to grow." As Lakeville's Planning Commissioner, he thoroughly understands Lakeville's development plan and history. He, like many others we spoke to, emphasized that in general Lakeville residents do not oppose solar but rather that "it really just comes down to the land value." The Lakeville city government clearly supports solar energy in theory and even financially by purchasing solar credits to offset the energy costs for the city's ice arenas and providing funds for one of the solar gardens in Empire Township. Yet, according to the Lakeville Planning Commissioner, the Planning Commission "thinks there is no place for that much land to be taken up by something that is going to be in the way of development." He expects they will see even more residential development in Lakeville in the coming years and that Farmington, although approximately ten to fifteen years behind Lakeville's development trajectory, will soon catch up as well. Anticipating this future development, he explained, Lakeville will not likely adopt a solar garden within the city limits anytime soon because, as he puts it, "any city would want to restrict having a solar garden right in the way where you know ten years later that housing is going to be." Thus, Lakeville, with valuable land for residential development, economically should not have a solar garden while Farmington, with lower land value and more vacant rural land, can economically justify its solar gardens.

Similarly, a Lakeville City Council member emphasized the importance of property values in determining solar garden locations, and explained that "in general, property values and land values are higher in Lakeville [than in Farmington] because you know we have had more growth . . . [we have] the freeway access and a couple of other things. Land has stayed cheaper in Farmington . . . It is easier to pick up an acre of land in Farmington to build solar gardens than it would be in Lakeville." Again, he identified that "the cost of land is the biggest driver. . . . So I would imagine it is more of a cost thing . . . [than] this city government is willing to do it and that one is not." Specifically expressing that the solar garden discrepancy is not due to the city government's willingness, this Lakeville City Council member's statements provide further evidence that right now the main factor influencing Lakeville's decision-making processes is development. He also says that land is not available, saying "it's not like there's a big piece of farmland that all of a sudden can be converted to a solar garden." Another Lakeville City Council member said the same: "A lot of it has to come down to land values and future development opportunities. In general, land values in Lakeville are going to be more expensive than they are in Farmington, and when you're looking at having to buy property or lease property in Lakeville, it's going to be more expensive, and to do that, what kind of return are you going to have to get on that investment you're putting on the property? And is a solar garden going to make that return on that investment as opposed to a residential development or a commercial or industrial project?" Farmington's Planning Commissioner, echoed this idea, saying that the difference between the number of solar gardens in Farmington and Lakeville is because of "availability of land more than anything."

In addition, solar developers such as the Chief Development Officer of IPS Solar--one of the oldest, largest, and most prevalent solar developers in Minnesota--stated that there is more potential solar development opportunity in Farmington than Lakeville right now because of the differences in suburban development. He says: "I'd imagine just generally speaking about

potential differences between say an area like Farmington and an area like Lakeville, really probably has to do more with property values and property costs than it does necessarily with ideology or anything related. Even from an infrastructure standpoint, I think Lakeville has seen a tremendous amount of residential development in the last two decades or so. And when we're installing these systems we're looking obviously for farmland. And what the city often has to do is reconcile the landowners' rights to develop and do as they wish with their property along with future plans for the city." This IPS Chief Development Officer, who understands the solar industry from an insider's perspective, again reiterated that "competing interest for land use" has prevented solar garden development in Lakeville, saying: "Lakeville is more developed and probably is looking to any kind of vacant parcels as potential future opportunity for either commercial or residential development. I think that potentially in the future if Farmington becomes as developed as Lakeville then there may be [a] different conversation." Similarly, a representative from Oak Leaf Energy Partners, the solar development company that developed the Empire Solar Garden, explained over email that "The primary [solar garden] siting criteria are: 1) Available land (i.e. enough contiguous, flat and clear land), 2) Cost of the land, 3) Proximity to Xcel facilities with sufficient capacity, and 4) Proximity to potential subscribers." These criteria highlight the importance of land value and land availability in how solar development companies decide on suitable parcels. Furthermore, in answering why he thinks Farmington has three solar gardens and Lakeville has none, the representative from Oak Leaf Energy Partners stated that "Lakeville, as I understand it, is a fast-growing community with substantially higher land prices than the Empire Township. For this reason alone I am not surprised [that] solar gardens have not been sited in Lakeville as there are better uses for that land (e.g. residential development). The City of Lakeville is a subscriber to the Empire Solar Garden, however, so the city is still benefiting from renewable energy." Although Lakeville does not have cheap, vacant land available for solar gardens, Lakeville residents can subscribe to Farmington's solar gardens, as the energy produced by a solar garden is available to anyone within the county and in the adjacent county. Therefore, Lakeville residents--and anyone in Dakota county and adjacent counties--benefit from the solar gardens without having the facilities within their city limits.

Similar to the solar garden siting priorities detailed by the Chief Development Officer of IPS and the representative from Oak Leaf Energy Partners, the Chief Development Officer from SolarStone Partners--the solar development company that constructed the Farmington Holdco Solar Garden--explained how they select areas to site solar gardens, stating: "a lot of what drives all of what we do is economics and then land use . . . Our strategy has always been [that] we provide the greatest output and the highest and best use for the land. If it's developable and worth a hundred thousand or a million dollars an acre, you should go do that!" He also expressed that Lakeville's rapid suburban development, in contrast with the Castle Rock Township's intent to keep the area rural, drives the solar garden discrepancy. These statements from solar developers reiterates what we heard from most of our interviews: that Lakeville's rapid suburban development and high land prices are the main reasons why there are currently no solar gardens sited there.

Finally, the landowners for all three of the solar gardens near Farmington--the Farmington Holdco Solar Garden, the Empire Solar Garden, and the Ursa Community Solar Garden--explained that they decided to allow solar garden development on their land because it was the best land use decision. For the Farmington Holdco Solar Garden, the landowner explained that the parcel was an abandoned tree farm prior to the solar garden installation.

Similarly, according to Met Council's Sustainable Operations Manager who oversees the project, the Empire Solar Garden on Met Council's Waste Water Treatment Plant was developed on buffer land because it "seemed like a really great use of this land that otherwise wasn't going to be used for anything." Third, the Ursa Community Solar Garden landowner expressed that the area was a "marginal farming area" with "a tendency to be a little wet." Thus, he chose to lease his land to solar garden development there because "it's a good investment on that land. [It] makes good use of that land." In addition to the residents', solar experts', and decision-makers' statements that Lakeville's higher land values and less available vacant land drove the solar garden siting processes, the testimonies from the three landowners indicate that the solar gardens were sited on low-value, otherwise unused, available land.

In summary, we heard overwhelming evidence from residents, decision-makers, and solar experts alike that Farmington's and Lakeville's land values and availability most strongly influenced solar garden siting decisions.

c) Utilities

Another theme mentioned consistently by our interviewees was the difference between Farmington and Lakeville's energy providers--specifically that Farmington is mostly in Xcel Energy territory and Lakeville is mostly in Dakota Electric territory. In evaluating what solar experts stated, we found that one of the main differences between the utility companies are their different models of operation. The Chief Development Officer for IPS, The Public Relations Director for Dakota Electric, and two Lakeville City Council members all described in their own words that a key difference between Xcel Energy and Dakota Electric is that Xcel Energy is an investor-owned company that both generates and distributes their own electricity, making it more vertically integrated. In contrast, Dakota Electric is a distribution cooperative, so they do not build or own the energy that they distribute, but rather buy it from Great River Energy. In addition to this difference in business models, Xcel Energy is a much larger company than Dakota Electric, serving energy to 3.3 million customers across eight states (Xcel Energy Annual Report 2015, n.p.). Additionally, in 2015 Xcel Energy had $39.054 billion (Xcel Energy Annual Report 2015, n.p.) in total assets whereas Dakota Electric had $296,605 in total assets (Dakota Electric Annual Report 2015, 4). Thus, Xcel Energy is a much larger company than Dakota Electric, with many more available resources.

Furthermore, legislation such as the "Next Generation Energy Act" (2007) and the "Solar Energy Jobs Act" (2013) specifically mandates that Xcel Energy increase their renewable mix to reach 30% renewables by 2020. Xcel Energy therefore has stronger incentives and more resources to build solar gardens than a small cooperative. The Public Relations Director from Dakota Electric articulated this point, saying "Xcel is just massive so you aren't even talking the same scale. Besides Xcel [has] the law that says you must build. So everything that the electric co-ops have built is all voluntarily. We don't have legislation telling us to build it . . Try to figure out what the co-ops have built voluntarily and what has Xcel built voluntarily, then we are night and day different because they are mandated to build theirs. So it's just scale--they just need so much more power than we do." All the solar gardens built in Dakota Electric territory are voluntary because Great River Energy, the electric transmission and generation cooperative Dakota Electric is a part of, has already reached the "Next Generation Energy Act's" renewable portfolio standards of 25% renewable sources in their energy mix.

Xcel Energy's mandates for renewable energy, along with their larger scale and increased resources, explains why, as stated by the IPS Chief Development Officer "there is a huge disparity between access to community solar between areas that have Xcel [Energy] and areas that don't." Additionally, the Xcel Energy Senior Director of Customer Strategy and Solutions echoes this idea, saying: "the vast majority [of solar gardens] are in Xcel Energy's territory." A map created by Eric Wang, Jerrilyn Goldberg, and Archie Fraser (2018) shows the solar gardens in Minnesota above one MW categorized by utility territory and demonstrates the difference between the 43 solar gardens in Xcel Energy territory (red dots) versus the 15 solar gardens in other utility companies' territories (blue dots) (See Figure 6). As portrayed in the map, although Xcel Energy serves more customers than other utility companies, they have less overall territory--especially in rural areas.

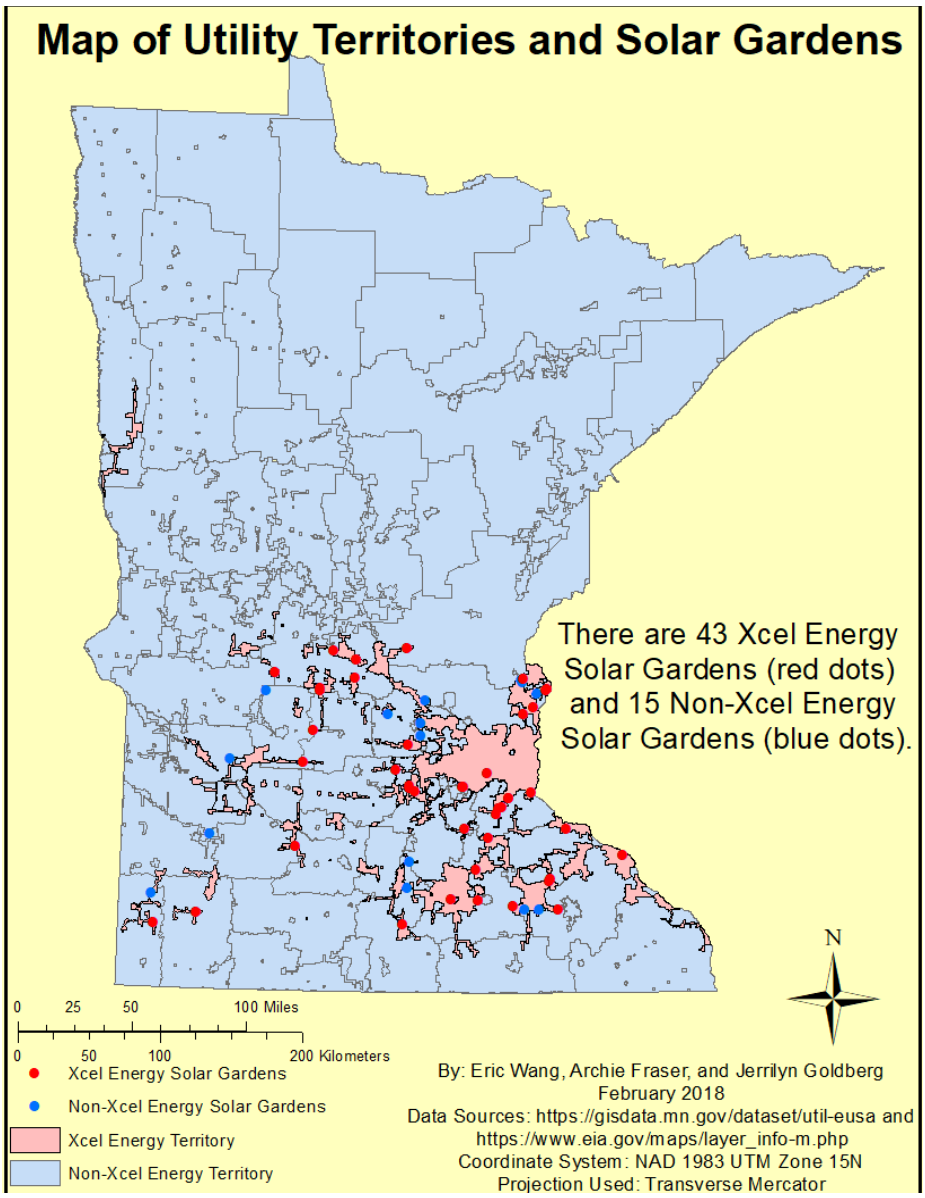

Figure 6: Map of Utility Territories and Solar Gardens
Note: This map only depicts solar gardens greater than one MW.

From our interviews with the Senior Communications Consultant from Xcel Energy and a Public Relations Director from Dakota Electric, we learned that the utility company boundaries had been decided over 70 years ago. The Dakota Electric Public Relations Director expressed that during that time, the larger companies refused to enter into the rural areas because they saw no profitability which caused farmers to begin cooperatives to ensure that rural areas could have electricity. These nearly century-old boundaries mean that neither company currently has control over which exact regions they serve.

In conclusion, we repeatedly heard interviewees point to the difference between Farmington's and Lakeville's utility providers as another explanatory factor for the solar garden siting discrepancy. We have determined that the differences in land value between Farmington and Lakeville is the first, most important explanatory factor for why Farmington has three solar gardens and Lakeville has none because even interviewees who spoke about the utility

differences, such as IPS Chief Development Officer and Dakota Electric's Public Relations Director, stated that land value was the most important determining factor. Without cheap, available land, a solar garden developer would never consider suggesting a solar garden. If there exists suitable land, however, then the utility company serving the area becomes important, as it seems much easier to create solar gardens in Xcel Energy territory than in other utility companies' territories.

d) City Character

A number of the interviewees also referenced Farmington's and Lakeville's different city characters, suggesting they influenced why Farmington has three solar gardens while Lakeville has none. We first encountered this theme in our archival research. A reporter for *The Twin Cities Pioneer Press* wrote an article in March 2016 that mentioned a one-year moratorium in May Township, "out of fear the panels might damage the township's rural character" (Shaw, n.p.). In an interview with this reporter, he elaborated on this sentiment and said, "they're thinking about their pioneer days and how things were back 120 years ago and how wonderful this was and there's a nostalgia for this, and the resistance is stronger often when you get into this argument about preserving rural heritage, preserving our small town charm." Thus, the importance of maintaining the traditional rural character seemed to be important in whether or not a city modernized, specifically regarding solar garden development. The Chief Development Officer from SolarStone Partners, the solar development company that worked on the Farmington Holdco Solar Garden, expressed similarly that "a lot of times people don't like change."

Although other interviewees did not mention the nostalgia aspect, some mentioned differences in how Farmington and Lakeville citizens approach changes in their communities. For example, two interviewees insinuated that Lakeville might be more cautious and fiscally conservative than Farmington--particularly about changes to the landscape. The Lakeville Board of Education's Director of Facilities and Plant Planning said, "we are cautious . . . we raise the risk and the rewards." Interviewees suggested that, in comparison with Lakeville, Farmington is more open to changes and often makes those changes more quickly. The teacher from Lakeville who proposed solar gardens for Lake Marion Elementary School used to teach in Farmington and said, "Farmington traditionally is quicker to act." She also pointed out that, "In Farmington it's not just that we jump on the bandwagon, it's we flag bandwagons down." This statement suggests that the different city characters--namely Lakeville's caution and Farmington's willingness to try new options--might be another potentially influencing factor for the discrepancy in solar gardens between Farmington and Lakeville. However, we found no other examples of differentiated caution between the two cities.

Likewise, the differing stages of suburban development in the two cities appeared to influence their city characters. According to a Lakeville City Council member, Lakeville has experienced unprecedented development with an increase in 850 residential units (townhomes, apartments, and single family homes) in the last year. As we heard in our interview with Lakeville's Planning Commissioner, Lakeville's Planning Commission prioritizes this suburban development plan over any other land use. As one Lakeville resident explained "Investing in solar gardens, well why would you do that? It's basically, 'I'd rather build a house. I could make more money.'" On the other hand, since Farmington is in the early stages of their development plan, they are more willing to lease land to solar development. Thus, the differentiated

development timelines may create different overall city characters, in turn impacting opinions on solar gardens.

e) Politics

The final theme we encountered was the politics surrounding solar garden development. In talking to City Council and Planning Commission members from both Farmington and Lakeville, we learned how local government impacts solar garden siting processes. Specifically, the local government approves permits for solar garden development and, if needed, amends zoning ordinances to include solar gardens. From our interviews with decision-makers, these checkpoints did not seem to be determining factors for the eventual location of solar gardens. In order to evaluate whether the solar garden discrepancy in Farmington and Lakeville follows the Path of Least Resistance, we looked for evidence of differentiated political power between Farmington and Lakeville residents. Again, we found none. Furthermore, decision-makers from both Farmington and Lakeville adamantly expressed support for solar garden development. Therefore, while local politics--as well as state policies like the "Next Generation Energy Act" (2007) and the "Solar Energy Jobs Act" (2013)--certainly impact solar garden development decisions, we do not believe that Farmington has three solar gardens and Lakeville has none because of differences in their politics.

Discussion

From our interviews, we derived a few possible explanations for the discrepancy in the number of solar gardens in Farmington and Lakeville. These factors--Lakeville's higher land values and less available vacant land; the Xcel Energy and Dakota Electric utility territories; public support and opposition for solar gardens; a difference in Farmington's and Lakeville's city characters; and the influence of local politics--all play important roles in the siting of solar gardens. In analyzing these factors and how they influence the siting processes, we conclude that the solar garden discrepancy does not follow the Path of Least Resistance as we did not find that Farmington and Lakeville residents view solar gardens as LULUs nor did we see a lack of political resistance in the communities. Furthermore, we found that almost all of our interviewees pointed to Lakeville's higher land values and less available vacant land, due to their rapid suburban development, as the main determining factor for why Lakeville currently does not have any solar gardens.

These results differ from the typical environmental justice case studies synthesized in our literature review and thereby offer a new perspective for the environmental justice movement and particularly conversations about the energy justice implications of renewable energy. Comparing our results to environmental justice literature which also utilized the Path of Least Resistance theory demonstrates key differences between our findings and theirs. In contrast to some of the literature on public perception of wind farms and solar gardens, such as Groth and Vogt (2014), Songsore and Buzzelli (2016), and Yenneti and Day (2015; 2016), we did not find opposition to solar gardens, indicating that solar gardens are not perceived as LULUs. This opinion could change over time, however, if residents and experts in the future identify currently unknown negative externalities.

In addition to comparing our results to renewable energy studies, comparing our results to Bullard's classic environmental justice research further emphasizes that this case does not follow the Path of Least Resistance. Unlike in *Dumping in Dixie*, where residents generally opposed the proposed facilities and felt ignored by decision-makers, Farmington residents did not express the

same frustrations. Also, residents felt they had the opportunity and political power to engage in the decision-making process and often chose not to. Simply put: Farmington residents did not feel oppressed by solar gardens.

Rather than finding differentiated political resistance as the driving factor, we determined that lower land values most strongly affected solar garden siting trends and created the discrepancy between Farmington and Lakeville. In our particular case study, we found no racial injustices related to this difference in land value because both Farmington and Lakeville are 90% white. Studies show, however, if facilities are sited in locations of lower land value, the situation is ripe for distributive injustice. Specifically, in the book *American Apartheid*, authors Douglas Massey and Nancy Denton explain that the landscape is segregated by race and has been for the majority of American history. As stated, "it was segregation that confined the increased deprivation to a small number of densely settled, tightly packed, and geographically isolated areas" (Massey and Denton, 8). This trend, termed residential segregation, "systematically undermines the social and economic well-being of blacks in the United States" (Massey and Denton, 2). Massey and Denton note that residential segregation results in pockets of low-income, minority communities across the landscape where "middle-class blacks live in much poorer neighborhoods than do middle-class whites, Hispanics, or Asians" (Massey and Denton, 144). Residentially segregated landscapes continue to persist in today's society and are relevant to the environmental justice movement because, as highlighted by Cole and Foster, marginalized communities tend to live in areas with lower land values. Therefore, even if facilities are sited based on economic rationale, and even if facilities are not intentionally sited based on community demographics, residentially segregated landscapes resulting in high densities of marginalized communities in areas with cheap land leads to distributive injustice. Thus, the market dynamic hypothesis--claiming that economics alone determine facility sitings--still generates disproportionate environmental burdens on racially marginalized communities.

Moreover, Yenneti and Day's study of the Charanka solar park in Gujarat, India illustrated the potential injustices created by siting solar gardens in areas with low land value, because the marginalized peasant farmers who relied upon low value farmland lost their source of subsistence. Therefore, while we did not find injustices or signs of the Path of Least Resistance in our case study, scholars such as Yenneti and Day, Massey and Denton, and Cole and Foster would suggest that the conditions used to site solar gardens could be unjust, especially if sited in marginalized communities in residentially segregated landscapes.

Limitations and Future Research

While our study provides insights to a new field and will hopefully serve as a useful starting point for future research, we recognize that there are many limitations. First, our ten-week timeline limited us severely, as the scope of our project requires years of work. This time constraint was especially challenging given that our research question posed three questions, rather than one. These three questions were: 1) Are solar gardens LULUs? 2) Were solar gardens sited in Farmington because they were unable to resist? 3) Have no solar gardens been sited in Lakeville because they have more political resistance than Farmington? Although we have attempted to answer all three of these questions, future research should delve more thoroughly into each of these questions individually. In particular future scholars should systematically address whether solar gardens are considered LULUs and ask people with diversified backgrounds--possibly through a short survey, textual analysis of media, or more interviews with residents. A better understanding of whether solar gardens are LULUs would contribute

enormously to the renewable energy justice literature, which has not yet reached consensus on this topic.

With multiple research questions and limited time, we were only able to conduct twenty-five interviews which limited our ability to extrapolate our findings to other cases. Additionally, the demographics of our interviewees likely do not reflect the demographics of all of Minnesota because we spoke mainly to residents and decision-makers in Farmington and Lakeville--two wealthy, majority white areas. Therefore, our finding that solar gardens are not considered LULUs may not accurately represent how all Minnesotans conceptualize solar gardens but rather presents a narrow perspective. In contrast to our findings, previous research such as Yenneti and Day who studied a solar garden in Gujarat, India found opposition to solar gardens. This disparate finding suggests that people from different backgrounds might conceptualize solar gardens differently--specifically some people might consider solar gardens LULUs and some people might not. Future research, therefore, should explore whether there exists a racial or socioeconomic difference in who considers solar gardens LULUs.

In addition to challenges with interviewing people from different backgrounds, we encountered difficulties tracking down, contacting, and interviewing our subjects. Due to this obstacle, we only spoke with five Farmington residents and four Lakeville residents, which weakens our claim that the community does not consider solar gardens LULUs because we did not survey a sufficient number of residents to confidently determine general community sentiment. We also encountered interviewer bias as interviewees probably believed that, as Environmental Studies majors studying solar gardens, we support solar gardens and therefore the interviewees may not have felt comfortable expressing opposition. Also we may have received biased results because we asked leading questions in our interviews after our initial open-ended questions yielded few useful answers. Future research, therefore, should aim to reduce interviewer bias as much as possible as well as develop less leading questions.

We also encountered challenges in our data analysis methods, specifically with our thematic analysis methods. As no one in our group had ever conducted qualitative research of this scope and we had a limited timeline, our coding methodology may have produced biased quantitative results. Due to this inexperience with thematic analysis methods, the codes and themes we found in our data gave us a subjective measurement and indication of general trends rather than reliable quantitative results. Therefore, we chose to rely more heavily on quotations from interviews than on the calculated sums of total mentions per code when determining the answers to our research questions. Future research should aim to utilize more systematic coding methods, as well as incorporate metrics for codes like mentions per interview, mentions per minute, and total voluntary mentions in order to strengthen the claims by providing quantitative evidence.

Another issue we faced was that, prior to conducting our interviews, we were unaware of the split between Xcel Energy and Dakota Electric in Farmington and Lakeville. Through our research, we discovered that this split is one of the main driving forces in the disparate solar garden sitings. Therefore, future research should examine cities that are entirely covered by the same utility company, particularly cities in Xcel Energy territory, to eliminate this driving factor and isolate other determining variables--such as land values, city character, and NIMBYism.

Additionally, future research should investigate the relationship between the siting of solar gardens and the edge effect, the trend where facilities are located near the edge of a spatial unit so the effects extend to people living outside the spatial unit. Common to environmental justice case studies, the edge effect can perpetuate injustices first because those affected--namely

people living outside the border of the spatial unit--do not have a say in the siting process. Second, the edge effect obscures who is actually impacted by facilities because spatial analyses often only study the spatial unit containing the facility rather than using an updated methodology such as distance-based methods that look at who actually lives close to the facility (Cutter, 275). We identified the potential for the edge effect in our case study because the Farmington Holdco Solar Garden is located on the edge between Castle Rock Township and the City of Farmington. This led to questions such as why is the Farmington Holdco Solar Garden on the edge of Farmington? Does the solar garden only impact Castle Rock Township residents or Farmington residents as well? Related, are all three of the solar gardens near Farmington technically in Castle Rock and Empire Townships because of the lower land values there or because of other driving factors? Unfortunately, we did not have sufficient time or resources to fully investigate these questions. Therefore, future studies should research whether the edge effect plays a role in the siting of solar gardens by attempting to answer these questions. Additionally, future research could spatially analyze whether there exists trends in solar gardens sitings on the edge of a political border.

Future research should also study areas with more diverse demographics, particularly areas with solar gardens and large populations of typically marginalized people. As mentioned previously, for our case study, we chose two cities that have similar racial and socioeconomic demographics, as we wanted to focus on the one glaring difference: the number of solar gardens present. In doing so, we chose to not focus on the influence that demographics could play in siting decisions but rather see what other factors could be at play, specifically the influence of political power. However, environmental justice scholars, such as Bullard and the United Church of Christ, have demonstrated that the demographics of an area influence siting decisions, and therefore future studies should evaluate how community demographics affect public sentiment about solar gardens as well as whether disproportionate sitings exist in typically marginalized communities. This study could quantitatively evaluate all solar garden locations in Minnesota and the surrounding communities' demographics to determine the distribution of the facilities. If future research finds that most solar gardens are sited in marginalized communities, future environmental justice case studies could examine whether these populations view solar gardens as LULUs and the possible procedural and recognition justice issues in these siting decisions. Similarly, if future research finds that most solar gardens are sited in majority wealthy, white areas, scholars should address whether solar gardens are considered amenities. If solar gardens are considered amenities, then a skewed distribution of solar gardens in mostly white and wealthy cities may represent another form of distributive injustice with environmental benefits not distributed to marginalized people.

Moreover, we concluded that solar gardens are placed in areas with cheaper land and we recognize, from Massey and Denton's and Cole and Foster's arguments, that land values are structurally distorted by racial and class segregation. Our majority white, wealthy study areas, however, did not allow us to further explore how renewable energy facility sitings follow residential segregation, where marginalized people live in low-value areas. Therefore, future studies should explore possible uneven distributions of renewable energy facilities with potential externalities burdening low-income communities of color living in areas with lower land value.

In addition to the aforementioned suggestions for future research, we propose future studies continue to build off our research and findings to further fill in the gap in the literature about solar gardens. For example, future studies could investigate the role of schools in getting solar gardens. As mentioned in our results, Lake Marion Elementary School is in the process of

getting a solar garden. In talking with the teacher who attended a REcharge Labs seminar along with the Co-Director of REcharge labs, using renewable energy as a teaching tool is gaining popularity. Thus, future studies could investigate whether other Minnesotan schools have solar gardens, how they are used as teaching tools, how parents, students, teachers, and neighbors view the solar gardens, and how this trend affects the distribution of solar gardens across the landscape.

We also suggest that future studies investigate one of the 80+ codes we derived from our interviews, such as the role of environmental stewardship in solar garden sitings. Talking to a Lakeville resident, they indicated that the Lakeville city government supports some types of environmentally-friendly development, like parks and open spaces because they attract affluent residents, but otherwise are not as proactive about other environmental initiatives. Due to time constraints, we were unable to further explore the connection between environmental stewardship and solar garden sitings, but future studies could research this connection to gain a greater perspective of whether solar gardens are predominantly sited in areas where there is more emphasis on environmental stewardship. Specifically, future research could answer the question: are more environmentally-conscious cities more likely to install solar gardens? This research question would supplement our understanding of the motivations that drive solar garden development.

In addition to researching these specific unanswered questions, we encourage future scholars to utilize varied methods--including quantitative, qualitative, and mixed methods approaches. As we used a primarily qualitative methodology, we were unable to statistically test any of our claims and instead, given the limitations of our data, could only generate hypotheses; specifically we hypothesize that solar gardens are not viewed as LULUs and that solar garden sitings do not demonstrate the Path of Least Resistance. Using diversified methods would strengthen the understanding of Minnesota's emerging solar energy landscape and its potential environmental justice implications.

Conclusion

In conclusion, we found overwhelming evidence that the difference between Farmington's and Lakeville's available vacant land and land values--a difference created by Lakeville's recent and massive suburban development--is the driving force behind the solar garden discrepancy between the two cities. Other factors, such as the difference in utility companies serving Farmington and Lakeville, public opinion on solar gardens, and differences between Farmington's and Lakeville's city characters and their local politics still impact this case study and provide useful information about siting decisions. Based on these results, we found no evidence of differentiated political resistance between Farmington and Lakeville, and therefore we claim that this case study does not reflect a typical Path of Least Resistance narrative. Although we reached these conclusions, there still exist important environmental justice implications for future research to investigate.

As renewable energy continues to spread rapidly across the Minnesota landscape, studies must continue to investigate the implications and effects of this development. Although renewable energy is often categorized as a solely beneficial, environmentally-friendly investment and we found no evidence that Farmington and Lakeville residents view solar gardens as LULUs, studies have not yet sufficiently examined the possible negative externalities of renewable energy facilities. In suggesting there could exist unseen consequences of solar gardens, we do not aim to undermine efforts to expand renewable energy. Instead, we hope our

study allows for more equitable solar garden development. Investigating the Path of Least Resistance and comparing Farmington and Lakeville represents a first step which we hope will spark even more in-depth scholarship, knowledge, and eventually better policies in the future regarding the siting of renewable energy facilities.

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Appendix

Interview Questions

Interview questions for solar garden landowners

- Can you tell us the general story of how this solar garden was sited on your land?
- Have you always supported solar gardens?
    - If not, why not? And what changed your mind?
- How did you choose the solar garden development company?
- Were there any challenges or obstacles in the development process?
- Did you hear of any complaints from neighbors or other?
- We also asked landowners any clarifying questions we had from the meeting minutes
- Why do you think there is a discrepancy between the amount of solar gardens in Farmington as compared to Lakeville? (Namely, why Farmington has three solar gardens while Lakeville has none)
- Is there anything else we should know?

Interview questions for Farmington residents:

- When did you move in? (See if it was before or after renewable energy siting)
    - If before:
        - When the solar garden was proposed, were you excited, upset, ambivalent?
        - Did you engage in any of the city council meetings regarding the siting of the solar gardens? If yes, what did you do? If not, why did you not participate? (Gauge interest/public involvement in the decision-making process)
        - How do you feel now about living near a solar garden? (see if opinions change at all after exposure to the site)
    - If after:
        - Did living near a solar garden influence your decision to move here? If yes, in what way were you influenced?
        - How do you feel now about living near a solar garden?
- If any opposition to the solar garden siting is expressed, we will need to ask more about why they oppose it, and if they have engaged with the local representatives at all to voice their opposition
- What is your read on Farmington's public sentiments on solar gardens in general?
- In your opinion, how is Farmington different from Lakeville?
- Why do you think there is a discrepancy between the amount of solar gardens in Farmington as compared to Lakeville? (Namely, why Farmington has three solar gardens while Lakeville has none)
- Is there anything else we should know?

Interview questions for Lakeville residents:

- How do you feel about solar gardens?

- Would you like to see solar gardens in Lakeville? If yes, why? If not, why not?
- What is the history of solar gardens in Lakeville, if any?
- How do you feel about the fact that so many solar gardens are popping up around MN?
- What is your read on Lakeville's public sentiments on solar gardens in general?
- In your opinion, how is Lakeville different from Farmington?
- Why do you think there is a discrepancy between the amount of solar gardens in Farmington as compared to Lakeville? (Namely, why Farmington has three solar gardens while Lakeville has none)
- Is there anyone else in your neighborhood we should contact about this?
- If a solar garden were built right outside your house, would you mind seeing them?
- Is there anything else you want us to know?

Interview questions for the decision-makers and solar experts:

- How is your organization/company/council/commission involved with solar garden sitings?
- Can you describe the solar garden siting process?
- What is your role in these solar garden siting decisions?
- What factors did you consider when trying to figure out where to place the solar gardens?
- If applicable: has your utility company (either Xcel Energy or Dakota Electric) been receptive to the idea of solar gardens? Have you been approached by the utility company or by solar developers?
- If applicable: When did the zoning ordinances for solar gardens get created? Who suggested/pushed for them? What was that process like?
- Do you anticipate that there will be solar gardens implemented in the future in Lakeville and/or Farmington?
- How do you feel personally about solar gardens?
- Are you a resident of either Farmington or Lakeville?
    - If so, see above for interview questions for Farmington and Lakeville residents
- Why do you think there is a discrepancy between the amount of solar gardens in Farmington as compared to Lakeville? (Namely, why Farmington has three solar gardens while Lakeville has none)
- Is there anything else we should know?

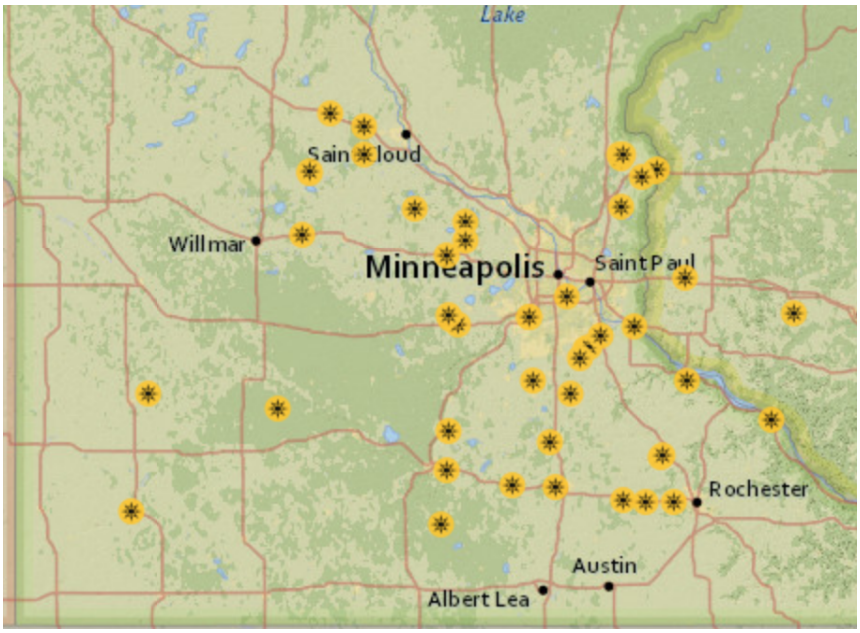

Figure 1: Map of Minnesota's Solar Gardens, https://www.eia.gov/state/?sid=MN

Table 3.1 – Racial and Socioeconomic Characteristics of People Living Near Hazardous Waste Facilities

	Within 1 km.	Between 1 km. and 3 km.	Between 3 km. and 5 km.	Beyond 5 km.
Population				
Total Population (1000s)	845	7,828	14,101	225,936
Population Density (persons per square kilometer)	690	840	810	24
Race/Ethnicity				
Percent People of Color	47.7%	46.1%	35.7%	22.2%
Percent African American	20.6%	20.4%	20.6%	11.2%
Percent Hispanic	23.1%	20.4%	18.1%	7.8%
Percent Asian/Pacific Islander	4.4%	5.4%	5.3%	2.7%
Percent Native American	0.6%	0.6%	0.5%	0.8%
Socioeconomic Characteristics				
Poverty Rate	20.1%	18.3%	16.9%	12.7%
Mean Household Income	$31,192	$33,318	$36,920	$38,745
Mean Housing Value	$93,985	$102,594	$111,915	$111,956

Table 1: Racial and Socioeconomic Demographics (Bullard, 2007)

Chart of Southern MN City Demographics

City	Number of Solar Gardens	Median Annual Income	Population	Population Density (People per Square Mile)	Land Size
Lakeville	NONE	$95,130	61,938	1,192.4 people per square mile	37.83 mi^2
Farmington	3(Ursa Solar, Empire Solar, Farmington Holdco Solar)	$87,925	22,656	986 people per square mile	14.94 mi^2
Rosemount	Rosemount Community Solar	$90,448	23,911	434.2 people per square mile	35.21 mi^2
Red Wing	Red Wing Solar	$48,431	16,526	475.7 people per square mile	41.19 mi^2
Wabasha	Wabasha Holdco LLC	$37,361	2,453	318.4 people per square mile	9.27 mi^2
Pine Island	Pine Island Holdco LLC	$63,194	3,360	583.7 people per square mile	5.61 mi^2
Shakopee	Blue Lake Solar Shakopee Met Council WTP	$79,174	40,610	1,323.7 people per square mile	29.32 mi^2
Norwood Young America	WGL Energy Systems, Inc.	$62,850	3,680	1,855.8 people per square mile	2.52 mi^2
Carver	Lind Solar CSG	$86,323	4,628	931 people per square mile	4.18 mi^2

Table 2: Chart of Southern Minnesota Town Demographics

Position Title	Type of Interview
Twin Cities Pioneer Press Reporter	Solar Expert
Outreach Coordinator with MN IPL	Solar Expert
Co-founder of Lakeville Friends of the Environment	Resident
Chief Development Officer at IPS (solar development company)	Solar Expert
Lakeville Associate Planner	Decision-maker
Farmington Resident	Resident
Public Relations Director at Dakota Electric	Solar Expert
Lakeville City Administrator	Decision-maker
Bulletin Newspaper Reporter	Solar Expert
Lakeville Teacher	Resident
Lakeville Resident	Resident
Lakeville City Council member	Decision-maker
Farmington Resident	Resident
Director and Founder of REcharge Labs	Solar Expert
Farmington Resident	Resident
Lakeville School Board of Education member	Decision-maker
Lakeville Resident	Resident
Farmington Planning Manager	Decision-maker
Castle Rock Township Planning Commission Member	Decision-maker
Empire Township Planning Commission Member	Decision-maker
Senior Media Relations Representative Xcel Energy & Senior Director of Customer Strategy Solutions	Solar Expert
Landowner of Farmington Holdco Solar Garden property	Solar Expert and Resident
Landowner of Ursa Community Solar Garden	Solar Expert and Resident
SolarStone Partners Chief Development Officer	Solar Expert
Metropolitan Council Sustainable Operations Manager	Solar Expert

Table 4: Table of Interviewees

Type of Interview	Number of Interviews
Farmington Resident	5
Lakeville Resident	4
Farmington Decision Maker	3
Lakeville Decision Maker	3
Solar Garden Expert	10
Total Interviews	**25**

Table 5: Number of Types of Interviews
There is some overlap between the types of interviews, so we categorized each interviewee based on the description that most accurately reflected what information they provided us.

Ranking	*Codes*	*Sums*
1	**Xcel Energy**	**83**
2	**Quick suburban Development**	**71**
3	**Land Use And Values**	**71**
4	**Support**	**67**
5	**Resistance/opposition**	**65**
6	**City Codes, Regulations, and Zoning**	**55**
7	**Solar developers**	**53**
8	**Rural/Agricultural Land**	**48**
9	**Dakota**	**45**
10	**NIMBY**	**45**
11	**Politics/city council**	**44**
12	**Cost**	**43**
13	**Vacant Land Availability**	**41**
14	**Education**	**30**
15	**Tax breaks/incentives**	**29**
16	**Community**	**28**
17	**Environmental Stewardship**	**27**
18	**Not a priority / No engagement**	**27**
19	**Planning Commission and comprehensive plan**	**26**
20	**Profit**	**24**

Table 7: Twenty Most Mentioned Codes

Themes and Codes	Sum of Codes	Sum of Themes
Public Sentiment		**285**
Support	67	
Resistance/opposition	65	
Not a priority / No engagement	27	
Environmental Stewardship	27	
Aesthetics	24	
Lack of knowledge/understanding	23	
Engagement	16	
No impact	14	
Hesitancy	12	
Lack of trust	6	
Noise	2	
Contract (Length)	2	
Utility Differences		**268**
Xcel Energy	83	
Solar developers	53	
Dakota Electric	45	
Two utilities (Lakeville split)	19	
Cooperative	15	
Boundaries	14	
Expand solar	14	
Large companies	12	
Solar as a new concept/technology	8	
Reliability	5	
Politics		**238**
City Codes, Regulations, and Zoning	55	
Politics/city council	44	
Cost	43	
Tax breaks/incentives	29	
Planning Commission and comprehensive plan	26	
Profit	24	
MN Next Generation Energy Act and 2013 Solar Jobs Act	17	

Farmington and Lakeville Land		**231**
Quick suburban Development	71	
Land Use/values	71	
Rural/Agricultural Land	48	
Vacant Land Availability	41	
City Character		**136**
NIMBY	45	
Community	28	
Preserving rural character / Averse to change	23	
City Character	22	
Local	11	
Grassroots	7	

Table 8: Table of Themes and Codes

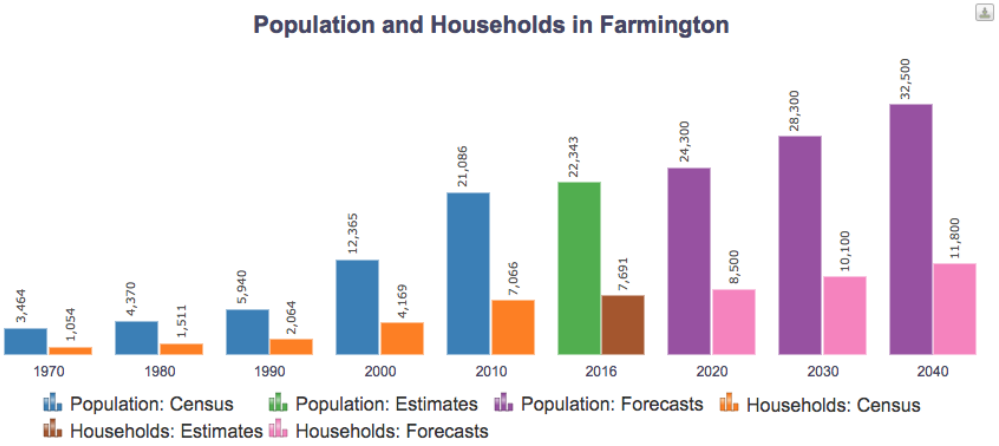

Figure 4: Population and Households in Farmington, source: https://stats.metc.state.mn.us/profile/detail.aspx?c=02394747#POPANDHH

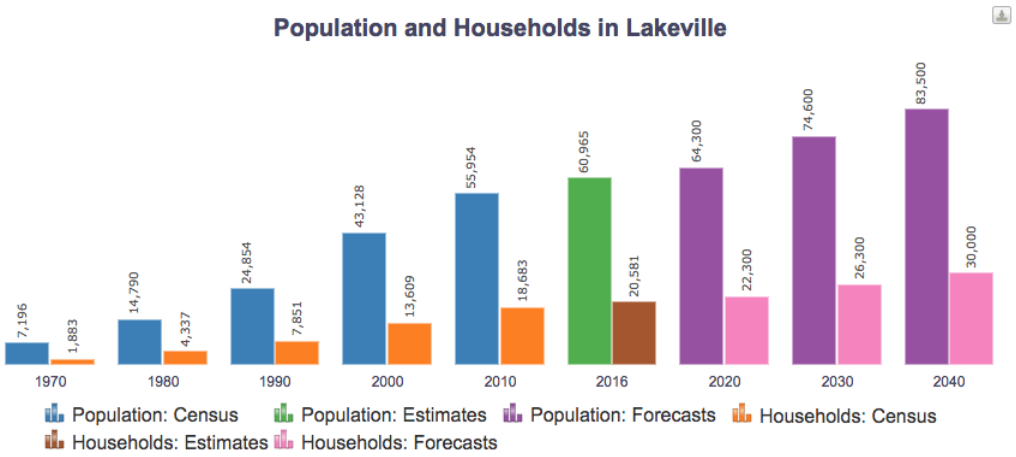

Figure 5: Population and Households in Lakeville, source: https://stats.metc.state.mn.us/profile/detail.aspx?c=02395614