2018

Normative Reframing as a Policy Process: Community Solar for Low-Income Electric Customers

Madeline Murray-Clasen

Normative Reframing as a Policy Process: Community Solar for Low-Income Electric Customers

Madeline Murray-Clasen

A senior thesis
submitted in partial fulfillment of the
requirements for the degree of
Bachelor of Arts

Environmental Program
College of Arts and Sciences
Honors College

University of Vermont
2018

Advisors:
Robert Bartlett, Ph.D., Professor, University of Vermont
Brendan Fisher, Ph.D., Associate Professor, University of Vermont
Jody Prescott, LL.M., Lecturer, University of Vermont

Abstract

State legislatures and public utilities commissions are increasingly implementing policies to promote and regulate the development of community solar programs as mechanisms to expand the development of and increase access to renewable energies. This paper tests normative reframing, a theory of policy process, to explain the development of community solar policy in Maryland and Minnesota in the face of competing policy goals and institutional opposition. Through process tracing of primary legislative and rulemaking sources, supplemented by informational interviews with stakeholders, it explores the norms embedded within these policies and the frames through which these norms are portrayed. Additionally, this paper offers insight into how research on normative reframing may be further explored across the renewable energy industry to help explain and understand a clean energy transition.

Acknowledgements

I am humbled by the research and writing processes and by my fortune for the opportunity to pursue an undergraduate thesis. I would like to first thank Professor Bartlett. Without his guidance and thoughtful questions and critiques, this project would not have been completed. More specifically, the two courses I took with Professor Bartlett during my Fall 2017 semester were instrumental in the development of my learning in the fields of policy studies and international law.

Next, I need to express deep gratitude for my personal, professional, and academic communities. Growing up in Vermont influenced my strong passion for and interest in human impacts on the environment. At the University of Vermont, I am surrounded and supported by a group of incredible students, professors, and mentors, who have contributed immensely to my personal growth and provided me with countless opportunities to push myself. To my friends, thank you for listening to my ramblings and for sticking around through the ups and downs; our friendships are what make me smile each day.

Lastly, I especially need to thank my sister for her honesty and humor and my parents for their immeasurable love and unbelievable abilities to persevere.

Table of Contents

Introduction

Normative reframing is an emerging policy process theory that is applied to understand how and why policies change. It builds upon mainstream policy process theories including the advocacy coalition framework, punctuated equilibrium theory, and the multiple streams framework. Specifically, normative reframing delineates policy change as a process through which problems are reframed using alternative norms to promote certain policies, making such policies more politically viable. A small body of literature employs normative reframing to explain the policy process, citing the need for increased scholarship and testing of this theory to validate, or invalidate, its effectiveness. This research specifically investigates the presence and applicability of normative reframing within the spheres of public utility rulemaking and regulation.

In the United States, there is a marked increase in the number of states adopting community solar legislation and regulations, with nine states specifically including provisions for low-income electric customers. Community solar policies expand beyond traditional net metering policies, allowing all electric consumers to access or participate in renewable energy production through virtual or group net metering with their utilities. These policies sit at the center of a complex conflict of institutional norms: transitioning from a centralized energy production and delivery system in which customers and utilities have maintained separate roles for over a century, to a participatory and distributed energy system in which the roles of customers and utilities are beginning to overlap. This paper applies normative reframing to the development of community solar policies in the United States first, to contribute to a developing understanding of normative reframing as a policy process and second, to explain how and why community solar policies are proliferating. Case studies of policies in Maryland and Minnesota

were conducted to identify the presence of and degree to which normative reframing played a role in these states community solar policies.

The paper first offers a review of the foundations of normative reframing, norms and framing, followed by a more in-depth discussion of this policy process theory, its deficiencies, and how it might be tested and strengthened. This is followed by a discussion of the research design in the context of community solar policies in the U.S. A literature review provides background of recent evolutions in solar photovoltaic electricity generation in the U.S., community solar, and the actors involved in and impacted by community solar policies. A review of the main policy process theories and normative reframing concludes this section.

The specific research methodology is described, followed by a narrative background and history of community solar policies in Maryland and Minnesota. An analysis of these policies in the context of normative reframing is conducted to determine the rigor of this policy process theory and to identify the frames used to support the norms underlying community solar policies. The research is largely derivate and follows process tracing exercises supplemented by qualitative informational interviews with actors influential to the development of these policies. A concluding discussion of the relevance and applicability of normative reframing based on the analysis of the development of community solar policies is provided, including recommendations for further research.

Norms and Framing

Studying the policy process, or creation of policies, is an endeavor to understand "systematic casual relationships" (Smith and Larimer 2017, 94). There are a variety of lenses through which to approach policy process research, but all policy process research examines

power and how problems are defined. Norms are a tool through which to explore political power and differing norms allow problems to be framed in more than one view.

Within norm-based research that spans academic disciplines, multiple definitions and types of norms exist, yet across these definitions it is evident that norms hold implicit power (Finnemore and Sikkink 1998, 891). Social norms hold power in that they influence human behavior and therefore act as leverage points to manipulate behavior. Simply put, a change in a norm can incite a change in behavior. More specifically, social norms are standards of behavior appropriate to certain identities and serve as informal rules to guide thinking and actions. Essential qualities of norms are that they are dynamic and subjective, and as standards of appropriateness are subject to change and exist among and between certain populations, cultures, regions, organizations, institutions, and governments. It is possible to study the influence of norms as they provide "justifications for action" through which analysis of an "extensive trail of communication among actors" is possible (Finnemore and Sikkink 1998, 893).

Finnemore and Sikkink review the role of norms in political change and explain how they can be studied through norm life cycles, to ultimately identify policy change. Norm emergence occurs when "norm entrepreneurs," promote their ideals of behavior within certain communities by "using language that names, interprets, and dramatizes them," otherwise known as framing (Finnemore and Sikkink 1998, 897). Norm emergence is followed by norm cascades and eventually, internalization, where norms are institutionalized through laws (Finnemore and Sikkink 1998, 904).

Institutions are constructed through an aggregation of norms that may be enforced in some way by formal and informal rules. Finnemore and Sikkink (1998) define slavery as a legal institution previously supported by norms of property rights and norms of what constituted a

person. The norms supporting this institution were eventually undermined by more salient norms of "legal equality of opportunity" (Finnemore and Sikkink 1998, 907). Another example of institutional norm change is the evolution of violence against women. Previously, this was supported by prevailing norms of dominance over women and, in some sense, norms of property, until it was reframed as a human rights violation and a crime, promoting norms of equality (Finnemore and Sikkink 1998; Raymond et al. 2013). Similar to the manner in which changes in social norms incite changes in behavior, the strength and stability of institutions are dependent on norms; if institutions become "inconsistent with prevailing social norms" they may be "less effective or more vulnerable to challenge" (Raymond 2013, 1999). Sabatier notes that American political institutions are designed in such a way that they "resist many efforts at change and thus make mobilization necessary if established interests are to be overcome" (1999, 99). Anadon et al. (2016) examine how institutions based on norms of economic profit and intellectual property rights that govern technological innovation are misaligned with evolving norms of sustainable development and justice. Therefore, norms are an intervention point through which institutional change can be prompted in the face of strong institutional opposition.

In the examples listed above, framing is recognized as a tool for catalyzing policy change. Stone (2012, 253) defines framing as a way in which political actors portray reality to make their problem definition more salient. Smith and Larimer (2017, 106-115) explain framing through the employment of policy images and state that the application of appropriate policy images can disrupt a "policy equilibrium." Finnemore and Sikkink (1998, 908) echo this in that political activists may use frames to construct a singular perception of a problem in such a way that it is connected to their ideals of appropriate behavior, ultimately supporting their desired policy solutions by increasing political saliency.

Normative Reframing, Limitations, and Future Research

Raymond (2016, 4) cites normative reframing as the "strategic use of issue frames to portray an issue in terms of an alternative norm" to ultimately incite policy change. He argues that this policy process theory can improve the ability to predict and explain specific policy changes by examining the strength and fit of norms underlying existing policies.

Normative reframing as a policy process theory has three main deficiencies. First is the level of governance at which it has been applied. The origins of normative reframing are found in the development of international laws and regimes, which are highly dependent on norm building and acceptance (Baber and Bartlett 2009; Baber and Bartlett 2015). Raymond (2013) applies normative reframing to the development of the Regional Greenhouse Gas Initiative (RGGI), a regional cap and trade program for carbon emissions that originated from a multi-state memorandum of understanding, model rules, and eventually statutory requirements within each participating state (Raymond 2016). In a critique of Raymond's work, Haapala (2017) notes that it remains unclear at what scale of governance normative reframing as a policy process is most applicable and effective.

Second, the scope and universality of normative reframing as a policy process is yet to be determined. It is not evident to what degree normative reframing is successful in generating institutional change, or how likely it is to guarantee policy change (Raymond 2017, 184). Because the scenarios in which normative reframing is most successful are not clear, there is currently limited value placed on this policy process theory (Raymond 2017, 43). This directly corresponds to the third weakness of normative reframing; few studies exist in which normative reframing as a specific policy process theory has been applied. Raymond et al. (2013) employ normative reframing to explain political changes surrounding societal problems like climate

change and violence against women, both of which occur at multiple scales of governance. Raymond (2016) identifies a policy change within RGGI as an example of normative reframing. Although these three cases thoroughly substantiate normative reframing as a policy process, there is a need for increased scholarship on and testing of this policy process theory.

Normative Reframing and Community Solar

The limitations to normative reframing as a policy process theory are not singular or unique, as discussed later in a review of the main theories of policy process. Despite the lack of cohesion in policy process studies, Smith and Larimer argue it is worthwhile to pursue "ad hoc" case studies and note that "we question whether any policy framework (or even any framework in political science) is so comprehensive and open to replication" (Smith and Larimer 2017, 108). Therefore, any research that tests new theories of policy change has the potential to improve our understanding of the heart of conflict in the development of policy, namely, the differing perspectives (or conflicting norms) that lead to such conflict.

Specific to normative reframing, there are several benefits for further testing of this policy process theory. The three deficiencies noted in the previous section can be alleviated by first examining policy change at specific levels and types of governance. For example, does normative reframing also take place within local or state governments? And can changes in formal rules including legislation and rulemaking, not just institutional or international changes, be explained by normative reframing? Here, it is necessary to look for specific cases of policy change at scales and types different from research previously conducted.

The proliferation of community solar policies in the U.S. presents an interesting case for the testing of normative reframing and an opportunity to reduce its three main deficiencies. First, community solar policies exist at a specific level of governance; they have originated from state

legislation and are crafted by state agency regulations. Second, the development of legislation and regulations provides a "trail of communication" through which the presence of reframing of norms can be evaluated (Finnemore and Sikkink 1998, 893). Finally, because the adoption of community solar policies has occurred on a state by state basis, there is opportunity for evaluation of future state community solar policies in the context of normative reframing. This makes this research replicable and provides opportunities to increase our understanding of normative reframing.

In contrast to the mainstream policy process theories, there is reason to believe that normative reframing offers the best explanation for the increase in community solar policies with low-income provisions. Normative reframing attempts to illuminate the norms that shape current institutions and policies and explain how manipulating those norms can create meaningful policy change. The norms that the institutions of electricity and utility regulation are built on are deeply rooted. It is evident that these institutions are being challenged, as utilities are protesting the growth of distributed renewable electricity generation and some statewide regulations are limiting the value of these resources through net metering and ratemaking. Understanding the normative values at the heart of this conflict and how some states are overcoming these and implementing policies specific to the expansion of shared renewables can help to advance an energy transition that requires systemic, institutional change.

A case study of two states with community solar policies with low-income provisions is an opportunity to test the validity and broaden our understanding of normative reframing as a policy process. To confirm this validity, it is necessary to consider the counterfactual. This is what the outcome of policy entrepreneurs' efforts to establish low-income community solar policies might have been in Maryland and Minnesota if normative reframing was not present.

Because of the institutional and normative conflicts mentioned above, it is likely that normative framing enabled the presence of low-income provisions in these states' community solar programs.

Literature Review

Introduction

Literature pertinent to this paper falls into two categories. The first is a review of literature specific to the topics of community solar, state electricity regulation, low-income electric customers, and the theme of inequity. The second is a review of academic literature specific to policy process research, popular theories of policy process research, and normative reframing as a theory of policy process research.

As governments and communities across the globe work to minimize human contributions to climate change by transforming energy production and consumption, renewables are increasingly employed as non-carbon intensive energy sources. Residential solar photovoltaic (PV) systems for electricity production are a popular and efficient renewable energy technology. Despite the expansion of solar PV systems in the United States, there is an issue of equity in access to this technology. Policies that allow virtual or group net metering and support community solar address barriers that low-to-moderate income (LMI) populations face in benefitting from solar PV systems.

In the U.S., federal policies that encompass renewable energy goals like the Clean Power Plan and state renewable portfolio standards contribute to the exponential increase in the demand for renewable electricity generation, with an anticipated 70 gigawatts of combined wind and solar PV capacity to be added by 2021 (U.S. Energy Information Administration 2017, 72). These projections are becoming reality as 14,800 megawatts (MW) of solar PV capacity was

installed in 2016 (Solar Energy Industries Association 2017). These policies not only set targets for the amount of installed solar PV capacity, but also aim to reduce the cost of solar PV systems, making them more cost competitive with conventional energy sources (Barbose and Darghouth 2016). The U.S. Department of Energy's SunShot Initiative has a goal to decrease the cost of residential solar PV electricity from $0.10 per kilowatt (kW) in 2020 to $0.05 per kilowatt (kW) by 2030 (U.S. Department of Energy n.d.). The Lawrence Berkeley National Laboratory (LBNL) publishes an annual report, "Tracking the Sun," summarizing trends in the price of grid-connected, residential and non-residential solar PV systems in the U.S. The LBNL 2016 report concludes that since 1998, the median price of installed solar PV projects has declined between eight and twelve percent on average each year, in total from $12 per watt to $4 per watt (Barbose and Darghouth 2016).

A challenge for these national and state goals is that at least half of U.S. households and businesses are unable to host solar PV systems (Artale and Dobos 2015, 19). According to Mueller and Ronen (2015), low-income households host less than five percent of solar installations in the U.S and are likely to face the range of challenges mentioned above. Community solar is touted as a solution to achieve national and state renewable energy goals and address issues of inequity, as it allows multiple electricity consumers to subscribe to solar PV projects that are not directly connected or metered to their homes (Garren et al. 2017). The National Renewable Energy Laboratory (NREL) estimates that community solar has the potential to comprise fifty percent of the market for distributed renewable energies by 2020; whereas, this renewable energy model currently comprises less than one percent of solar PV projects in the U.S. (Jones 2017).

Virtual and group net metering policies are important mechanisms for community solar to increase access to solar PV, as they allow individuals to receive the benefits of renewably generated electricity in the form of financial credits on their utility bills (Jones 2017). Net metering policies are state specific and constantly in flux due to changes in laws, regulations, and incentives, which are influenced by "utilities, solar developers, residential or commercial landlords, municipalities, community and nonprofit organizations, or a combination thereof" (Jones 2017; Feldman et al. 2015, 7). The U.S. Energy Policy Act of 2005 encouraged development of net metering by requiring state public utility commissions (PUCs) to promote these policies and require electric utilities to make net metering available upon request (Hess 2016). State legislatures and PUCs are able to control the diffusion of solar PV through net metering laws and regulations by placing caps on the percentage of net-metered electricity in utilities' energy portfolios or by providing incentives for the development of net-metered solar PV projects, such as tax benefits or favorable rates for solar generated electricity (NREL 2014).

As states work to achieve their renewable portfolio standards, there is a clear need to focus on increasing access to and encouraging the development of solar PV projects for low-income electric customers in order to expand the market for solar energy (NREL; Garren et al. 2017). Legislatures and PUCs play a key role in this as they set net metering and shared renewable policies, which are foundational components that allow low-income electric customers to participate in community solar projects (Garren et al. 2017). A conflict arises, however, between lawmakers and regulators expanding net metering policies to increase access to renewables for low-income electric customers while utilities are "increasingly lobbying for policy changes that would slow this trend" (Rule 2015).

Many articles attempt to address the issue of cross-subsidization through a combination of rate structures and policies that are most cost-effective for all electric customers, incentivize the development of renewables, and avoid financial and infrastructure burdens on utilities (Chan et al. 2017). Community solar challenges the historical role of utilities and retail electric suppliers through virtual net metering, purportedly making financial compensation for utilities more difficult to attain. This begs the question of what motivates law and rule makers to craft regulations and incentives that expand access to renewable energies for low-income populations that are potentially unfavorable for utilities?

Community Solar

Solar PV is a form of renewable energy technology that converts sunlight into electricity using solar electric cells. This technology has minimal greenhouse gas emissions compared to conventional fuel sources, such as coal or natural gas (U.S. Energy Information Administration 2017). It is calculated that worldwide, renewable energies are the fastest developing sources for electricity generation as countries implement renewable energy policies and regulations to minimize reliance on fossil fuels and curb greenhouse gas emissions (U.S. Energy Information Administration 2016, 83). Solar PV is the most rapidly growing renewable energy technology, with installed capacity increasing an average of 8.3 percent each year (U.S. Energy Information Administration 2016, 84). Jacobson et al. (2015) predict that the majority of solar growth in the U.S. will come from utility-scale solar projects, as residential solar is expensive and unavailable to around fifty percent of households, greatly limiting the expansion of the residential solar market (Feldman et al. 2015).

Community solar, also referred to as shared solar, is touted as a mechanism to expand the residential solar market. The establishment of community solar as a means to increase utility

customers' access to solar energy is attributed to the Clean Energy Collective, a Colorado-based energy company founded in 2010 (Langton 2016). There exists a growing body of academic literature and reports specific to the topic of community solar in the U.S. A number of articles from *Solar Today*, the American Solar Energy Society's bi-monthly magazine, the *Electricity Journal*, and *Natural Gas & Electricity* discuss the history, definitions of, benefits, and challenges pertaining to community solar. In the *Electricity Journal*, Augustine and McGavisk (2016) write that community solar is a relatively underdeveloped subsection of renewable energy in the U.S. with approximately 100 completed projects. These projects are mainly located in states with legislation to incentivize the growth of renewables. Several law schools, including Vermont Law School, George Washington University Law School, and the University of Minnesota Law School have published resources including guides and lease models for community solar projects (VLS Energy Clinic 2016; Attanasio et al. 2017; Andre et al. 2016).

No universal definition or singular term for community solar currently exists; however, most definitions encompass similar elements (Funkhouser et al. 2015, 91). Also known as a solar garden, a community solar project operates as a solar PV installation that provides the benefits of solar power to multiple end users under the same utility, offsetting their electricity consumption (Augustine 2015). These projects can be implemented through a variety of ownership and subscription models. Utilities, private solar developers, residential or commercial property owners, nonprofits, and community organizations can host and administer community solar arrays (Feldman et al. 2015, vi). Subscription to a community solar project can be either capacity or energy-based (Feldman et al. 2015, vi). First, with capacity-based subscriptions, customers may subscribe to a share percentage of a community solar array and receive a corresponding amount of credits or second, through energy-based subscriptions, customers may purchase a

kilowatt hour amount of electricity generated by a community solar project (Feldman et al. 2015). Chan et al. (2017) review the variety of community solar program designs and their impact on access to solar PV and equity in cost sharing.

Funkhouser et al. note that definitions of community solar fail to account for the "utility, policy, and private, non-utility activity" capacity building necessary to achieve the intended goals of this model of solar electricity generation (2015, 91). Community solar comes to fruition through a variety of legislative and regulatory mechanisms but is most often enabled by an expansion of net metering legislation to include virtual net metering (VNM) (Feldman et al. 2015; Heavner et al. 2015). Virtual net metering is a bill crediting mechanism that allows multiple utility customers at shared or separate electric service addresses to offset their electricity bills with credits that come from electricity produced by an offsite solar system; however, the definition and parameters of VNM differ across states (Heavner et al. 2015). Additional mechanisms include aggregate net metering and statewide-shared solar programs (Heavner et al. 2015, 31).

The Interstate Renewable Energy Council tracks existing and proposed state-shared renewable energy legislation and regulations, which they define as "programs that enable multiple customers to share the economic benefits of one renewable energy system via their individual utility bills" (IREC 2017). As of September 2017, sixteen states are listed in IREC's State Shared Renewable Energy Program Catalog (IREC 2017); however, in some states utilities may voluntarily develop community solar programs. The NC Clean Energy Technology Center notes that the growth of community solar hinges on statewide legislation and resulting regulations to remove barriers for development. This is due to the possibility that utility-sponsored programs may be available to only certain territories and offer limited subscription

models (Inskeep et al. 2016, 22). The future expansion of community solar depends on direction and incentives stemming from state legislation and regulations, the motivation of utilities, and access to resources and funding to implement these projects.

Low-income Populations

Electricity and Energy Insecurity

A small collection of articles exists specific to low-income electricity consumers in the U.S. Hernández (2016) cites access to energy as a public health concern and reviews data that demonstrates that in the U.S., the majority of households meeting federal poverty standards are burdened by energy costs. This economic burden contributes to a phenomenon known as "energy insecurity" or "an inability to adequately meet basic household energy needs," of which electricity plays a significant role and about which there is little comprehensive academic literature or research (Hernández 2016).

Baxter (1998) traces the history of federal low-income energy assistance to the 1973 oil embargo and the creation of the Low Income Home Energy Assistance Program and analyzes the impact of potential policies on low-income populations throughout the electric industry restructuring and deregulation of the 1990s. Three main policy solutions to protect low-income populations in respect to electricity pricing and usage are prominent since this time: energy assistance for bill payments, consumer protections, and energy efficiency and weatherization programs (Baxter 1997; Oppenheim and MacGregor 2003). Assistance for electric customers is largely determined on a state-by-state basis and some articles examine the relationship between utilities and low-income electricity customers and identify leverage points to assist this demographic, including unique rate structuring, increased access to energy efficiency programs,

and increased access to distributed renewable generation and smart meters (Karier 2015; Evens 2015).

Community Solar

According to Mueller and Ronen (2015), low-income households host less than five percent of solar installations in the U.S. Low-income populations may face a range of challenges in accessing solar projects including a lack of suitable siting, authority of roof space as renters, and limited financial capability, credit, and tax appetite for the thirty percent federal income tax credit (Artale and Dobos 2015; NREL 2014). Community solar is a relevant mechanism to expand the development of renewable energies due to the flexibility of ownership and subscription models.

Community solar models help eliminate hurdles that many communities or individuals may face in accessing renewable energy. Artale and Dobos (2015) state:

> at least 49 percent of US households and 48 percent of US businesses are currently unable to host a PV system due to… insufficient roof space, structural issues, and lack of total authority over roof space (i.e., leasing building or shared owned space)… In addition, many households and businesses do not want to host a PV system for various economic, aesthetic, and operational reasons (19).

Community solar is capable of breaking down barriers to market entry for this forty-nine percent of households unable to host a solar PV system. By removing these barriers, this model of renewable electricity generation has the potential to double the size of the residential market for solar electricity (Feldman et al. 2015).

Community solar may be advantageous for low-income households, as this demographic allocates around four times the percentage of its income to electric bills compared to non-low-income households. This is referred to as "household energy burden," or the percentage of annual household income reserved for energy bills (Sabol 2016; Mueller and Ronen 2015;

Franklin et al. 2017, 31; Hernandez et al. 2016). Community solar subscriptions can provide increased electricity rate stability, potentially at a lower cost, and can incorporate savings guarantees (NREL 2014). Additionally, community solar can provide more abstract but equally important benefits to low-income electricity consumers including energy democracy and autonomy (Franklin et al. 2017, 35; Welton 2018).

Chan et al. (2017, 40) cites the political motivation for developing community solar programs as fulfilling a "normative goal to increase access to solar energy for those without an adequate roof or finances." Several organizations are specifically focused on expanding low-income populations access to renewable energies. The National Association for the Advancement of Colored People's (NAACP) 2017 Just Energy Report cites the mission of the NAACP's Renewable Energy Campaign which is to "engage communities of color and low income communities as leaders on advancing state legislation on Renewable Portfolio Standards, Energy Efficiency Resource Standards, and Distributed Generation Standards" and lists net metering standards and community renewable energy as one of five policy areas to achieve their mission's goals (Franklin et al. 2017, 4-5).

In 2015, the Obama Administration announced an initiative to "increase solar access for all Americans" through the National Community Solar Partnership and the "Department of Energy's SunShot Prize: Solar in Your Community Challenge," which has a specific focus on low-to-moderate income communities (Office of the Press Secretary 2015; Office of the Press Secretary 2016a; Office of the Press Secretary 2016b). Founded in 2016 by three nonprofit organizations (the Center for Social Inclusion, GRID Alternatives, and Vote Solar) the Low-Income Solar Policy Guide is motivated by issues of justice, climate change, and economic opportunity and seeks to tap into the benefits of community solar including "long-term financial

relief to families struggling with high and unpredictable energy costs, living-wage employment opportunities in an industry adding jobs at a rate of twenty percent per year, and a source of clean, local energy sited in communities that have been disproportionately impacted by traditional power generation" (Garren et al. 2017). The Interstate Renewable Energy Council (IREC) published its 2016 "Shared Renewable Energy for Low-to Moderate-Income Consumers: Policy Guidelines and Model Provisions" to provide policymakers, regulators, utilities, and shared renewable energy developers and administrators with information on how programs can be designed to provide "meaningful and tangible benefits" to low-income populations (IREC 2016). In the September 2017 State Shared Renewable Energy Program Catalog published by IREC (2017), nine states included elements specifically tailored to benefit low-to-moderate income electric customers in proposed and/or existing shared renewables statutes and program rules. Among the nine states, legislation was passed and programs were launched between 2008 and 2017. Within this group, six of the nine states implemented regulations and/or programs between 2015 and 2017.

Public Utility Commissions and Electricity Regulation

Public utility commissions (PUCs) regulate essential utility services, including electricity, and typically consist of three to five commissioners appointed by a state governor and confirmed by the legislature or elected by the public. The relationship between PUCs and utilities has revolved around ratemaking for electricity, largely exclusive to technical experts, where PUCs determine the per-kilowatt hour charge for electricity consumption based on utilities' infrastructure needs and ability to remain financially solvent (Boyd 2014; Welton 2018). Within the ratemaking process, competing policy goals are present for PUCs, setting "just and

reasonable rates" while providing compensation to utilities for operating a centralized electricity grid (Welton 2018; Karier 2015).

Several articles examine the development of shared solar projects, programs, and policies from the perspective of utilities; however, little literature exists pertaining to the development of shared renewable policies from the perspective of the PUC rulemaking process (Funkhouser et al. 2015). As distributed electricity generation expands and demand for renewables increases, new policy goals beyond just and reasonable ratemaking are introduced into the regulatory process, including concerns of environmental impact, global climate change, and equitable access to renewable energies.

Policy Process Research and Theories of Policy Change

Public policy as a field or discipline is not dictated by a unified conceptual framework, analytical tool, or research question and is considered multidisciplinary and derivative of other academic fields. It borrows research methods and theories from economic, social, and political sciences (Smith and Larimer 2017, 17). Public policy studies assume causal relationships, which fall under two, paradoxical models dating back to Laswell's vision of the policy sciences: the employment of rational fact to understand policy and the use of and normative values to assess public policymaking and implementation (Smith and Larimer 2017, 12-16). The tension between the scientific model based in rational fact and normative model based on values contributes to the lack of an overarching framework of public policy and replicable theories from which to conduct policy analyses.

Stone critiques the dominant economic and scientific theories of public policy. Deeming these the "rationality project" or the "market model," Stone explains these theories seek to define causal relationships in policymaking with objectivity and find universal explanations of how the

world works (2012, 10). The market model directly contradicts the "value-laden," unpredictable, reality of politics and policymaking, which Stone dubs the "polis model," that seeks to illuminate the differing perspectives contributing to conflict in public policy (Smith and Larimer 2017, 16; Stone 2012, 10). This post-positivist, polis model of public policy, while more nuanced, may not uncover universal explanations and is more applicable on a case by case basis (Smith and Larimer 2017, 17).

Policy Process Research

Smith and Larimer enumerate a range of subfields of policy studies of which "policy process research" focuses specifically on the "how and why of policymaking" (2017, 5). This includes examinations of policies' origins and why they change through analysis of agenda setting, or the way in which attention to problems is prioritized, and the actors that affect policymaking. It is accepted that there is no singular theory of policy change that adequately explains how and why policies change. For the purpose of this thesis, policy is defined as a governmental response to a perceived problem through goal-oriented action (Smith and Larimer 2017, 4). This may include a declaration of intent through the adoption of legislation, resulting assignment of governmental agencies to execute the goals of the legislation, and the agencies' processes of determining what policies to implement and how, often through rulemaking (Smith and Larimer 2017, 165).

Within policy process research, the main theories of policy change include: advocacy coalition framework, punctuated equilibrium theory, and multiple streams theory. These theories attempt to explain how governments select problems to focus on, how these problems are defined, and why policies specific to perceived problems change (Smith and Larimer 2017, 93). Aligning with Stones' polis model of policy, values, beliefs, and norms are foundational to these

theories. Therefore, within policy process research it is crucial to examine actors that influence policy change through indirect power. This is demonstrated to be more influential than the direct decision-making power of policymakers, as actors may possess expertise and power to frame policy alternatives (Smith and Larimer 2017, 94-95; Sabatier 1999).

Advocacy Coalition Framework

The advocacy coalition framework (ACF), developed by Sabatier and Jenkins-Smith (Sabatier 1999), argues that the policy process is "permeable," suggesting that a variety of actors, whether public officials, individuals such as researchers and journalists, or non-governmental organizations, through direct and indirect power are able to influence the policy process (Smith and Larimer 2017, 97). An advocacy coalition is a long-term alliance of a group of actors that possesses mutual normative and causal beliefs ranging from deep core beliefs (most resistant to change), policy core beliefs (the "glue" of advocacy coalitions), and secondary aspects (more easily adjusted based on new information and circumstances) (Smith and Larimer 2017, 99; Sabatier 1999, 120-122). As a theory of policy change in policy process research, the ACF explains policy stability and rapid change through advocacy coalitions' policy learning and/or non-cognitive, external events, where groups evolve with changes in political and social spheres, subsequently adjusting their policy goals. Policy change occurs when coalitions' core beliefs are in contrast to the "value priorities" and "perceptions of important causal relationships… and perceptions/assumptions concerning the efficacy of various policy instruments" that support existing policies (Sabatier 1999, 120). Smith and Larimer (2017) reference critiques of the ACF in that it does not possess a standardized methodology from which to test or predict instances of policy change and requires a time span of at least ten years to examine any change. Despite this,

two reviews of publications spanning 1987 to 2017 indicate that the ACF was employed in close to 200 articles (Smith and Larimer 2017, 100).

Punctuated Equilibrium Theory

Punctuated equilibrium theory (PET), developed by Baumgartner and Jones (Sabatier 1999) seeks to explain the "rapid and significant change" in policy subsystems that departs from periods of stability and incrementalism. Changes are labeled as policy punctuations, where actors influence agenda setting and issue definition in the policymaking processes and undermine structures that support current policies to create instability and incite an opportunity for change (Smith and Larimer 2017, 102). Policy equilibrium occurs when an "policy monopoly has a definable institutional structure responsible for policymaking in an issue area" and is supported by a policy image, comprised of "empirical information and emotive appeals," tied to core values (Sabatier 1999, 100). Actors create instability within policy monopolies through redefining issues to set new policy images, triggering a collapse in the rationale for current policies and inciting the need for policymakers to make change (Smith and Larimer 2017, 102-103; Sabatier 1999, 100-101). Similar to ACF, PET lacks the ability to predict when policy punctuations will or will not occur due to the unpredictability of external events and the inherently dynamic qualities of policymaking (Smith and Larimer 2017, 106).

Multiple Streams

Multiple streams (MS) theory, developed by Kingdon, describes policy change as dependent on timing and occurring "under conditions of ambiguity" (Sabatier 1999, 74). Ambiguity is generally defined as an anarchic state in which subjectivity and multiple ways to consider a situation, which cannot be remedied by input of additional information, lead to conflict (Sabatier 1999, 74). MS examines what policymakers pay attention by identifying

predecisions (including the problem definition and policy alternatives), issue framing, and where and how solutions to a problem are conceived (Sabatier 1999, 73). Rationality is disregarded, as agenda setting and problem definitions may be "vague and shifting" and are often paradoxical.

First, agenda setting is a consequence of policy entrepreneurs converging three streams to open a policy window: problems, policies, and politics. The problem stream is based on indicators and measurements, focusing events, or feedback from existing policies, and is influenced by values and beliefs. The policy stream consists of various policy alternatives that are selected based on the linkages of a policy alternative with a problem and are dependent on cost, logistical feasibility, and acceptability (Sabatier 1999, 76; Smith and Larimer 2017, 110-111). The politics stream, or the national political ideology and legislative/administrative turnover, impacts agenda setting as well.

At certain points in time these three streams can open a policy window, allowing for policy entrepreneurs to advance their policy agendas. The convergence of two streams is unlikely to incite policy change. The streams of problem definition and policy alternatives are the predecisions and are restricted from creating policy change without a receptive political climate. Policy windows may open based on unpredictable or predictable events such as a disaster or an annual programmatic review of an existing policy. Here, the value of policy entrepreneurs is highlighted as they must be successful in coupling a problem to their policy solution and securing a political decision maker to enact their policy. The major limitations to MS include creating clear distinctions between the three streams and a lack of falsifiable hypothesis that policy scholars can test (Sabatier 1999, 87; Smith and Larimer, 2017, 112).

It is evident that the main theories of policy change within policy process research are difficult to model and replicate and that case studies have limited value due to their lack of a

"grand conceptual framework proposing causal links to empirically verify" (Smith and Larimer 2017, 14-15).

Normative Reframing

Normative reframing is a policy process theory articulated by Leigh Raymond, professor of Political Science at Purdue University in Indiana, who posits this theory is better able to answer the long-debated questions of how and why policies change. While normative reframing is a relatively new theory to explain policy change, it is grounded in basic theoretical principles regarding the power and influence of norms and issue framing, and falls under Stone's, value and politically oriented polis model of policymaking. Additionally, it builds on ACF, PET, and MS theories, which all account for the values and deep core beliefs of actors in policymaking as influential to problem definition and agenda setting, but do not examine them as specific catalysts of policy change. The basic premise of normative reframing as a policy process theory is that policy entrepreneurs or change advocates undermine existing norms supporting current policies by employing a strategic issue frame to define a problem "in terms of an alternative norm" (Raymond 2016, 15). Norms, Raymond suggests, are crucial to sparking policy change and normative reframing extends beyond the main policy process theories, which recognize norms to maintain policy stability, by instead investigating norms as catalysts of policy change (2016, 15). By highlighting alternative norms that are more appropriate in addressing a problem, norms serve as justification for policy change. Additionally, normative reframing is particularly useful in the face of opposition by prominent vested interests or existing institutions.

Raymond (2016) applies this theory to explain the development of the Regional Greenhouse Gas Initiative's auction system for pollution allowances and the application of revenues to public benefits programs. He uses this example to demonstrate how the normative

"fit," or the appropriateness of norms supporting an existing policy or institution and the normative "force," the strength of norms and degree to which they are held within a society, can be examined to identify levers for policy change. In the case of RGGI, the norms supporting the free allocation of pollution allowances were framed as unfitting and weaker than the norms supporting the new auction system and public benefit fund. Here, public benefit frames that defined a problem in terms of more deeply held social norms allowed for a shift in policy.

Normative reframing does not supply a universal explanation for policy change; however, it can contribute a piece of the puzzle as to how and why certain problems are conceptualized and solutions are developed. The main policy process theories speak to the importance of norms in some manner, but do not directly examine them. Normative reframing begins by examining the appropriateness and strength of norms supporting current policies and the subsequent values held by actors and the norms they employ in an effort to change them.

Methodology

The objective of this thesis was to determine whether normative reframing as a policy process theory explains the proliferation of statewide community solar policies with provisions for low-income electric customers. More specifically, I sought to test normative reframing as an explanation of the outcome of state community solar policies in Maryland and Minnesota, two states that adopted pilot community solar programs.

Case Studies and Selection

To study the presence of normative reframing as a policy process, I sought to identify and analyze two states from the nine with community solar policies with provisions for low-income electric customers. Maryland and Minnesota were the states with the most policy criteria in

common which allowed for replicability in the research process. The availability of documents from the rulemaking processes restricted state selection. Community solar regulations needed to be fully developed and adopted for a retroactive analysis of the policy process. The political and social contexts of legislatures, governors, public utility commissioners, and attitude towards renewables also needed to align. As well, the states needed to possess a common organizational structure at the public utility commission (PUC) level and the state legislation inciting the PUC rulemaking needed be similar in scope. In Maryland and Minnesota, the statutes are relatively simple, allowing for the majority of the program design to take place at the PUC rulemaking level.

Normative Reframing as a Policy Process

Within policy process research, the unit of analysis is policy change (Smith and Larimer 2017, 115). Policy process analysis begins by assessing the political and governmental contexts, as the broad political framework and organizational structure within which policymakers operate will set parameters for the development of policy. Next, a policy's history is examined, as most policies are incremental and based on prior policy actions (Sabatier 1999, 169). Lastly, identification of main actors in the development of a policy, their motivations, and degree of influence uncovers competing policy goals.

I reviewed the political and governmental context of renewable energies and low-income electric assistance in Maryland and Minnesota. I conducted a process tracing exercise by first examining the origins of the community solar policies, which included a review of draft legislation and resulting enacted statutes in legislative tracking databases. Actors relevant to the creation and adoption of the legislation were also identified. Language within the statutes was examined to identify the intent of developing community solar programs in these states. I studied

the rulemaking processes by examining all filings in the electronic administrative dockets for community solar regulations enacted by the Maryland Public Service Commission and the Minnesota Public Utility Commission. These dockets housed draft regulations in addition to stakeholders and public comments.

Central to normative reframing is identification of issue frames and conflict in norms. Any opposition to or conflict within the development of community solar policies in Maryland and Minnesota with low-income provisions was identified. The current (or now evolving) norm pertaining to traditional net metering and utility and electric customer relationships was identified by examining opponents to and key conflicts within the development of community solar policies. The alternative norm was identified by examining proponents of the policies and their arguments for implementation of community solar programs with low-income provisions. This allowed for the identification of what issue frames were employed, which I predicted to include equity and democratization frames.

Because normative reframing is a mechanism that may not be actively or consciously employed by policy entrepreneurs or change advocates and is instead a mechanism that is later identified through policy analysis, interviews with actors relevant to the policy process in each state helped to determine the rigor of normative reframing. To supplement the process tracing research, after receiving approval from the University of Vermont Research Protections Office under the Committee on Human Research in the Behavioral and Social Sciences, seven semi-structured, informational interviews were conducted, via phone, with eight public officials and representatives of organizations that were prominent in the legislative and rulemaking processes. Interview subjects were identified through the process tracing exercise in addition to a comprehensive internet search of news articles and press releases specific to community solar

policies in these states. A snowball sampling method was used, whereby I asked primary interview subjects for recommendations of other relevant actors or organizations. To minimize risk of compulsion in the snowball sampling, participants did not receive any incentives or compensation for referring additional participants and were expressly notified prior to and asked permission during the interview to use their names when additional interview subjects were contacted (see Appendix 1 for the Research Information Sheet).

Limitations and Biases

Limitations to this research begin with the applicability of case studies to explain policy process on a larger scale. Because policy development is specific to the political and social contexts within each state, conclusions drawn from this research may not apply to other states. There are many perspectives from and lenses through which to analyze policy development. Additionally, deeper analyses of the policy process in each state could occur. But to achieve the objectives of this thesis two cases were selected to broaden the examination of normative reframing and to increase the likelihood of broader validity.

Other limitations included availability of interview subjects. As this was a retroactive study, some individuals knowledgeable of or who participated in the rulemaking process were no longer working for the same organizations, restricting access to some key actors. Availability of certain documents within the rulemaking processes posed a limitation as there was often reference to, but no available record of, conversations between actors. Lastly, as a researcher, there exists potential for subjectivity and confirmation bias because of my personal background as a proponent of community solar. Conclusions drawn as to the presence and effectiveness of normative reframing are based on my interpretation of the policy processes in these two states.

Maryland

Legislative and Regulatory Background

Maryland is a progressive state in its commitment to increase the adoption of renewable energy and energy efficiencies to promote resilience in the context of climate change and the environmental impacts of energy production (Solar Energy Industries Association 2017). The mission of the State of Maryland Energy Administration (MEA) is "to promote affordable, reliable and cleaner energy for the benefit of all Marylanders" (Maryland Energy Administration N.d.). This is evident across the MEA's website, which offers extensive commentary and information on the State's commitment to adopting renewable energy and increasing energy efficiencies. This is mirrored in Maryland's Renewable Energy Portfolio Standard (RPS), the EmPOWER Maryland initiative, and the Greenhouse Gas Emissions Reduction Act (Md. Code Ann. Public Util § 7-101; MD PSC 2018b; MD S.B. 323 2016).

Enacted in 2004, and since revised by the Maryland General Assembly several times (DSIRE 2017), the RPS for Maryland details the required percentage of in-state retail electricity sales that come from renewable energy sources (Md. Code Ann. Public Util § 7-101). The current goal is twenty-five percent renewably sourced electricity by 2020, at least 2.5 percent of which must come from solar (Md. Code Ann. Public Util § 7-101). The EmPOWER Maryland Energy Efficiency Act of 2008 set the goal of fifteen percent reduction of per capita electricity usage and peak demand by 2015, which has since been extended by the Maryland Public Service Commission (PSC) in 2016 to continue energy efficiency efforts (MD PSC 2018b). The Greenhouse Gas Emissions Reduction Act, most recently revised and signed into law by

Governor Hogan in 2016, requires a forty percent reduction in statewide greenhouse gas emissions from 2006 levels by 2030 (MD S.B. 323 2016).

Dating back to 1997, Maryland's net metering legislation enables residents, businesses, schools, and government entities under all utilities to participate in net metering with eligible renewable energy sources (MD PSC Net Metering Working Group 2013). Public Utilities Article §7-306(d) from the Code of Maryland places an aggregate cap of 1,500MW on net metered electricity generation of which approximately 461MW is installed as of June 2016 (MD PSC 2017). An eligible customer may net meter a system sized up to 2MW (PUA §7-306(d)).

Low-income Electricity Assistance

In Maryland, the Office of Home Energy Programs (MDHS 2018) under the Department of Human Services provides assistance to low-income households for energy bills to restore and prevent loss of services (MDHS 2018). Specifically, the Electric Universal Service Program (EUSP) provides financial assistance and places eligible electric customers on a monthly budget plan with their utility company (MDHS 2018). Born out of the Electric Customer Choice Act of 1999 and delegated to the PSC, the program's original intent was to assist low-income electric customers during the restructuring of Maryland's electric market and continues to serve residents today (MD PSC 2000). Additionally, the Supplemental Targeted Energy Program (STEP) provides educational resources for EUSP recipients to help them lower and maintain the electricity bills (MDHS 2018). The Arrearage Retirement Assistance program provides electric customers with financial assistance up to $2,000 for significant, outstanding electric bills (MDHS 2018). Auction proceeds from the Regional Greenhouse Gas Initiative help to provide funding for these programs, as determined by the General Assembly (RGGI 2015; NCAT 2017).

Community Solar Legislation

Expansion of traditional net metering through community energy legislation was first introduced in the General Assembly as House Bill in 2012. Its progression halted, however, due to an unfavorable report from the House Committee on Economic Matters (2012). Additionally, there was no mention of low-income electric customers in the text of the bill (MD H.B. 864 2012). In 2014, community energy legislation was revived with House Bill 1192 with language specific to low-income electric customers similar to the currently codified statute. This bill again received an unfavorable report from the House Committee on Economic Matters (2014). Delegate Luke Clippinger (D), is the only sponsor listed on all three house bills.

In May 2015, House Bill 1087, "An Act Concerning Community Solar Energy Generating System Program," was signed into law by republican Governor Larry Hogan. A partisan bill sponsored by 16 democrats, with Delegate Clippinger as the primary sponsor, the final vote favored the legislation with 119 yea votes (90 Democrat, 29 Republican) and 20 nay votes (20 Republican) (LegiScan 2015). This bill tasked the PSC with: (1) establishing regulations for a three year "community solar energy generating systems" (CSEGS) pilot program by May 15, 2016 and (2) with the MEA, convening a "stakeholder workgroup to study the value and costs of the pilot program," which will report its findings to the Senate Finance Committee and the House Economic Matters Committee on or before July 1, 2019 (MD H.B. 1087 2015).

Specific to low-income electric customers, the legislation states:

> it is in the public interest that the state enable the development and deployment of energy generation from community solar energy generating systems in order to: (i) allow renters and low–income and moderate–income retail electric customers to own an interest in a community solar energy generating system; (ii) facilitate market entry for all potential subscribers while giving priority to subscribers who are the most sensitive to market barriers; and (iii) encourage developers to

> promote participation by renters and low–income and moderate–income retail electric customers" (MD H.B. 1087 2015, 4).

Additionally, it is stipulated that in the implementation study, the stakeholder workgroup:

> shall identify and examine… (2) the costs and benefits of community solar energy generating systems to participating subscribers and to nonsubscriber ratepayers… (12) how community solar project developers can increase participation by low– and moderate–income retail electric customers in community solar projects; (13) the progress of the community solar energy generating pilot program under § 7–306.1 of the Public Utilities Article, as enacted by Section 1 of this Act, in attracting low– and moderate–income retail electric customers…" (MD H.B. 1087 2015, 9-10).

Beyond these stipulations, any details pertaining to low-income electric customers and the rates at which participants would be credited were left to the discretion of the PSC, the stakeholder workgroup, and public comments throughout the rulemaking process.

Actors contributing to the statewide legislation include (Solar United Neighbors 2017, 5):

- Chesapeake Climate Action Network
- David Brosch, founder, University Park Solar LLC
- Earthjustice
- MDV-Solar Energy Industries Association (SEIA)
- Sierra Club
- Solar United Neighbors of Maryland

Community Solar Rulemaking and Regulations

The non-partisan Maryland Public Service Commission commissioners serve staggered terms of five years, are appointed by the governor, and are approved by the Maryland State Senate (MD PSC 2018c). Throughout the development of the community solar pilot program, the commissioners who unanimously passed the final proposed regulations were:

1. W. Kevin Hughes (chairman) - appointed by Governor Martin O'Malley (D) in August 2011 and appointed Chairman in January 2013.
2. Anne E. Hoskins - appointed by Governor Martin O'Malley (D) in September 2013 and served until June 2016.
3. Harold D. Williams - appointed by Governor Parris Glendening (D) in 2002.
4. Jeannette M. Mills - appointed by Governor Larry Hogan (R) in June 2015.

5. Michael T. Richard - appointed by Governor Larry Hogan (R) in January 2016 (MD PSC 2018c).

To submit comments to the PSC as an official filing, the "Guidelines for Submitting Official Filings," must be followed. These include a transmittal letter and seventeen copies of any comments.

In July 2015, under the direction of the Commission's Electricity Division Director Phil Vanderheyden, the PSC convened The Maryland Net Metering Work Group, which on November 10, 2015 published draft regulations and a program design for the CSEGS pilot program to modify the Code of Maryland Regulations (COMAR) (MD PSC 2017; MD PSC 2018, 1; SUN 2017). The Work Group, comprised of a diverse array of stakeholders including representatives from utilities, the Office of the People's Counsel, solar developers, and ratepayer advocates, provided input to the PSC's Technical Staff in the development of the regulations; however, a consensus was not reached within the group (SUN 2017; MD PSC 2018, 1-2).

Following the publication of the draft regulations, on November 12, 2015, the PSC opened Administrative Docket RM56, initiating the public notice and comment rulemaking process to receive input on the draft regulations (MD PSC 2018, 2). This included electronic filing of eighty official comments (some filings included comments from multiple individuals), and three public rulemaking sessions for oral testimony. Commenters included: Maryland residents, investor owned and municipal utilities, local and national solar developers, solar trade association representatives, nonprofits advocates for solar energy, nonprofit advocates for low-income populations, county and municipal representatives, members of Congress, and Maryland's ratepayer advocate.

Because of the statutory requirement to develop a community solar program that benefits low-income electric customers, several overarching points of conflict that impact the ability for

low-income participation were debated throughout the rulemaking process: the rate at which electric customers would be credited, the definition and design of low-income participation, the capped size of the program, and the design of the program evaluation. More technical program design aspects were reviewed as well.

In its summary report "Community Solar in Maryland," Solar United Neighbors cites utilities' strong opposition to crediting participants at a full retail rate (SUN 2017, 6). This is evident in seven filings recommending community solar participants be credited at the avoided cost of electricity generation.

In response, Solar United Neighbors of Maryland, along with other stakeholders, submitted formal comments, seventy-one letters, and in person testimony to the PSC with a goal of "ensuring equitable program access for low-and moderate-income (LMI) residents" (SUN 2017, 6).

In July 2016 finalized regulations were adopted by the PSC and registered in COMAR (MD PSC 2018, 100). Key provisions to the design of the pilot program and stipulations for low-income electric customers include:

- The program capacity is 1.5 percent of Maryland's 2015 peak electric demand in MW, estimated around 196MW. All participating projects will contribute to the 1,500MW net metering cap (20 COMAR § 62.02.02; SUN 2017, 8).
- Participation is required by all investor-owned utilities; however, municipal and cooperative utilities may voluntarily participate (SUN 2017, 8).
- Projects energized throughout the duration of the three-year pilot program will be grandfathered under the current regulations for 25 years (20 COMAR § 62.02.10).
- The program capacity is divided among three categories:
    - 40 percent Open Category for projects up to maximum system size of 2MW
    - 30 percent Small, Brownfield, and Other Category for projects up to 500kW located on rooftops, parking lots, roadways, parking structures, brownfields, or serving more than 51 percent of the kWh generation to low-to-moderate income (LMI) customers

    - 30 percent LMI Category for projects serving more than 30 percent of the kWh generation to LMI customers, of which a minimum of 10 percent must directed to low-income electric customers (20 COMAR § 62.02.02).
- Low-income subscribers are defined as having a gross annual household income at or below 175 percent of the federal poverty level or are eligible for federal, state, or local assistance programs (20 COMAR § 62.01.02).
- Participants can be residential, commercial, or municipal electric customers but must be in the same utility territory as the community solar array (SUN 2017, 8).
- Participants will be credited at the full retail rate for the subscription to an array (SUN 2017, 8).

After the finalized regulations were adopted, participating utilities were then required to file tariffs with the PSC within 45 days (MD PSC 2017; 20 COMAR § 20.62.01.03). After an additional public comment period on the tariffs, the PSC made a final ruling and accepted the re-submitted tariffs, officially launching the Community Solar Pilot Program in March 2017.

Minnesota

Legislative and Regulatory Background

Similar to Maryland, Minnesota is a progressive state in its commitment to adopt renewable energies and increase energy efficiency (Solar Energy Industry Associates 2017b). The State of Minnesota Commerce Department (MCD) oversees energy-related matters including advocating on behalf of the public in utility regulation and energy conservation programs, conducting environmental reviews of proposed energy generation projects, and administering federal energy assistance programs (Minnesota Commerce Department n.d.). The "Energy" section of the MCD's website provides comprehensive and robust information on the role of renewables in Minnesota's renewable energy goals and the lives of its residents (MCD n.d., "Energy"). Specific to solar energy, the State has an economic interest as well, listing its

mission as “helping Minnesota-based solar businesses expand” and “attracting new solar businesses to the state” (MCD n.d., “Solar Industry”).

Minnesota’s Renewable Energy Standard, enacted in 2007, requires utilities to source twenty-five percent of their electricity generation from renewable energies by 2025 (MCD n.d., “Renewable Energy”). In 2013, the Minnesota Legislature sought to expand the growth of solar PV generation by setting the Solar Energy Standard, which requires 1.5 percent of utilities’ retail electricity sales to come from solar energy by 2020 and ten percent by 2030 (Laws of Minnesota 2013, chapter 85, article 10, section 3). These goals are supported by a U.S. Department of Energy Grant, “MN Solar Pathways: Illuminating Pathways to 10% Solar” (MCD n.d., “MN Solar Pathways”). Additionally, the legislature created the “Made in Minnesota Solar Incentive Program” and “Xcel Energy Solar Incentive Program,” which required investor-owned utilities to allocate annual, production based, financial incentives of $15 million for 10 years and $5 million for five years to those who installed solar PV systems (Laws of Minnesota 2013, c 85, art 10-11). In 2017, the legislature repealed the Made in Minnesota program; meanwhile, the Xcel Energy Solar Rewards program was expanded (Laws of Minnesota 2017, c 94, art 10, s 30; s 4).

Minnesota adopted net metering in 1983, which applies to all utilities and electric cooperatives and requires them to compensate customers at the full retail electric rate for systems 40 kW and under (Minn. Stat. 2017, § 216B.164). There is no aggregate cap on the amount of renewable energy systems that may be net metered in the state. Customers of investor-owned utilities may net meter systems up to 1,000 kW, while customers of municipal utilities and electric cooperatives may net meter systems up to 40 kW.

Low-income Electricity Assistance

In Minnesota, the MCD administers the federally-funded Low Income Energy Assistance Program and Weatherization Assistance Program, and the Home Energy Loan Program (HELP), which is funded locally through the Center for Energy and Environment. HELP assists low-income households with utility bills, and energy conservation and efficiency efforts (MCD n.d., "Programs to Save Energy and Money").

Community Solar Legislation

House File 792, an omnibus jobs, economic development, housing, commerce, and energy bill signed into law in May 2013 by Democratic Governor Mark Dayton, included Article 10 Section 2, otherwise known as the Solar Energy Jobs Act. This established the origin of Minnesota's community solar garden initiative (Minn. Stat. § 216B.1641). The bill required Xcel Energy, Minnesota's largest utility, to file a proposal for a "community solar garden program" with the Minnesota Public Utility Commission (PUC) by September 30, 2013, which must begin 180 days after the PUC's approval (Laws of Minnesota 2013, c 85, art 10, s 2). Community solar gardens were required to have a minimum of five subscribers per project and no individual subscriber could possess a share greater than forty percent. There is no limit to the aggregate generating capacity of the program; however, the maximum system size is 1 MW. Plans for community solar gardens could be submitted to the PUC by utilities or third-party developers.

There is no mention of low-income electric subscribers in the 2013 legislation; although the House Research Summary for 2013 solar energy legislation notes that community solar gardens provide "access to solar energy by renters and property owners lacking sufficient capital to install their own solar systems or whose property may be shaded or otherwise unsuitable for a solar installation" (Eleff 2013, 2).

Beyond the minimal guidelines in the legislation, any details pertaining to generating capacity limits, the rate at which subscribers would be credited, and net-excess generation were left to the discretion of Xcel Energy in its proposed program design, the PUC, and public comments throughout the rulemaking process.

Actors contributing to the Solar Energy Jobs Act include:

- Minnesota Environmental Partnership
- Solar Works for Minnesota coalition
- Fresh Energy
- Minnesota Renewable Energy Society (Energy News Network 2013).

Community Solar Rulemaking and Regulation

The five Minnesota Public Utility Commission commissioners serve staggered terms of six years and are appointed by the governor and approved by the Minnesota State Senate (MN PUC n.d., "Meet Our Commissioners"). The PUC cannot consist of more than three commissioners from the same political party and all must be "persons learned in the law, engineering, public accounting, property and utility valuation, finance, physical or natural sciences, production agriculture or natural resources as well as being representative of the general public" (Minn. Stat. 2017, § 216A.03).

Throughout the development of the community solar garden program, seven commissioners overlapped due to term limits but five ultimately unanimously passed the final proposed regulations:

1. Betsy Wergin – appointed by Governor Tim Pawlenty (R) in 2008. Term expired January 4, 2016.
2. Beverly Jones Heydinger (Chair) – appointed by Governor Mark Dayton (D) in 2012. Term expired January 2, 2017.
3. Nancy Lange (Chair) - appointed by Governor Mark Dayton (D) in March 2013 and appointed Chair in January 2017.
4. Dan Lipschultz (Vice-chair) - appointed by Governor Mark Dayton (D) in February 2014.

5. John Tuma – appointed by Governor Mark Dayton (D) in 2015.
6. Matthew Schuerger – appointed by Governor Mark Dayton (D) in 2016.
7. Katie Sieben – appointed by Governor Mark Dayton (D) in 2017 (MN PUC n.d., "Meet Our Commissioners").

To submit comments to the PUC, a user-friendly, online public commenting and PUC decision tracking platform called "Speak Up!" is provided by the Commission (MN PUC 2018).

Because of the imprecision of the 2013 legislation, the rulemaking process took nearly four years to complete and was left to the discretion of the PUC. The PUC opened electronic filing Docket 13-867 and on September 30, 2013, Xcel Energy filed its proposed community solar gardens program (MCD 13-867 2018, 20139-91933-01). Within the initial proposal, Xcel did not stipulate provisions for low-income electric customers but did note that community solar allows electric customers facing financial barriers to access solar PV projects. Xcel requested the program generating capacity be limited to 20 MW in its early years, to apply the full retail credit rate for compensation as this is "consistent with statute and past authorized levels of compensation for distributed solar resources," and that the PUC should consider preserving "the role of utility-scale solar resources in meeting the Solar Energy Standard" as Xcel believed this to be the most cost effective (MCD 13-867 2018, 20139-91933-01, 1-22). Actors beyond Xcel that contributed to the rulemaking process included:

- Fresh Energy
- Interstate Renewable Energy Council
- Cooperative Energy Futures
- Institute for Local Self-Reliance
- Environmental Law and Policy Center
- Clean Energy Access Coalition (MCD 17-527 2018).

At the time this research was conducted, Docket 13-867 held 977 filed documents consisting of comments from "governmental agencies, nonprofit organizations that work on energy issues, solar providers and the state's solar industry association, and almost 200 members

of the public" of which forty-seven are not available to the public due to ratemaking and trade secret exemptions (Eleff 2017, 2; MCD 13-867 2018). General program rules for community solar gardens were approved in 2015, but due to the nature of the program being mainly designated to one utility, there are continuous modifications as Xcel Energy proposes new community solar projects to meet the requests of the third-party community solar developers (Jossi 2018; MCD 13-867 2018).

Fresh Energy, a nonprofit clean energy advocacy organization, filed forty-eight documents with the PUC and was a main advocate for the inclusion of specific provisions for low-income electric customers in the community solar garden program, pushing Xcel to develop proposals for low-income community solar projects. Fresh Energy, with the Environmental Law and Policy Center, and Minnesota State Senator John Marty, first requested the PUC open comments for the inclusion of provisions for low-income electric customers in August 2015 (MCD 13-867 2018, 20158-113664-01).

In September 2016, the PUC ordered Xcel, and any other interested parties, to craft proposals for a low-income community solar garden by March 2017 (MCD 17-527 2018, 20177-133690-02). The PUC noted that this was to "address the fact that the solar garden proposals to date have failed to attract low-income subscribers," which may be attributed to the fact that the majority of community solar projects being developed and owned were by private, third-party developers (MCD 17-527 2018, 3-140797-01; Eleff 2017).

An initial concept was jointly submitted by Xcel and Energy CENTS Coalition, a local nonprofit whose mission is to "promote affordable utility service for low and fixed income people, to ensure the basic necessity of energy to all citizens, and to encourage the participation of low and fixed income citizens in energy issues and energy related decision-making" (MCD

17-527 2018, 20176-133411-01; Energy CENTS 2015). No other proposals were submitted, but the Institute for Local Self Reliance (ILSR) filed a document containing principles and guidelines for program design for low-income participation in community solar programs (MCD 13-867 2018, 20173-129546-01).

Due to the volume of filings in Docket 13-867 and the frequency of comments specific to the inclusion of low-income provisions, the PUC opened electronic filing Docket 17-527 for low-income community solar proposals in June 2017. This Docket contains thirty-two filings, eleven of which are public comments (MCD 17-527 2018). Xcel and Energy CENTS proposed a utility sponsored, community solar garden pilot program, that would operate in the Railroad Island neighborhood of Saint Paul, MN and serve around 160 participants (MCD 17-527, 20176-133411-01). The program would provide subscribers, who are determined based on LIHEAP eligibility requirements, with energy efficiency services and guarantee no net costs. In response, the PUC requested public comments on a number of topics including whether Xcel and Energy CENTS' proposal was "in the public interest," drawing from the original statutory language (MCD 17-527 2018, 20177-133690-01; Minn. Stat. § 216B.1641).

All commenters in Docket 17-527 noted that the mechanics of the proposal were in line with the public interest; however, some critiqued the program's scope as insufficient to serving the public interest. They cited the development of a community solar garden program in a single neighborhood as inhibitive to future scaling in terms of program size and number of communities reached (MCD 17-527 2018, 20183-140797-01). The ILSR commented that without specific direction for expansion or replication of the pilot, the program would fail to reach a significant portion of the over 200 thousand households below the federal poverty level (MCD 17-527 2018, 20178-134721-01). Final program rules were approved by the PUC in late January 2018,

contingent on Xcel providing an annual report that identified how the program could be expanded (Passer 2018; MCD 17-527 2018, 20183-140797-01).

Analysis of Normative Reframing

Can normative reframing as a policy process theory explain the development of Maryland and Minnesota's community solar regulations?

Examining the political and social contexts within Maryland and Minnesota suggests that these states are relatively friendly towards the increased adoption of renewable energies based on their legislative goals (Maryland with a focus on contributions to climate change and Minnesota with a focus on the economic development benefits of a clean energy industry). This sets the stage for an increased likelihood that policies that expand the development of renewables will be implemented. It does not, however, explain why community solar regulations with low-income provisions were crafted.

The origin and history of the community solar policies must be considered. Both states had enacted net metering regulations prior to the development of the community solar legislation. Additionally, the community solar regulations set by the commissions in both states are mandated by legislation. The frames employed by the policy entrepreneurs (the proponents of the community solar regulations with low-income provisions) originated explicitly in the Maryland legislation and implicitly in the Minnesota legislation.

A frame that supports community solar policies with low-income provisions includes equity in access to renewables. By employing an equity frame to promote community solar, traditional net metering policies are highlighted as being misaligned with norms foundational to renewable energies and a clean energy transition. These include energy autonomy and

participation in energy production and consumption. Funkhouser et al. (2015, 94) note an increased recognition that some solar programs are "perceived to be socio-economically regressive due to the relatively wealthier beneficiaries of the subsidies."

In Maryland, the motivations to develop a community solar policy were evident in the statutory language (MD H.B. 1087 2015). The legislation stated that it was in the public interest to develop community solar regulations in order to facilitate market entry for electric customers that faced potential barriers. Additionally, a community solar pilot program could provide low-income populations with the same benefits as Maryland residents who enjoy traditional net metered solar PV systems (MD H.B. 1087 2015, 4).

Here, an equity frame trumped conflicts in the rulemaking process. Proponents of strong low-income protections advocated for subscribers to be credited at the full retail electric rate, while utilities and electric cooperatives vied for the avoided cost rate. The PUC chose to implement regulations that credit subscribers at the full retail rate. This overruled utilities' arguments that they would be unable to recoup the costs of transmission and distribution and that non-net metering customers would subsidize these costs and community solar subscribers by paying higher rates.

Policy entrepreneurs in support of low-income protections did not face challengers who explicitly opposed low-income provisions. Susan Miller, a staff attorney at Earthjustice, explained that no stakeholders in The Maryland Net Metering Work Group disagreed that developers of community solar projects needed to include low-income electric customers (pers. comm., March 27, 2018). Policy entrepreneurs were instead up against actors who held a powerful seat at the table of utility regulation and ratemaking and whose norms, once considered appropriate to the utility-customer relationship, were previously protected.

In Minnesota, the frame of equity was not implied in the legislation, which likely contributed to policy entrepreneurs later requesting that the PUC open comments specifically for low-income provisions in the community solar rulemaking process. This was accomplished by framing the lack of intent in the legislation as an issue of equity. Senator John Marty (pers. comm., March 29, 2018), an original advocate for the solar gardens initiative, noted that despite the lack of explicit language on the intent and inclusion of low-income customers in the initiative, the aim of the legislation was to minimize issues of environmental justice and create a means for all Minnesotans to participate in the development of solar.

Ben Passer, a senior policy associate at Fresh Energy, a nonprofit advocate for energy policies that benefit all, explained that the motivation for the PUC to open comments on the inclusion of low-income provisions came from outside the rulemaking process as well (pers. comm., April 3, 2018). Due to the unrestricted cap on the capacity of the community solar garden program, there was an influx of applications from national solar developers for utility-scale community solar projects (Eleff 2017, 3). Passer noted that this unfolding of the community solar garden initiative was not in line with the norms underlying the policy. The frame in this case was also advancement of the public interest. Large, third party, community solar projects with fewer numbers of subscribers taking large shares, such as higher education institutions, was antithetical to the equity frame and participatory norm that supports community solar (Trabish 2015; B. Passer, pers. comm., April 3, 2018).

In both states, policy entrepreneurs cited the need for strong language on the inclusion of low-income populations in order for community solar programs to be effective and fulfill their normative intentions. Sara Baldwin Auck, director of regulatory programs at the Interstate Renewable Energy Council, indicated that if the significant barriers many residents face in

participating in community solar programs are not addressed, that these policies are unlikely to fulfill their goals (pers. comm., April 6, 2018). Simply allowing community solar through virtual net metering to exist does not guarantee participation of all socio-economic classes.

From these case studies, it is evident that normative reframing can explain the development of community solar policies in Maryland and Minnesota at the legislative and rulemaking levels. Due to the historical, political, and legislative contexts surrounding renewable energy policies in these states, it is more difficult to ascertain the degree to which normative reframing played a role. The norms supporting the standard utility business model and customer relationship, where utilities benefitted from selling increasing amounts of electricity generated and delivered by a centralized grid, are weakening (Lehr 2013). By employing frames of equity and universal public interest, policy entrepreneurs can highlight the inadequacies of this relationship, in contrast to the norms supporting the development of community solar and other renewables energies. Additionally, the development of community solar policies introduces new actors into the "policy monopoly" of utility regulation and electric ratemaking (Shallenberger 2016; Sabatier 1999, 10).

Community solar policies emerge from the complex interactions of institutional norms. Normative reframing can contribute to our understanding of why community solar policies with low-income provisions have succeeded in the face of stakeholder and institutional opposition.

Discussion: Normative Reframing, Relevance, and its Future

This analysis of normative reframing to explain the development of community solar policies addresses some deficiencies in our understanding of this policy process theory. First, it demonstrates that normative reframing can, to some degree, explain policy change at a singular level of governance. It also contributes to the small collection of studies in which this specific

policy process theory has been applied. What remains to be more thoroughly understood are the parameters that might limit or promote the power of normative reframing. Maryland and Minnesota are not particularly conservative states. Additionally, Raymond's analysis of normative reframing in the context of RGGI is a case study of a policy development among largely Democratic states (Haapala 2017). It would therefore be useful to test normative reframing in different political contexts.

Because the adoption of community solar policies occurs on a state by state basis, there is an opportunity for evaluation of future state community solar policies with normative reframing. It would be useful to either test the predictive capabilities of normative reframing to determine which states might next adopt community solar regulations with low-income provisions or apply this policy process theory to a different level of governance (perhaps low-income community solar programs developed by utilities that are not prompted by regulations, such as in Vermont) or to a more conservative political context.

It is important to note that normative reframing, as with all policy processes, cannot be definitively cited as the mechanism for policy change in Maryland and Minnesota. What normative reframing can do, however, is offer the best explanation for these policy developments compared to ACF, PET, and MS. These theories of policy process do not closely examine the roles that norms play in inciting policy change. A final opportunity for future research, and to further validate normative reframing, is to determine if this policy process is present in the states with community solar legislation and regulations that do not include low-income provisions.

Conclusion

Normative reframing, a developing policy process theory, articulates policy change as the use of issue frames to reveal weaknesses in the normative foundations of current policies, ultimately aligning desired policy solutions with alternative norms. A case study of Maryland and Minnesota's net metering regulations specific to the development of community solar policies with provisions for low-income participants, demonstrates that normative reframing can explain policy change at specific levels of government.

There is a palpable shift in the norms governing the institutions of electricity generation and regulation. This analysis of community solar policies with low-income provisions through normative reframing uncovers the transition to policies that are founded on norms of energy autonomy, justice, and participation, through public interest and equity frames.

Arguably this thesis is most valuable for policy scholars and perhaps policymakers who are trained in the mainstream policy process theories. It may be of value, although, for policy entrepreneurs and other stakeholders to obtain a deeper knowledge of the theoretical underpinnings and mechanisms of policy change. This could provide these actors with the tools to look for weaknesses in the normative foundations of current policies to ultimately help advance their policy initiatives and normative values.

Appendix: Research Information Sheet

Title of Study: Community Solar for Low-to-Moderate Income Populations: Exploring the Development of Regulations and Policies in Maryland and Minnesota

Principal Investigator: Madeline Murray-Clasen

Faculty Sponsor: Robert Bartlett, Professor

Introduction to the Research
You are being invited to take part in this research because you have been identified as an expert in the development of community solar policies with provisions specific to low-to-moderate income populations in (Maryland or Minnesota). This study is conducted by Madeline Murray-Clasen, an undergraduate student at the University of Vermont, writing an Honors Thesis in the Environmental Program to be completed in May 2018.

Purpose
In September 2017, the Interstate Renewable Energy Council published its State Shared Renewable Energy Program Catalog which tracks existing and proposed state shared renewables statutes and program rules. Listed in the catalogue are nine states that have statutes or programs including elements specifically tailored to include low-to-moderate income customers in the development of community solar.

The aim of the research is to understand how and why legislatures, public utility commissions, and utilities in Maryland and Minnesota crafted and adopted low-income provisions in their community solar laws, regulations, and policies. This research is relevant as states work to achieve their renewable portfolio standards, which will require the expansion of renewable energies to populations that are unable to access them due to a lack of financing, suitable infrastructure, or autonomy over their energy sources as renters or tenants of multi-unit homes. Additionally, little in the way of academic research is written specific to the development of community solar statues and rules.

Research Procedures
To understand how and why the low-income provisions were developed in (Maryland or Minnesota) I first examined the origins of the legislation for community solar programs and the low-to-moderate-income provisions through legislative tracking databases and relevant articles and press releases published by or mentioning stakeholders. Following this, public utility commission (PUC) dockets of the rulemaking processes were examined to identify key stakeholders and advocates for the specific rules. Analysis of the language in the draft and published rules, in addition to documents submitted to the PUC, was completed to understand the values and goals of the advocates and stakeholders of the rules.

To further my analysis and understanding of the development of the community solar policies with low-to-moderate income provisions I plan to conduct informational interviews with public officials and representatives of organizations that were prominent in the legislative and rulemaking processes. A snowball sampling method will be used, where I will ask participants for the names of other relevant experts. In the interviews, I will ask the following questions in addition to relevant follow-up questions as needed:

- How were you or your organization involved in the development of community solar legislation and regulations that include provisions for low-to-moderate income populations?
- What motivated you or your organization's involvement in the rulemaking process?
- Were the challenges and obstacles in the adoption of community solar regulations with low-to-moderate income provisions? If so, what were they?
- Why do you think these regulations were successfully crafted and adopted?
- Why was the adoption of community solar regulations with low-to-moderate provisions necessary? Or, why were the prior regulations insufficient?
- Do you think it is important to include provisions for low-to-moderate income populations in community solar regulations? If so, why?
- Are there other relevant stakeholders or experts who were instrumental in the development of the community solar and low-to-moderate income rules and regulations in Maryland who I should reach out to?
- If the answer to the above question is yes: If I am able to contact the individual(s) you mentioned, may I inform them I received their name(s) from you?

Duration and Location of Participation
One interview lasting 20 to 40 minutes with the potential for follow-up questions via phone conversation or email communication

Costs and Risk
There will be no costs to you for participation in this research. The risk of participation in this research is no greater than that encountered in daily life.

Compensation and Benefits
You will not be paid or otherwise compensated for taking part in this research. There is no significant personal benefit to participation in this research; however, your responses may be of value to readers of this thesis interested in the development of community solar policies and the topic of equity in access to renewable energies.

Confidentiality
All information collected from your interview during the research period and in the final thesis will be maintained with your name (and title if applicable) as an identifier so that you can be matched to your responses. Your responses to the interview questions will not be confidential unless you choose to withdraw or later change your mind about participating in this research.

Records of the informational interviews will be kept for the duration of my research project, which will be completed in May 2018. For the duration of the research, records of the interview may be accessed by Madeline Murray-Clasen or by Professor Robert Bartlett in the Department of Political Science. The final product may or may not be published on the University of Vermont's Environmental Program thesis database.

Voluntary Participation and Withdrawal
Participating in this research is entirely voluntary and you may refuse to participate without penalty or discrimination at any time. You are free to answer some, all, or none of the questions or withdraw your responses at any time. If you choose to take part and later change your mind and withdraw, any record of your interview (audio recording or written notation) will be destroyed and will not be used in the analysis and writing.

Questions and Concerns
This research has been reviewed and approved by the University of Vermont Committee on Human Research in the Behavioral and Social Sciences.

If you have any questions about this study at present or in the future, you may contact the Principal Investigator, Madeline Murray-Clasen, at the following phone number and/or email address: (802)-595-9941, mmurrayc@uvm.edu. If you have questions or concerns about your rights as a research participant, then you may contact the Director of the Research Protections Office at (802) 656-5040.

Bibliography

Anadon, et al. 2016. "Making Technological Innovation Work for Sustainable Development." *Proceedings of the National Academy of Sciences of the United States of America*, 113 (35), 9682–9690. http://doi.org/10.1073/pnas.1525004113 (January 30, 2018).

Andre, Samuel et al. 2016. *A Guide to Sample Community Solar Garden Leases*. Minneapolis, MN: The University of Minnesota Law School Environmental Law Clinic. http://energytransition.umn.edu/wp-content/uploads/2016/07/A-guide-to-sample-community-solar-garden-contracts.pdf (January 30, 2018).

Attanasio, Donna et al. 2017. *Catalyzing Community Solar: A Handbook for Municipalities*. Washington, D.C.: The George Washington University. https://sustainabilitycollaborative.gwu.edu/sites/g/files/zaxdzs2481/f/image/Community%20Solar%20Handbook%20for%20Municipalities%20-%20Oct%202017.pdf (January 30, 2018).

Augustine, Paul. 2015. "The Time is Right for Utilities to Develop Community Shared Solar Programs." *The Electricity Journal* 28 (December), 107-108. https://doi.org/10.1016/j.tej.2015.11.010 (January 30, 2018).

Augustine, Paul and Emily McGavisk. 2016. "The Next Big Thing in Renewable Energy: Shared Solar." *The Electricity Journal* 29 (May): 36-42. https://doi.org/10.1016/j.tej.2016.04.006 (January 30, 2018).

Artale, Emily and Hillary Dobos. 2015. "Community Solar Presents Rewards and Risks." *Natural Gas & Electricity* 32 (October): 19-24. http://dx.doi.org/10.1002/gas.21865 (January 30, 2018).

Baber, Walter F., and Robert V. Bartlett. 2015. *Consensus and Global Environmental Governance: Deliberative Democracy in Nature's Regime*. Cambridge, MA: The MIT Press.

Baber, Walter F., and Robert V. Bartlett. 2009. *Global Democracy and Sustainable Jurisprudence: Deliberative Environmental Law*. Cambridge, MA: MIT Press.

Barbose, Galen, and Naïm Darghouth. 2016. "Tracking the Sun IX: The Installed Price of Residential and Non-Residential Photovoltaic Systems in the United States." *Lawrence Berkeley National Laboratory*. https://emp.lbl.gov/sites/default/files/tracking_the_sun_ix_report.pdf (January 30, 2018).

Baxter, Lester W. 1998. "Electricity Policies for Low-Income Households." *Energy Policy* 28 (February): 247-256. https://doi.org/10.1016/S0301-4215(97)00142-0 (January 30, 2018).

Chan, Gabriel et al. 2017. "Design Choices and Equity Implications of Community Shared Solar." *The Electricity Journal* 30 (November): 37-41. https://doi.org/10.1016/j.tej.2017.10.006 (January 30, 2018).

COMAR Online. 2018. "Title 20: Public Service Commission." *Maryland Division of State Documents*. http://www.dsd.state.md.us/COMAR/subtitle_chapters/20_Chapters.aspx#Subtitle62 (January 30, 2018).

DSIRE. 2017. "Renewable Energy Portfolio Standard." http://programs.dsireusa.org/system/program/detail/1085 (January 30, 2018).

Eleff, Bob. 2013. "House Research Short Subjects: 2013 Solar Energy Legislation in Minnesota." *Research Department of the Minnesota House of Representative*. http://www.house.leg.state.mn.us/hrd/pubs/ss/sssolarleg.pdf (January 30, 2018).

Eleff, Bob. 2017. “Information Brief: Xcel Energy’s Community Solar Garden Program.” *Research Department of the Minnesota House of Representative*. https://www.leg.state.mn.us/docs/2017/other/171031.pdf (January 30, 2018).

Energy CENTS Coalition. 2015. “Energy CENTS Coalition.” http://energycents.org/ (January 30, 2018).

Energy News Network. “In Minnesota, Solar Tops Clean Energy Agenda.” *ENN*. January 9, 2013. https://energynews.us/midwest/in-minnesota-solar-tops-clean-energy-agenda/ (January 30, 2018).

Evens, Anne. 2015. “The Utility of the Future and Low-Income Households.” *The Electricity Journal* 28 (2015): 43-52. https://doi.org/10.1016/j.tej.2015.11.008 (January 30, 2018).

Feldman, David et al. 2015. “Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation.” *National Renewable Energy Laboratory*. http://www.nrel.gov/docs/fy15osti/63892.pdf (January 30, 2018).

Finnemore, Martha, and Kathryn Sikkink. 1998. "International Norm Dynamics and Political Change." *International Organization* 52 (4): 887-917. http://www.jstor.org/stable/2601361 (February 22, 2018).

Franklin, Marcus et al. 2017. “Just Energy Policies: Model Energy Policies Guide.” *National Association for the Advancement of Colored People’s Environmental and Climate Justice Program*. http://www.naacp.org/wp-content/uploads/2014/03/Just-Energy-Policies_Model-Energy-Policies-Guide_NAACP.pdf (January 30, 2018).

Funkhouser, Erik et al. 2015. "Business Model Innovations for Deploying Distributed Generation: The Emerging Landscape of Community Solar in the U.S." *Energy Research & Social Science* 10 (November): 90-101. https://doi.org/10.1016/j.erss.2015.07.004 (January 30, 2018).

Garren, Sean et al. 2017. "Low-Income Solar Policy Guide." http://www.lowincomesolar.org/wp-content/uploads/2017/03/Policy-Guide_3.7.17.pdf (January 30, 2018).

General Assembly of Maryland. "House Economic Matters Committee: Voting Record - 2012 Session." http://mgaleg.maryland.gov/2012rs/votes_comm/hb0864_ecm.pdf (January 30, 2018).

General Assembly of Maryland. "House Economic Matters Committee: Voting Record - 2014 Session." http://mgaleg.maryland.gov/2014RS/votes_comm/hb1192_ecm.pdf (January 30, 2018).

Haapala, Kate M. 2017 "Reclaiming the Atmospheric Commons: The Regional Greenhouse Gas Initiative and a New Model of Emissions Trading, by Leigh S. Raymond." *Carbon Management* 8 (1): 109-110. https://doi.org/10.1080/17583004.2017.1285179 (January 30, 2018).

Heavner, Brad et al. 2015. "Virtual Net Metering Policy Background and Tariff Summary Report." *Center for Sustainable Energy*. https://energycenter.org/sites/default/files/docs/nav/programs/solar-pathways/(6902)_Virtual_Net_Metering_Policy_Background_and_Tariff_Summary_Report.pdf (January 30, 2018).

Hernández, Diana. 2016. "Understanding 'Energy Insecurity' and Why It Matters to Health." *Social Science & Medicine* 167 (October): 1-10. https://doi.org/10.1016/j.socscimed.2016.08.029 (January 30, 2018).

Hernández, Diana et al. 2016. "Housing Hardship and Energy Insecurity Among Native-born and Immigrant Low-income Families with Children in the United States." *Journal of*

Children and Poverty 22 (2): 77-92. https://doi.org/10.1080/10796126.2016.1148672 (January 30, 2018).

Hess, David J. 2016. "The Politics of Niche-regime Conflicts: Distributed Solar Energy in the United States." *Environmental Innovation and Societal Transitions* 19 (June): 42-50. https://doi.org/10.1016/j.eist.2015.09.002 (January 30, 2018).

Inskeep, Benjamin et al. 2016. "The 50 States of Solar: 2015 Policy Review Q4 Quarterly Report." *NC Clean Energy Technology Center*. https://nccleantech.ncsu.edu/wp-content/uploads/50sosQ4-FINAL.pdf (February 22, 2018).

Interstate Renewable Energy Council. 2016. "Shared Renewable Energy for Low-to Moderate-Income Consumers: Policy Guidelines and Model Provisions." https://irecusa.org/wp-content/uploads/2016/03/IREC-LMI-Guidelines-Model-Provisions_FINAL.pdf (January 30, 2018).

Interstate Renewable Energy Council. 2017. "State Shared Renewable Energy Program Catalog." https://irecusa.org/regulatory-reform/shared-renewables/state-shared-renewable-energy-program-catalog/ (January 30, 2018).

Jacobson, Mark Z. et al. 2015. "100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-sector Energy Roadmaps for the 50 United States." *Energy & Environmental Science* 8 (May): 2093-2117. http://pubs.rsc.org/en/content/articlepdf/2015/ee/c5ee01283j (January 30, 2018).

Jones, Kevin B. et al. 2017. "Beyond Community Solar: Aggregating Local Distributed Resources for Resilience and Sustainability." In *Innovation and Disruption at the Grid's Edge: How Distributed Energy Resources Are Disrupting the Utility Business Model*, ed. Fereidoon Sioshansi. London: Academic Press, 65-81. https://doi.org/10.1016/B978-0-12-811758-3.00004-8 (January 30, 2018).

Jossi, Frank. "Xcel, Developers Reach Agreement on Minnesota Community Solar Program." *Energy News Network*. June 24, 2015. https://energynews.us/midwest/xcel-developers-reach-agreement-on-minnesota-community-solar-program/ (January 30, 2018).

Karier, Tom. 2015. "Utility Pricing and Public Policy." *The Electricity Journal* 28 (July): 12-19. https://doi.org/10.1016/j.tej.2015.05.015 (January 30, 2018).

Langton, Rebecca. 2016. "The Birth of Community Solar." *Solar Today*, Spring, 14. http://www.omagdigital.com/publication/?i=301010#%22{\%22issue_id\%22:301010,\%22page\%22:14%22 (January 30, 2018).

LegiScan. 2015. "Roll Call: MD HB1087 | 2015 | Regular Session." https://legiscan.com/MD/rollcall/HB1087/id/432922 (January 30, 2018).

Lehr, Ronald L. 2013. "New Utility Business Models: Utility and Regulatory Models for the Modern Era." *The Electricity Journal* 26 (October): 35-53. https://doi.org/10.1016/j.tej.2013.09.004 (January 30, 2018).

Maryland Energy Administration. N.d. "About MEA." http://energy.maryland.gov/Pages/insideMEA/index.aspx (January 30, 2018).

Maryland Department of Human Services. 2018. "Energy Assistance." Office of Home Energy Programs. http://dhr.maryland.gov/office-of-home-energy-programs/ (January 30, 2018).

Maryland Public Service Commission. 2000. Electric Universal Service Program Year One Report. Annapolis, MD: MD PSC. http://www.psc.state.md.us/wp-content/uploads/YearOneEUSPReport2000.pdf (January 30, 2018).

Maryland Public Service Commission. 2017. *Report on the Status of Net Energy Metering in the State of Maryland*. Annapolis, MD: MD PSC. http://www.psc.state.md.us/wp-content/uploads/Final-2016-Net-Metering-Report.pdf (January 30, 2018).

Maryland Public Service Commission. 2018. "Admin Docket Jacket: Admin Docket Number: RM56 Revisions to COMAR 20.62 - Community Solar Energy Generation Systems." http://www.psc.state.md.us/search-results/?keyword=RM56&x.x=27&x.y=10&search=all&search=rulemaking (January 30, 2018).

Maryland Public Service Commission. 2018. "EmPOWER Maryland." http://www.psc.state.md.us/electricity/empower-maryland/ (January 30, 2018).

Maryland Public Service Commission. 2018. "The Commission." http://www.psc.state.md.us/the-commission/ (January 30, 2018).

Maryland Public Service Commission's Net Metering Working Group. 2013. *A Guidebook on Net Metering in Maryland*. Annapolis, MD: MD PSC. http://www.universityparksolar.com/Meter/MD%20NM%20Guide%20DRAFT%206-7-2013.pdf (January 30, 2018).

Minnesota Commerce Department. 2018. "eDockets: Docket Number 13-867." https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&docketYear=13&docketNumber=867# (January 30, 2018).

Minnesota Commerce Department. 2018. "eDockets: Docket Number 17-527." https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&userType=public# (January 30, 2018).

Minnesota Commerce Department. N.d. "About Us." https://mn.gov/commerce/about/ (January 30, 2018).

Minnesota Commerce Department. N.d. "Energy." https://mn.gov/commerce/industries/energy/ (January 30, 2018).

Minnesota Commerce Department. N.d. “MN Solar Pathways.” https://mn.gov/commerce/industries/energy/solar/solar-pathways.jsp (January 30, 2018).

Minnesota Commerce Department. N.d. “Programs to Save Energy & Money.” https://mn.gov/commerce/consumers/your-home/save-energy-money/ (January 30, 2018).

Minnesota Commerce Department. N.d. “Renewable Energy.” https://mn.gov/portal/natural-resources/renewable-energy/ (January 30, 2018).

Minnesota Commerce Department. N.d. “Solar Industry.” https://mn.gov/commerce/industries/energy/solar/ (January 30, 2018).

Minnesota Public Utilities Commission. 2018. “Speak Up!.” https://minnesotapuc.granicusideas.com/ (January 30, 2018).

Minnesota Public Utilities Commission. N.d. “Meet Our Commissioners.” https://mn.gov/puc/about-us/our-team/commissioner/ (January 30, 2018).

Mueller, James and Amit Ronen. 2015. “Summary for Policymakers: Bridging the Solar Income Gap.” *GW Solar Institute*. https://solar.gwu.edu/bridging-solar-income-gap (January 30, 2018).

National Center for Appropriate Technology. 2017. “State PBF/USF History, Legislation, Implementation: Maryland.” *LIHEAP Clearinghouse*. https://liheapch.acf.hhs.gov/dereg/states/maryland.htm (January 30, 2018).

National Renewable Energy Laboratory. 2014. “Community Shared Solar: Policy and Regulatory Considerations.” *National Renewable Energy Laboratory*. https://www.nrel.gov/docs/fy14osti/62367.pdf (January 30, 2018).

Oppenheim, Jerrold and Theo MacGregor. 2003. "Low-Income Issues in Electricity Restructuring." *Review of Policy Research* 20 (June): 263–284. doi:10.1111/1541-1338.t01-1-00006 (January 30, 2018).

Passer, Ben. "Xcel Energy's Low Income Solar Project Gets Approval." *Fresh Energy*. February 1, 2018. https://fresh-energy.org/xcel-energys-low-income-solar-project-gets-approval/ (February 24, 2018).

Raymond, Leigh. 2016. *Reclaiming the Atmospheric Commons: The Regional Greenhouse Gas Initiative and a New Model of Emissions Trading*. Cambridge, MA: The MIT Press.

Raymond, Leigh et al. 2013. "Making Change: Norm-Based Strategies for Institutional Change to Address Intractable Problems." *Political Research Quarterly* 67 (November): 197 - 211. https://doi.org/10.1177/1065912913510786 (January 30, 2018).

Rule, Troy A. 2015. "Solar Energy, Utilities, and Fairness." *San Diego Journal of Climate & Energy Law* 6 (symposium): 115-148. http://digital.sandiego.edu/cgi/viewcontent.cgi?article=1060&context=jcel (January 30, 2015).

Sabatier, Paul A., ed. 1999. *Theories of the Policy Process: Theoretical Lenses on Public Policy*. Boulder, CO: Westview Press.

Sabol, Patrick. 2016. "From Power to Empowerment: Plugging Low Income Communities into the Clean Energy Economy." *Groundswell*. https://groundswell.org/frompower_to_empowerment_wp.pdf (January 30, 2018).

Shallenberger, Krysti. "To Speak Softly: Why Sunrun's New Policy Head Could Signal a Shift in Solar Advocacy: Former Maryland Commissioner Anne Hoskins Outlines Her Approach to Utility-Solar Regulation." *Utility Dive*. September 29, 2016.

https://www.utilitydive.com/news/to-speak-softly-why-sunruns-new-policy-head-could-signal-a-shift-in-solar/427217/ (March 10, 2018).

Smith, Kevin B., and Christopher W. Larimer. 2017. *The Public Policy Theory Primer*. 3rd ed. Boulder, CO: Westview Press.

Solar Energy Industries Association. 2017. "Maryland Solar." https://www.seia.org/state-solar-policy/maryland-solar (January 30, 2018).

Solar Energy Industries Association. 2017. "Minnesota Solar." https://www.seia.org/state-solar-policy/minnesota-solar (January 30, 2018).

Solar Energy Industries Association. 2017. "Solar Market Insight Report 2016 Year in Review: Executive Summary." SEIA. http://www.seia.org/research-resources/solar-market-insight-report-2016-year-review (January 30, 2018).

Solar United Neighbors. 2017. *Community Solar in Maryland*. Washington, DC: SUN. https://votesolar.org/files/9515/1120/7089/Community_Solar_in_Maryland_-_Year_1.pdf (January 30, 2018).

Stone, Deborah. 2012. *Policy Paradox: The Art of Political Decision Making*. 3rd ed. New York, NY: W. W. Norton & Company.

The Regional Greenhouse Gas Initiative Inc. 2015. *Investment of RGGI Proceeds Through 2013*. http://mde.maryland.gov/programs/Air/ClimateChange/MCCC/Publications/RGGIProceeds2013.pdf (January 30, 2018).

The White House Office of the Press Secretary. 2015. *Fact Sheet: Administration Announces New Initiative to Increase Solar Access for All Americans*. Washington, D.C. https://obamawhitehouse.archives.gov/the-press-office/2015/07/07/fact-sheet-administration-announces-new-initiative-increase-solar-access (January 30, 2018).

The White House Office of the Press Secretary. 2016. *Fact Sheet: Obama Administration Announces Clean Energy Savings for All Americans Initiative*. Washington, D.C. https://obamawhitehouse.archives.gov/the-press-office/2016/07/19/fact-sheet-obama-administration-announces-clean-energy-savings-all (January 30, 2018).

The White House Office of the Press Secretary. 2016. *Fact Sheet: Obama Administration Announces New Actions to Bring Clean Energy Savings to All Americans*. Washington, D.C. https://obamawhitehouse.archives.gov/the-press-office/2016/11/18/fact-sheet-obama-administration-announces-new-actions-bring-clean-energy (January 30, 2018).

Trabish, Herman K. "Why Community Solar is Exploding in Minnesota: Mortenson-SunShare Partnership Leads the Charge with 100-plus MW Solar Pipeline." *Utility Dive*. February 5, 2015. https://www.utilitydive.com/news/why-community-solar-is-exploding-in-minnesota/360241/ (Mach 10, 2018).

United States Department of Energy. n.d. "Sunshot Initiative Goals." https://energy.gov/eere/sunshot/sunshot-initiative-goals (January 30, 2018).

United States Energy Information Administration. 2016. *International Energy Outlook 2016*. Washington, D.C.: Energy Information Administration. https://www.eia.gov/outlooks/ieo/pdf/0484(2016).pdf (January 30, 2018).

United States Energy Information Administration. 2017. *Annual Energy Outlook 2017*. Washington, D.C.: Energy Information Administration. https://www.eia.gov/outlooks/aeo/pdf/0383(2017).pdf (January 30, 2018).

United States Energy Information Administration. 2017. "What is renewable energy?" https://www.eia.gov/energyexplained/index.cfm/data/index.cfm?page=renewable_home (January 30, 2018).

Vermont Law School Energy Clinic. 2016. *Vermont Group Net Metering: Information & Guidelines for 150 kW (AC) Community Solar Projects*. South Royalton, VT: Vermont Law School. https://www.vermontlaw.edu/sites/default/files/Assets/iee/Vermont%20Group%20Net%20Metering%20Information%20and%20Guidelines%20%202016.pdf (January 30, 2018).

Welton, Shelley. 2018. "Grasping for Energy Democracy." Michigan Law Review 116 (4): 581-644. https://search.proquest.com/docview/2001313211?accountid=14679.