POLICIES TO SUPPORT COMMUNITY SOLAR INITIATIVES: BEST PRACTICES TO ENHANCE NET METERING

FINAL REPORT

A Renewable Energy Applications
for
Delaware
Yearly
(READY) Project

Center for Energy and
Environmental Policy

University of Delaware

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EXECUTIVE SUMMARY

This report, in support of the Renewable Energy Applications for Delaware Yearly (READY) project for 2011, reviews policies to support community solar initiatives and best practices to enhance net metering.

To help diversify energy resources within the U.S. electricity system, a number of policy approaches have been deployed to create greater demand for solar photovoltaic (PV) installations and to drive down installation prices. However, as the federal government has yet to pass a national renewable portfolio standard (RPS) or feed-in tariff, the solar industry has been highly dependent on the legislative efforts of individual U.S. states. These state legislative initiatives have come primarily in the form of RPS and net metering policies. State RPS laws have provided a requirement for utilities to purchase electricity from renewable resources, and net metering has provided a direct financial benefit to individual solar owners. While these policies have been effective in establishing a growing solar industry in a number of states, the policies were not designed to accommodate the development of community solar projects.

Many customers are unable to own or host a solar energy installation. This group may include renters and residents of condominium buildings, and customers who lack the financial resources to fund a solar energy system on their home or business but could fund a portion of an installation. Some property owners may have inadequate space on a rooftop or land. Rooftops may suffer from shading or obstacles, or they may face directions other than the South. The recognition of these barriers led to the development of local and community-owned energy resources, primarily wind and solar projects.

Community solar is a distinct branch of community-scale renewable energy generation focused on solar PV generation. Defining characteristics of community-scale renewable energy include the following:

- Clean energy projects with two or more subscribers;
- Projects that are generally (but not exclusively) larger than those financed by an individual, or that take advantage of site characteristics not readily available to individual onsite generation;
- Projects that involve communities and have a distinct economic impact therein; and,
- Projects that facilitate a transition towards energy independence for a community or community members (Morrigan, 2010; IREC, 2010a).

Community solar projects have been implemented in at least 10 states. As the economic and social benefits of the community solar model have become clearer and as implementation methodologies diffuse, more community projects are breaking ground.

While a strong net metering law is a prerequisite for community solar, standard net metering is insufficient to facilitate the development of community solar, and several policy approaches have been developed to enhance and expand net metering. One such approach is meter aggregation. Meter aggregation allows a customer with multiple meters or accounts to aggregate the meters on one bill to offset a renewable energy generator on one of the meters. Virtual net metering (VNM) is a policy strategy that lowers installation costs, optimizes array placement, and permits the owners to physically disassociate generation meters from consumption meters, maintaining only an administrative and financial relationship between the two. A variation of VNM, known as group billing, relies on a third-party billing agent to administer VNM.

Net metering policy in Delaware was established in 1999 as part of a larger electric utility restructuring law. Since then, Delaware's net metering law has been amended and enhanced several times. The law was expanded once again in July 2010, allowing customers to participate in VNM, meter aggregation, and group billing for community-owned energy generating facilities. The meter aggregation law provision provides an opportunity for farms and customers with multiple electric meters/accounts to pool these accounts and have the generation of an eligible energy resource hosted on one of the meters/accounts to offset the consumption from the pooled meters/accounts, at the full retail rate. The virtual net metering (VNM) law provision allows for renewable energy generating facilities to have multiple owners or participants who share the output of a generator to offset, at the supply service rate, the consumption on their electric bills. The group billing provision of the law allows utilities to opt out of virtual net metering and offer group billing, where the utility makes a payment to the generator-host instead of virtually net metering all of the participants/owners in the community-owned energy facility (26 Del. C. §1014).

The community solar policies of five states – Colorado, California, Maine, Massachusetts, and Vermont – are the subject of case studies. The community solar model in University Park, Maryland, is also examined due to its uniqueness as a model that developed without a state policy on community solar. The following are findings from our analysis of the case studies.

While meter aggregation addresses a need for customers with multiple meters (e.g., farms or campuses), to offset the generation from one meter, it has a limited capacity to facilitate the expansion of community solar as it is limited to customers with multiple meters/accounts. Group billing is an attractive option for policymakers because it avoids the issue of administrative burden to utilities and offers the flexibility for community solar projects to develop as its participants see fit. However, the following could present hurdles to the broad deployment of group billing: 1.) the complexity and expense associated with a third party billing system; 2.) concerns relating to credit-worthiness associated with a third party customer representative collecting participants' utility bills (IREC, 2010b); and 3.) the absence of established procedures for group billing projects. Another issue for group billing is that a check from the utility (instead of receiving a credit on a utility bill) is likely to be considered taxable income for participants in a community energy project. For these reasons, community solar programs based on meter aggregation and/or group billing are likely to remain more limited in size and scope than programs based on VNM.

VNM may be a superior method of administering a community solar program since utilities have significant experience with complex billing systems, as well as administering complex energy programs. From the consumer's perspective, VNM is more like owning a rooftop solar system that directly lowers consumption vs. simply receiving a check from the utility, as is done in group billing. Unlike meter aggregation, VNM is not inherently subject to geographic limitations. Compared to group billing, VNM divides the responsibilities of project initiation and management more evenly between the customer, developer, and utility. In addition to Delaware, the states spotlighted in this report have enacted VNM as the basis for their community solar legislation, positioning themselves as leaders in this renewable energy movement.

Several states with community solar policies have included requirements regarding the number of participants in a community solar project. Colorado and Massachusetts have a 10-member minimum intended to incentivize project developers to create systems large enough for wide participation and to capture economies of scale. While a participant minimum seems to send a correct signal, this may prove somewhat cumbersome for a developer to meet from the first day of operation. On the other hand, Maine's 10-member maximum sends precisely the wrong signal by limiting the ability of developers to construct projects that capture economies of scale, thereby removing one of the primary advantages of community solar.

States have various provisions in their community solar programs that limit the distance between participants and the community solar project installation. Colorado requires subscribers to live in the same county as the solar installation. Because Colorado has 64 counties of varying sizes and shapes, this requirement seems to be a fairly blunt instrument to limit the distance between participants and generator. Massachusetts' requirement for a community solar project's participants and installation to be located in the same New England Independent System Operator load zone (there are three) is much less restrictive than Colorado's. Other states, including Delaware, require that all participants in a community solar project be located within one utility's service territory. This requirement generally has an adverse impact on only the customers of the smallest municipal utilities.

The case studies indicate that community energy policies developed thus far have made a linkage between the crediting of distribution charges and the proximity of participants to a community energy facility. Colorado and California have made this linkage through restrictive policies, confining community net metering to small geographic units or limiting the types of eligible customers. Delaware's community net metering law recognizes that participants on the same distribution circuit as the generator-host have reduced impacts on, and use of, the distribution system. Thus, they are treated as standard metering customers, in terms of bill crediting. When deciding whether distribution charges are included in the kWh credit, it may be worth exploring possibilities in determining a solar installation's actual impact on the grid rather than its proximity of distance from generator to participants as most community solar programs use.

While legitimate concerns should be taken into account, utilities that object to community energy projects and VNM on the basis of administrative burden must clearly demonstrate that burden. Delaying implementation of VNM until billing software is updated for smart meters is one option for lessening administrative burden. A second option would be to allow group billing until utilities can make changes to their billing systems.

Despite the efforts of each of the states profiled in this report, community solar remains limited in the scope of its adoption. This is partly due to the newness of community solar legislation, but it also reflects that some early adopters of community solar (e.g., Maine, Massachusetts, and Vermont) have flawed, complex, and burdensome laws.

The 30 percent residential federal investment tax credit is another factor because it is only available for solar installations on the first or second home property – offsite installations are ineligible for the tax credit. Due to this provision of the federal law, community solar developers have been forced to structure themselves as a for-profit entity in order to claim the 30 percent business federal tax credit, which is not restricted to onsite installations. This was the case for the promising model of University Park, which then faced other roadblocks by the Securities and Exchange Commission's rules and state securities rules because federal tax law forced them to form a for-profit company. Federal legislation that allows a residential taxpayer to claim the 30 percent residential federal tax credit as an owner of an offsite community energy project could open the door to securities-exempt nonprofit community solar organizational structures. Clarity through legislation or rulemaking by Delaware's state regulatory bodies on this securities issue would also be helpful to community solar project developers.

Minor issues merit consideration with regards to Delaware's community net metering regulations, and revisions to these regulations (or underlying laws) could assist the development and diffusion of community energy generating facilities within the state. The current rules for meter aggregation require that customers provide full information disclosure along with intent to subscribe for a minimum of 90 days prior to the start of construction. The 90-day notice rule suggests that farmers with previously installed PV systems are ineligible to aggregate the meters to offset the existing PV system. The regulations also require that an eligible community of subscribers must include customers "sharing a unique set of interests." This ambiguous language could benefit from greater clarification and/or total elimination. Another issue is that a community energy facility could generate under 110 percent of its load and have an identical impact on the distribution system as a standard net metering system, although the distribution charge would be subtracted from the kWh credit.

To support existing renewable energy policies and increase consumer awareness of community solar, consideration should be given to an educational effort explaining how to begin a PV project (e.g., planning tips, potential ownership models including community models, financial opportunities and costs, lists of certified solar developers, summaries of federal and state incentives, etc.). From traditional media to websites and social networking platforms, targeted marketing can increase statewide awareness and interest in VNM and address information gaps for communities considering a community solar project.

Community solar projects can be an attractive option for consumers and a way to diversify participation in the solar energy market. The policies and case studies profiled in this report illustrate the dynamic character of this emerging policy. However, as with all new policies, uncertainties abound relating to performance; therefore, further analysis is warranted.

CHAPTER 1
INTRODUCTION

Over the past decade, state RPS policies – especially states with solar carve-outs – have been major drivers in the increased demand for solar energy across the U.S. Similarly, net metering policies have been effective in providing direct financial benefits to individual solar owners. But as effective as these policies have been in cultivating the emerging solar energy industry, newer policy models are being developed. Many consumers interested in self-generation face physical, logistical and financial barriers. Community solar is a policy innovation allowing consumers to gain the same economic benefit of solar ownership without hosting a solar installation on their home or business.

While a strong net metering law is a prerequisite for community solar, standard net metering is insufficient to facilitate the development of community solar, and several policy approaches have been developed to enhance and expand net metering. One such approach is meter aggregation. Meter aggregation allows a customer with multiple meters or accounts to aggregate the meters on one bill to offset a renewable energy generator on one of the meters. "Virtual" net metering (VNM) is a policy strategy that lowers installation costs, optimizes array placement, and permits the owners to physically disassociate generation meters from consumption meters, maintaining only an administrative and financial relationship between the two. A variation of VNM, known as group billing, relies on a third-party billing agent to administer VNM.

These policy approaches are the focus of this report, which identifies and reviews best practices in five U.S. states. Findings based on the case studies are utilized to offer recommendations for future community solar policy development in Delaware.

CHAPTER 2
THE ECONOMY, ENVIRONMENT AND EQUITY: A SHARED FRAMEWORK FOR OPTIMAL ENERGY SYSTEMS

The following section depicts key issues for understanding the benefits and challenges of conventional vs. sustainable energy systems. Major attention is directed toward environmental impacts, cost concerns, and equity concerns for a range of stakeholders.

2.1 Challenges in the Conventional Electricity System

The conventional electricity system relies on generation from large, centralized power plants and delivers electricity to end users through a vast network of transmission and distribution lines. This system attempts to maximize economic efficiency by capturing economies of scale with large baseload power plants for overall greater system utilization (Hirsh, 1999). Traditional fuel sources comprise the backbone of the system, led first by coal, followed by natural gas, then nuclear energy (see Figure 1).

The use of fossil fuels results in the release of nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs), particulate matter, and heavy metals such as mercury and lead. These pollutants may produce environmental problems such as acid rain, smog, and eutrophication of water bodies as well as health impacts such as respiratory infections, cardiovascular disease, and cancer (Chan, 2009).

Over 90 percent of greenhouse gas emissions in the U.S. (mostly in the form of carbon dioxide [CO_2]), come from the combustion of fossil fuels (U.S. Environmental Protection Agency [EPA], 2011a). Worldwide, the level of CO_2 in the atmosphere has increased from 275 parts per million (ppm) before the Industrial Revolution to 383 ppm by 2008 (Oak Ridge National Laboratory, 2009).

In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC, 2007) found that increases in anthropogenic greenhouse gas concentrations are "very likely to have caused most of the increases in global average temperatures since the mid-20th century." Impacts associated with climate change may include disruptions to weather and ecosystems, with increased frequency of heat waves, droughts, floods, and threats to biodiversity. Other environmental costs related to the reliance on fossil fuels range from mining impacts, such as mountaintop removal for coal extraction (EPA, 2011b), to potentially catastrophic accidents as occurred with the Deepwater Horizon offshore oil rig explosion in 2010.

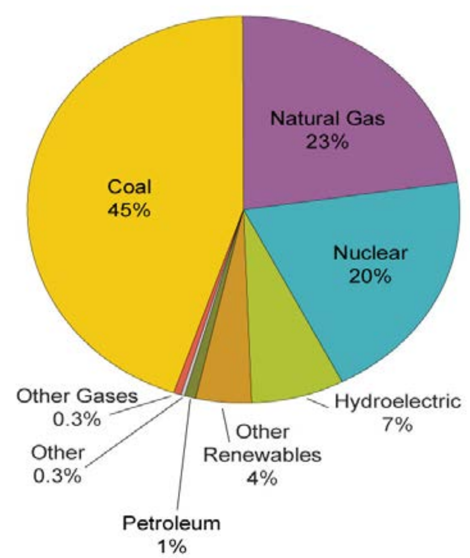
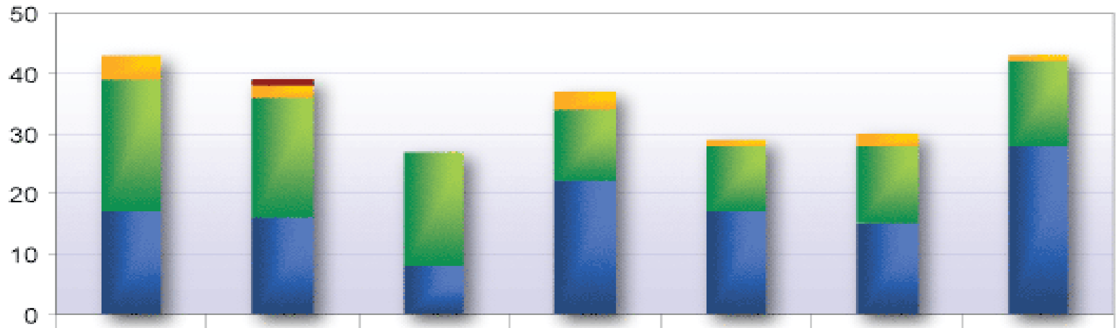


Figure 1: U.S. Electricity (Net Generation) by Fuel Source (2009)
Source: Energy Information Administration (EIA), 2010

The environmental challenges linked to reliance on the conventional energy system are complemented by technical vulnerabilities. Modern power systems rely upon the long-distance transmission of power from production facilities to load centers to radial distribution lines at the local level that deliver power to end users. This complex, interconnected system is vulnerable to disruptions and failures. Severe weather events, breakdowns in fuel supply, and mundane mishaps (e.g., falling trees, cars hitting poles, animal-induced arcs, etc.) can cause outages in this power delivery that impact millions of customers. Customers hundreds of miles away from a disturbance may have their electric service disrupted for several days or longer, causing enormous economic loses[1]. An example is the Northeast Blackout of 2003, which disconnected 50 million people in an area spanning eight U.S. states and two Canadian provinces (North American Electric Reliability Corporation [NERC], 2004; U.S.-Canada Power System Outage Task Force, 2004).

Historical data suggest that the frequency of blackouts in the U.S. is growing in severity[2] (see Figure 2). The frequency of blackouts during peak hours of the day and peak seasons of the year has seen statistically significant increases (Hines et al. 2009).



	2002	2003	2004	2005	2006	2007	2008
Category 5	0	1	0	0	0	0	0
Category 4	4	2	0	3	1	2	1
Category 3	22	20	19	12	11	13	14
Category 2	17	16	8	22	17	15	28

Figure 2: Number of Disturbance Events by Severity and Year
Source: NERC, 2011.

As shown in Table 1, average retail prices for electricity have risen steadily over the past decade. The cost to maintain adequate transmission and distribution infrastructure is also rising (see Figures 3 and 4). Investor-owned electric utilities (IOUs) invested nearly $58 billion in the nation's transmission system from 2000-2008 and are expected to spend an additional $54 billion from 2009-2013 (EEI, 2011).

[1]Annual losses to the U.S. economy from momentary and sustained power outages approximate $79 billion annually. Some 72 percent of costs affect the commercial sector, 26 percent impact industry, and two percent impact households (LaCommare and Eto, 2004).
[2] Data on Annual Electric Disturbance Events reveals that, from 1991 to 2000, 142 outages of 100 MW or more occurred. During 2001 to 2005, 200 outages of 100 MW or more occurred. The number of such outages increased to 219 during 2006 to May 2010. The number of U.S. power outages affecting 50,000 customers or more totaled 197 during 2001 to 2005, increasing to 312 during 2006 to May 2010.

TABLE 1
Average Retail Price of Electricity to End-Users by Sector in the U.S.

Year	Residential (¢/kWh)	Commercial (¢/kWh)	Industrial (¢/kWh)
1996	8.36	7.64	4.60
1997	8.43	7.59	4.53
1998	8.26	7.41	4.48
1999	8.16	7.26	4.43
2000	8.24	7.43	4.64
2001	8.58	7.92	5.05
2002	8.44	7.89	4.88
2003	8.72	8.03	5.11
2004	8.95	8.17	5.25
2005	9.45	8.67	5.73
2006	10.40	9.46	6.16
2007	10.65	9.65	6.39
2008	11.26	10.36	6.83
2009	11.55	10.21	6.84
2010	11.63	10.30	6.81

Source: U.S. EIA (2011)

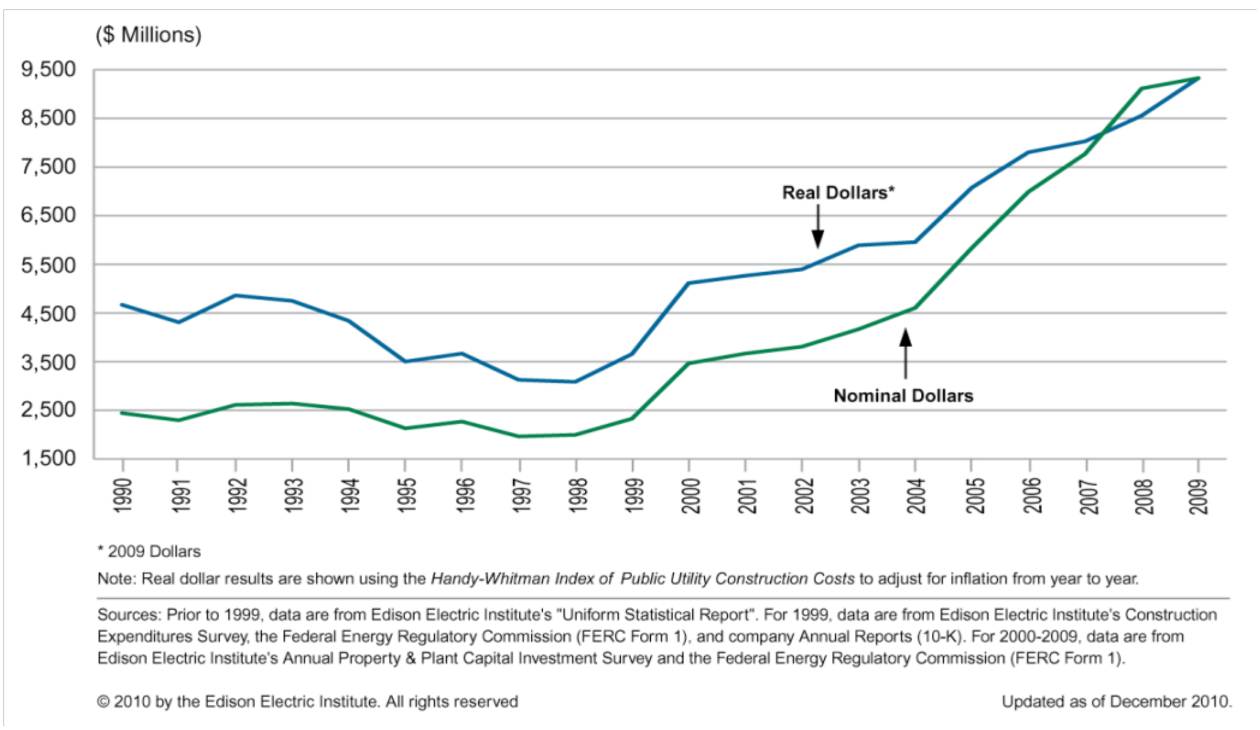


Figure 3: Transmission Investment, Nominal and Real 2008 Dollars (1980-2008)
Source: Edison Electric Institute (EEI) Business Information Group, 2010

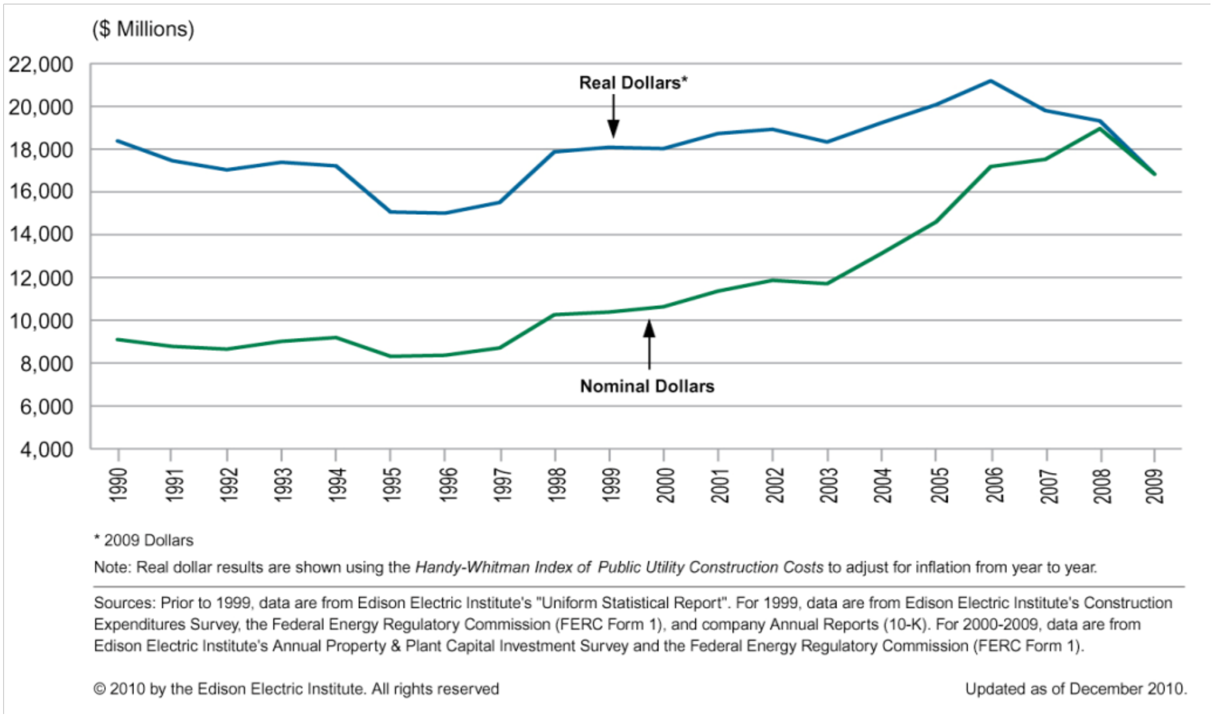


Figure 4: Distribution Investment, Nominal and Real 2008 Dollars (1980-2008)
Source: Edison Electric Institute (EEI) Business Information Group, 2010

A broad range of consumers who want to avoid the rising rates and environmental impacts of conventional electricity service has spurred interest in new approaches to developing energy projects that are oriented to distributed, community-based applications relying on renewable fuels. However, individuals, small groups, and communities seeking to design and fund alternative energy services at micro or neighborhood scales may encounter significant obstacles to change (Byrne and Toly, 2006; Palast, 2000) due to the complexity and hierarchy of relationships among utilities, regulators, competitive power companies and other market players (Winner, 1982; Grossman and Helpman, 2001; Bonardi et al. 2006).

2.2 Opportunities for Community-Owned Sustainable Energy Alternatives

The vulnerabilities of the conventional centralized energy model suggest that benefits may derive from greater decentralization in the electricity sector, in particular when distributed generation is wed to the use of alternative or renewable resources (Lovins, 1977; Hirsh and Serchuk, 1996; Hawken et al. 1999; Byrne and Toly, 2006). The following section describes some of the factors that are contributing to opportunities for greater utilization of community-owned energy.

2.2.1 Declining Costs

The cost of renewable energy has declined over time. Figure 5 shows the decrease in average installed solar photovoltaic (PV) costs from 1998-2009, and PV costs are continuing to fall.

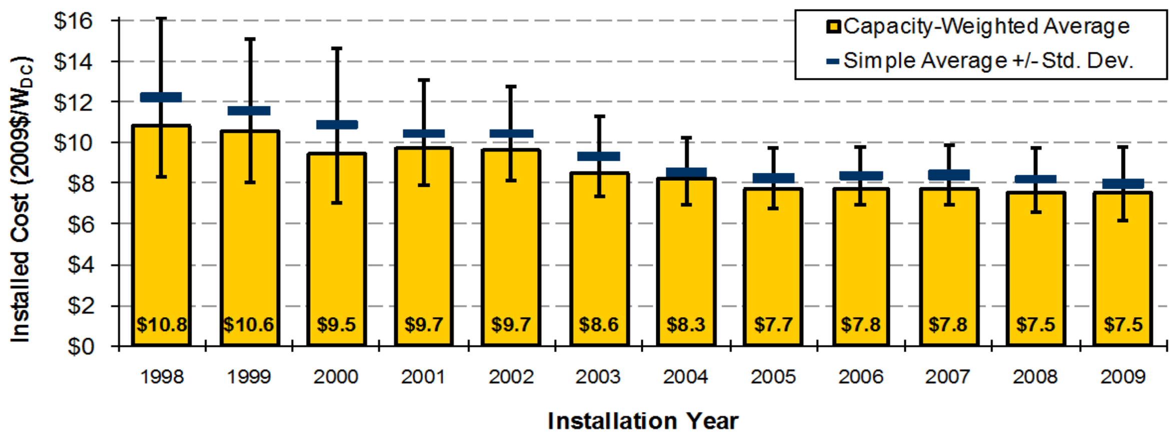


Figure 5: Average Installed Costs for Solar PV: U.S. Trends (1998-2009)
Source: Barbose et al. 2010

2.2.2 Social Acceptance of Clean, Renewable Energy Resources

Renewable energy resources, such as wind and solar, can reduce or mitigate many of the negative impacts of conventional energy resources discussed in Section 2.1. A number of studies confirm that the public recognizes these and other benefits of renewable energy and that there is social acceptance for, and support of, renewable energy in general (Wüstenhagen et al. 2007; Rogers et al. 2008) and solar energy specifically (Fischer, 2004; Faiers and Neame, 2006).

2.2.3 Locational and Distributed Benefits

Renewable resources can be sited in a variety of locations that have minimal land use and adverse impacts. Onshore wind farms can be developed to simultaneously allow other uses such as farming and cattle grazing. Solar PV installations use minimal land space when panels are placed on existing buildings or structures (U.S. EPA, 2010).

Distributed generation can provide modularity in responding to energy demand, meaning individual installations may be added incrementally at various scales and locales in response to fluctuating consumer demand or load patterns. When located close to the final consumer, distributed energy systems can result in less intensive use of distribution and transmission infrastructure, a reduction in line losses, and decreases in brownouts and blackouts (Coughlin et al. 2010). Distributed resources such as PV can also be used to offset peak demand, potentially offsetting the need for conventional peaking units (B.W. Beck Inc., 2009). Benefits such as a reduction in power outages and an improvement in power quality are valuable to large commercial and industrial customers who may avoid power service-related productivity losses totaling tens of billions of dollars each year. In turn, improved reliability can help to keep the prices of goods and services lower than they would otherwise be in the face of service disruptions (U.S. DOE, 2010b).

Additionally, distributed generation tends to be less vulnerable to physical disasters, equipment failure, potential human error, or deliberate external actions (U.S. DOE, 2007). For example, studies have shown that large-scale deployment of PV could have prevented the New York City blackouts of 2003 (Perez et al. 2004).

2.2.4 Potential of the Smart Grid to Maximize Value of Distributed Renewable Resources

The "smart grid" has potential to transform the conventional electric industry into an improved electricity supply chain – one that is less centralized and more consumer-interactive (U.S. DOE, 2010b). The smart grid helps to integrate electricity generated onsite at homes or businesses into the larger electric power network through an interactive relationship combining capabilities of advanced metering infrastructure, demand response, distributed resources, distribution management and automation, system and asset optimization, and information and communications technology. Whether customers seek access to more stable and better quality power, or to maximize opportunities to sell electricity produced onsite back into the grid, the smart grid promises to provide opportunities for consumers to participate more actively in the electricity system. From net metering programs to dynamic pricing[3] models that reflect hourly variations in retail power costs, the smart grid can help furnish individual customers with the information and tools that are necessary to manage their utility bills or energy profile in a variety of ways (U.S. DOE, 2010b). At a societal level, the smart grid can improve operating and market efficiencies, and create demand for new products and services both directly in the energy sector and beyond.

2.2.5 Emergence of Local and Community Energy Resources

Physical, logistical, and financial barriers are encountered by many customers interested in self-generation or supporting local renewable energy projects. For example, property owners with inadequate space on a rooftop or land, rooftops that suffer from shading or obstacles, and rooftops that face directions other than the South are physically unable to host solar energy installations (Farrell, 2010a: 2). Renters and residents of condominium buildings face logistical or legal barriers to hosting solar energy installations. Other customers' financial resources may be inadequate to fund a solar energy system on their home or business, but could possibly fund a portion of an installation. The recognition of these barriers led to the development of local and community-owned energy resources, primarily wind and solar projects.

Small communities or individuals can own portions of small-scale generation units, and that exclusive ownership can be transferred to a new owner (Bonneville Environmental Foundation [BEF], 2010). In this way, different social clusters could own community-based generation technology and produce and use that energy efficiently. Such ownership models are quite different from the conventional idea of private ownership.

While some existing projects involve physical ownership of solar PV modules, most community solar projects permit purchasing electricity via subscription or leasing part of the solar system and receiving access to its electricity output (Farrell, 2010a: 4 and 22). Individuals and organizations investing in community solar share the economic benefits, including sources of income such as greenhouse gas credits and renewable energy certificates.

2.2.6 Community-Owned Energy Models

One option available to those considering investing in a local or community-owned energy system is a utility-sponsored model. With this approach, system costs are financed by the participating customers

[3] The intended goal of such models is to inform energy consumption so that homes or businesses can avoid peak demand electricity use and, therefore, reduce usage and resulting energy bills (U.S. DOE, 2010b).

(via upfront or ongoing payments) to support the project. In return, customers receive credits or payments on their monthly electric bills proportional to their contribution and amount of energy produced by the solar system (Coughlin et al. 2010). To maximize the benefit from the 30 percent federal tax credit available for solar energy, individual consumers may structure a project as a business organization and finance it with equity invested by community members. Communities may also have a third-party business entity with enough tax appetite that would own and operate the system, transferring ownership to the community after it monetized and received the agreed upon rate of return. Financing community projects can also be achieved through selling the system to a business entity and purchasing back or leasing panels in a common installation (Coughlin et al. 2010). This avoids the financial and legal hurdles associated with running a business. Finally, individual customers may partner with non-profit organizations to develop a solar project. Under this model, raised donations are tax deductible (Coughlin et al. 2010).

2.2.7 Empowering Local Communities

The use of fossil fuels relies primarily on centralized energy systems combining the production of income streams with centralized decision-making authority (Gross and Bompard, 2004; Winner, 1982). The use of distributed renewable energy sources tends to move the decision-making authority related to electricity generation in the opposite direction – to local governments, authorities, communities, and neighborhoods. Local or community-based energy projects are an emerging and important subset of distributed generation (Farrell, 2011).

The development of community-owned energy, and solar projects in particular, can involve more active (Sauter and Watson, 2007) and effective participation by individuals and groups in energy decision-making (Walker and Devine-Wright, 2008). Shifting decision-making from reliance on centralized utilities to broader neighborhood, municipal, or community involvement can empower residents to more actively engage in choices regarding the delivery of energy to their homes or businesses, location of planned generation units, technical parameters of the generation, best models for project financing, and specific project developers. Local economies may also be stimulated through the purchase, installation, and maintenance of power generation technologies. With such localized transactions, financial resources can be recycled within the community or municipality, and communities can decide where and how these financial resources are invested. This process can create additional momentum for solar and other renewable energy technologies to compete more robustly as an option for local or neighborhood-based advanced energy services.

Local distributed renewable energy projects can offer numerous social[4] (Walker and Cass, 2007) and economic benefits (Farrell, 2010a) for communities while serving the nation's overall energy independence and security goals. According to the American Solar Energy Society, more than 9 million U.S. jobs were created in fields related to green energy industries in 2007. These included 450,000 jobs in renewable energy and 8 million jobs in energy efficiency (EESI, 2009). For communities, investment in green energy can translate directly into new local jobs, helping to boost economic opportunity and broader prosperity (NWSEED, 2011).

[4] Participation in community solar may involve social networking with other participants and promotion of individual efforts among the community.

CHAPTER 3
DELAWARE'S RENEWABLE ENERGY POLICIES

The following section describes legislation and initiatives pertinent to renewable energy development in Delaware.

3.1 Delaware Renewable Portfolio Standard

Delaware's Renewable Portfolio Standard (RPS) was enacted in 2005, with the Delaware Public Service Commission (PSC) adopting procedures to implement the RPS in PSC Order No. 6931 in 2006. Additional legislation has increased the state's RPS targets. The RPS applies to retail electricity sales to Delmarva Power & Light Company (DPL) customers. The exception is industrial customers with more than 1500 kW of peak load; they may exempt themselves from the RPS. The Delaware Electric Cooperative and municipal utilities may withdraw from the state's RPS upon developing their own equivalent to the standard. Benefits to Delaware from greater reliance on renewable energy include improved regional air quality and public health, increased electric supply diversity, new economic development opportunities, and protection against energy price volatility and supply disruption (26 Del. C. §354). Table 2 shows the progressively increasing targets for required generation from renewable sources under the Delaware RPS.

TABLE 2
Delaware RPS Energy Requirements

Compliance Year (beginning June 1)	Minimum Cumulative Percentage from Solar Photovoltaic Energy Resources	Minimum Cumulative Percentage from Eligible Energy Resources*
2007		2.00%
2008	0.011%	3.00%
2009	0.014%	4.00%
2010	0.018%	5.00%
2011	0.200%	7.00%
2012	0.400%	8.50%
2013	0.600%	10.00%
2014	0.800%	11.50%
2015	1.00%	13.00%
2016	1.25%	14.50%
2017	1.50%	16.00%
2018	1.75%	17.50%
2019	2.00%	19.00%
2020	2.25%	20.00%
2021	2.50%	21.00%
2022	2.75%	22.00%
2023	3.00%	23.00%
2024	3.25%	24.00%
2025	3.50%	25.00%
*Minimum Cumulative Percentage from Eligible Energy Resources includes the Minimum Cumulative Percentage from Solar Photovoltaics.		

Source: 26 Del. C. §354

The RPS required that Retail Electricity Suppliers derive a minimum of 0.011 percent of their retail electricity sales from solar PV (also known as a "solar carve-out") and a total of 1.5 percent of their retail electricity sales from Eligible Energy Resources for the RPS's 2008 compliance year. In 2011, these percentages increased to 0.20 percent and 7.00 percent, respectively. As Table 2 illustrates, the RPS will continue to gradually increase the required levels to a goal of 3.50 percent from PV and a total of 25.00 percent from Eligible Electricity Resources by 2025. Eligible Energy Resources under the RPS include solar PV, solar thermal, wind, tidal or current systems, geothermal technologies using steam turbines, fuel cells powered by renewables, and anaerobic digestion gases. Also eligible are hydroelectric facilities of 30 MW or less, biomass combustion using sustainably cultivated and harvested materials, and – with some restrictions – electricity generated via the combustion of methane gas in landfill recovery systems.

Retail Electricity Suppliers meet the RPS requirements by retiring Renewable Energy Credits (RECs) and Solar Renewable Energy Credits (SRECs). A REC is a tradable credit from the generation of 1 megawatt-hour (MWh) of electricity from Eligible Energy Resources. Generators must be certified by the PSC to be an Eligible Energy Resource and RECs from those Resources must be registered with the PJM EIS. Solar PV installations generate SRECs instead of RECs, and only SRECs are eligible to meet the solar carve-out.

If a Retail Electricity Supplier fails to retire sufficient RECs or SRECs to meet the specific requirements of a compliance year, it must pay an Alternative Compliance Payment (ACP) or Solar Alternative Compliance Payment (SACP) for each REC and SREC it failed to retire. The first year a Retail Electricity Supplier pays an ACP, it is charged $25 for each REC it failed to retire. The second consecutive year it fails to retire sufficient RECs, the ACP is increased to $50, and then $80 for the third consecutive compliance year. The SACP is similar to the ACP in function, though it has a higher value and is applicable when a Retail Electricity Supplier fails to retire an adequate number of SRECs. The SACP increases from $400 for the first, $450 for the second, and $500 for the third year of consecutive noncompliance.

Credit multipliers apply for certain renewable technologies. Customer-sited PV and fuel cells using renewable fuels are eligible for a 300 percent credit multiplier toward meeting the non-solar carve-out RPS requirements, provided the systems are installed before December 31, 2014 (PSC Order No. 7699). Wind energy installations sited in Delaware before December 31, 2012, are eligible for a 150 percent credit. Similarly, installations of offshore wind energy sited in Delaware before May 31, 2017, are eligible for a 350 percent credit. In 2010, the RPS law was amended to provide another credit: a 110 percent credit for wind and solar installations located in Delaware and installed with at least 75 percent state workforce or constructed with a minimum of 50 percent in-state manufactured components or equipment.

3.2 Renewable Energy Incentives in Delaware

Delaware's Green Energy Program, administered by the Department of Natural Resources and Environmental Control (DNREC), provides incentives for the installation of PV, solar water heating/thermal systems, wind, and geothermal heat pumps at homes and businesses in Delaware. Eligible technologies and incentives vary for each electric utility's territory (i.e., DPL, Delaware Electric Cooperative, and the nine municipal electric utilities in Delaware). Table 3 provides the current incentive levels for customers of DPL.

Another option for customers, regardless of utility territory, has included the Renewable Energy Relief Program, also administered by DNREC. The Relief Program aims to provide applicants access to an accelerated process for receiving grant payments for the installation of renewable energy systems. The

Relief Program utilizes funding from the American Recovery and Reinvestment Act (ARRA) to reduce customer wait times. In order to meet program eligibility, customers must engage a number of steps, including having an energy audit performed by a Sustainable Energy Utility-approved Home Performance with Energy Star-approved contractor (DNREC, 2011b). In November 2011, the ARRA Relief Program stopped accepting new applicants.

TABLE 3
New Green Energy Program Incentives for DPL Customers (Effective 12/10/2010)

	Residential	Non-Residential	Non-Profit
Photovoltaic (PV) & Wind*	($/watt)	($/watt)	($/watt)
0+ to 5 KW	$1.25	$1.25	$2.55
5+KW to 10KW	$0.75	$0.75	$1.50
10+KW to 50KW*	$0.35	$0.35	$0.70
Maximum Grant	$15,000.00	$24,000.00	$48,000.00
Solar Water Heating (SWH)	($/OG300 –KWHr Saved)	($/OG300 or PE1Calculated KWHr Saved)**	($/OG300 or PE1Calculated KWHr Saved)**
SWH Water Heater Only	$1.00	$1.00	$2.00
SWH Heating Integrated	$1.00	$1.00	$2.00
Maximum Grant	$5,000.00	$10,000.00	$10,000.00
Geothermal Heat Pumps	Residential	Non-Residential	Non-Profit
EER ≥18/COP≥3.6 First stage Load	($/ton)	($/ton)	($/ton)
First 2 tons	$800.00	$800.00	$1000.00
Over 2 Tons	$700.00	$700.00	$800.00
Maximum Grant	$5,000.00	$30,000.00	$30,000.00
*Requests for PV funding are limited to systems under 50 KW. Splitting of systems by meter or otherwise is not acceptable for funding. **PE1 = Licensed Delaware Professional Engineer required if the installed system is not OG-300 compliant.			

Source: DNREC, 2011a.

3.3 Delaware's Sustainable Energy Utility (SEU)

In 2007, the Delaware General Assembly passed legislation (29 Del. C. § 8059) authorizing the creation of the Sustainable Energy Utility (SEU). The SEU is a nonprofit entity seeking to expand opportunities for households and businesses in Delaware to utilize efficiency, conservation, and renewable resources to meet energy needs. The statutory goals for the SEU are to lower energy use among participants a total of 30 percent by 2015 and facilitate the installation of 300 MW of renewable energy in Delaware by 2019, with a corresponding 33 percent decrease in CO_2 emissions by 2020. The SEU began operations in 2009 and offers energy programs under the banner of "Energize Delaware." Renewable energy installations are an eligible measure under Energize Delaware's financing programs including the Efficiency Plus Business and Performance Contracting Programs (Energize Delaware, 2011b). The SEU also facilitates the installation of renewable energy through several non-incentive activities, including its statutory authority to bank SRECs for up to 10 years.

3.4 Net Metering and Virtual Net Metering in Delaware

More than 45 states and the District of Columbia have some type of net metering policy. Net metering is a mechanism allowing customers who host or own generators that operate in parallel with the electric grid, to export electricity to the grid during times when a customer is not consuming all of the electricity being produced by the generator. In general, net metering allows kWhs exported to the grid by a customer-generator to offset kWhs consumed by the customer. At the close of a billing cycle, if the customer-generator consumed more electricity than was exported to the grid, the customer pays the "net" consumption. However, if a customer exports more electricity to the grid than the customer consumes, that customer has net excess generation (NEG). Many states, including Delaware, allow customers to transfer the NEG to the next billing cycle to offset consumption in that cycle. All net metering policies have restrictions on the types and sizes of generation that are allowed to net meter.

Intermittent generators, such as solar and wind, particularly benefit from net metering since solar and wind generation do not typically match the exact consumption patterns of an individual customer. From a customer-generator's perspective, the primary benefit of net metering is to allow the customer to receive value from every kWh of generation. Utilities benefit from net metering by the diversification of the generation and the technologies, such as solar, that provide energy to the grid during times of peak demand.

Net metering policy in Delaware was established in 1999 as part of a larger electric utility restructuring law. Since then, Delaware's net metering law has been amended several times to:

- Widen the customer classes eligible for net metering;
- Increase the allowable size of generators;
- Redefine the types of renewable generation eligible for net metering;
- Expand net metering to all Delaware utilities; and,
- Change the technical requirements for the implementation of net metering.

The technologies currently eligible for net metering are PV, wind, hydroelectric, gas from anaerobic digestion, grid-integrated electric vehicles, and fuel cells. Delaware's law requires net metering systems to produce no more than 110 percent of the host customer's expected aggregate electrical consumption. The law also limits system size at 2 MW for non-residential DPL customers, 500 kW for non-residential Delaware Electric Co-op or municipal utility customers, 25 kW for all residential customers, and 100 kW for farm customers subject to residential rates. Utilities must install electricity meters that have the capacity to run in both directions for customers who wish to net meter. NEG is allowed to be carried forward indefinitely to the next billing. Customers may ask the utility for a payment for any NEG, at the supply service rate, at the end of an annualized billing period. Utilities may elect to disallow further net metering if net-metered systems account for more than 5 percent of the utility's aggregated customer capacity at peak demand (26 Del. C. §1014).

Delaware's net metering law was expanded again in July 2010, when Senate Bill 267 was enacted into law – allowing for customers to participate in VNM, meter aggregation, and group billing for community-owned energy generating facilities. The meter aggregation provision of the law provides an opportunity for farms and other customers with multiple electric meters/accounts to pool the accounts and have the generation of an eligible energy resource hosted on one of the meters/accounts to offset the consumption from the pooled meters/accounts, at the full retail rate. The VNM provision of the law allows for renewable energy generating facilities to have multiple owners or participants who share the output of a generator to offset, at the supply service rate, the consumption on their electric bills (26 Del. C. §1014). The group billing provision of the law allows utilities to opt out of virtual net metering and offer group billing, meaning the utility simply makes a payment to the generator-host instead of virtually net metering all of the participants/owners in the community energy generating facility.

CHAPTER 4
POLICY STRATEGIES FOR COMMUNITY SOLAR

Community solar is a distinct branch of community-scale renewable energy generation focused on solar PV generation. Defining characteristics of community-scale renewable energy include the following:

- Clean energy projects with two or more subscribers;
- Projects that are generally (but not exclusively) larger than those which can be financed by an individual, or which take advantage of site characteristics not readily available to individual onsite generation;
- Projects that involve communities and have a distinct economic impact therein; and,
- Projects that facilitate a transition towards energy independence for a community or community members (Morrigan, 2010; IREC, 2010a).

Community solar projects have been implemented in at least 10 states. As the economic and social benefits of the community solar model have become clearer, and as implementation methodologies diffuse, additional community projects are breaking ground. Community solar offers a number of distinct advantages over individually-owned and onsite solar installations. Community solar installations can offer optimal siting conditions (including the use of larger and less shaded areas, public land, and parking lots), reduced costs due to increased economies of scale, lower entry costs and financial risk, and the removal of home ownership as a barrier to owning or directly benefitting from solar installation (BEF, 2010).

Community-scale energy policies, and, therefore, community solar policies, vary from state to state. Some states, such as Massachusetts, broadly conceptualize the eligible participant community as any group of electricity customers within a contiguous utility service territory. In other states, such as Colorado, community ownership is limited by county boundaries.[5] Still others, such as California, have narrow and explicit policies limiting community solar installations to participants in a single multifamily structure (IREC, 2010a). The physical (size and location) and financial design of an installation is tied to the policy determination of eligible participants.

Net-metering is a pre-requisite condition for the financial viability of most models for community solar projects. With the goal of alleviating certain constraints which limit net-metering benefits to customers able to host onsite generation, a number of states, including Delaware, have enacted or are in the process of passing legislation that expands and enhances net metering. The following sections outline the three primary modes of net-metering expansion/enhancement strategies currently in use: meter aggregation, virtual net metering, and group billing.

4.1 Meter Aggregation

Meter aggregation policies refer to a strategy that permits customers with multiple accounts/meters on a single contiguous property, to aggregate their accounts/meters on one bill. No physical/electrical connection between the meters is required. This aggregation allows for the generation from a solar

[5] This strategy is an effort to ensure that community solar projects will be located in close proximity to the communities they serve. Another goal is to avoid speculation on locating a project on inexpensive land far from urban and town centers, and therefore, failing to mitigate peak demand at load centers and incurring transmission, as well as distribution, costs.

installation on one of the aggregated accounts/meters to offset the consumption of all the aggregated accounts/meters. For example, metering aggregation would allow a farmer with multiple buildings with different meters to erect a single large solar installation and count the aggregate consumption of multiple buildings toward the farmer's meter with the solar installation. Without meter aggregation, such customers would be limited to smaller installations (possibly incurring higher costs) that will only offset a small portion of the customer's overall consumption.

Meter aggregation is most applicable to commercial structures with multiple meters (such as shopping malls), farms with multiple points of consumption, and schools, municipalities, and other governmental customers with multiple accounts. Rhode Island's meter aggregation law, for example, only permits meter aggregation for cities, towns, schools, and farms with multiple buildings, as well as non-profit affordable housing units (Varnado and Rose, 2009). Rules and regulations for meter aggregation are usually the same as for traditional net metering. The administrative burden of meter aggregation to the utility is minimal as the number of customers eligible for meter aggregation is limited.

States with meter aggregation laws include Oregon, Rhode Island, Delaware, and Washington. Limits on the capacities eligible for meter aggregation vary by state and by customer class, from 25 kW for residential customers in Oregon, up to 3.5 MW for installations owned by city and municipal customers in Rhode Island (Varnado and Rose, 2009).

4.2 Virtual Net Metering

Virtual net metering (VNM), sometimes referred to as virtual net energy metering, takes meter aggregation one step further by allowing two or more customers (instead of one) to combine the consumption from two or more accounts/meters to offset the generation from a net-metering eligible facility (Varnado and Rose, 2009). The general goal of VNM is to approximate the billing that a customer would receive under standard net metering. An effective VNM policy allows a non-host participant to capture the same economic benefit of solar ownership as if the solar installation was located at their home or business. The policy advantage of VNM over meter aggregation is that all customers are eligible to participate.

Similar to meter aggregation, VNM is a policy strategy that lowers installation costs, optimizes solar array placement, and permits the owners to physically disassociate generation meters from consumption meters, maintaining only an administrative and financial relationship between the two. Policies for VNM have been implemented in California, Massachusetts, Maine, Colorado, and Delaware, and are being explored by the District of Columbia, Maryland, and a number of other states. Pennsylvania allows a hybrid "virtual meter aggregation" policy, essentially VNM within a two-mile radius (Varnado and Rose, 2009).

Rules for the administration of VNM are generally commensurate with standard net metering rules. However, the "netting" process may differ under VNM because the customer who hosts a renewable generator may be many miles distant from the community project's participants whose electric bills are being offset by the generator. VNM involves two primary options in sharing the output of a generator. Under the first, all generation from the community project is divided among participants regardless of the consumption of the customer hosting the generator (i.e., all participants are considered non-host customers). Such scenarios include a stand-alone generator (e.g., a ground-mounted system and no load associated with the generator) or where a meter measures all the output of the generator and the host customer's bill is not directly netted by the generation. Under the second, the NEG of the customer hosting the generator is shared among non-host participants on a monthly or annual basis.

States tend to differ on the value of a kWh credit applied to non-host customers' bills. Some states value the kWh credits for non-host customers at the full retail rate while other states exclude distribution charges from the credit because of the distance (geographically and electrically) between non-host participants and the generator.

Establishing the billing system for VNM requires some initial administrative legwork, particularly as the number of customers per installation increases. Policymakers may be sympathetic to utility claims that changes to their billing system to accommodate VNM will be expensive. Group or joint billing is a policy designed to address that concern.

4.3 Group/Joint Billing

Unlike VNM or meter aggregation, which are managed exclusively by the utility, customers participating in a group billing system must select a third party to conduct billing and net-metering credit apportionment. The utility's role in group billing is to cut a check to the community generator for kWhs that flowed to the distribution system.

Delaware's community net metering law allows the utility to opt out of VNM and have the community installations use group billing instead. Vermont is the only state that relies entirely on group billing and its form of group billing, called joint billing. It requires that each participant or meter be physically wired to the central meter, incurring additional installation costs (IREC, 2010b). An unlimited number of customers may participate in a joint billing system (geographically limited to a contiguous service territory), not to exceed 250 kW capacity, and participants receive credits valued at the full retail rate of electricity minus program charges (IREC, 2010b).

Group billing has yet to be proven a successful means of administering net metering for community solar, and may add significant expenses to a community solar project. Utility administration of VNM has several benefits including that, from a customer's perspective, it most closely matches standard net metering. The Interstate Renewable Energy Council also notes that "use of a utility administrator avoids creditworthiness concerns that might be associated with a third-party customer representative handling collection of participants' utility bills" (IREC, 2010b: 6).

CHAPTER 5
CASE STUDIES

Compared to RPS and net metering policies, community solar is still in its early stages of policy development and only a handful of states have experience with community solar policies. These community solar policies have addressed a particular set of goals and different visions of what community solar can accomplish. The following state case studies – Colorado, California, Maine, Massachusetts, and Vermont – reflect this variety.

5.1 Colorado

Colorado enacted its "Community Solar Gardens" law in 2010. This law allows for the establishment of community solar projects owned and operated by either a non-profit or for-profit company with the sole purpose of owning or operating a Solar Garden (HB-1342, 2010).

The Solar Gardens law is limited to customers of Colorado's IOUs – Xcel Energy and Black Hills Corporation. Participants in Solar Gardens must be located in the same county as the solar project, although certain exemptions allow smaller counties to band together (HB-1342, 2010). All customer classes are eligible to participate, but 5 percent of an IOU's Solar Gardens are required to be reserved for residential customers at or below 185 percent of the current federal poverty level, which may require the creation of low-income specific Solar Gardens and/or the creation of a low-income set-aside by each IOU (CO PUC, 2011).

Each Solar Garden requires at least 10 members to participate. Prior to reaching the 10-member minimum, Solar Garden developers will be paid at the utility's avoided cost rate (Martindale, 2011). After the developer reaches the 10-member minimum, the IOU is required to purchase unsold shares of the projects's electricity generation at the utility's wholesale rate instead of the net metering rate (HB-1341, 2010). Individual shares in any system must be larger than 1 kW, with the size of the entire project limited to 2 MW. Customers are prohibited from purchasing shares that offset more than 120 percent of the customer's consumption (HB-1341, 2010). Customers can retain ownership of their portion of a Solar Garden even if they move from their current residence or business, as long as they move within the same IOU territory and county as the solar project. Alternatively, customers are permitted to sell their share of a Solar Garden at any time, with transference fees limited to no more than 1 percent of the value of the subscription (HB-1341, 2010).

The net metering rate for residential customers invested in Solar Gardens will be the respective total aggregate retail rate charged to each customer (i.e., the standard net metering rate). Commercial Solar Garden rates will be determined by dividing all electric charges – including demand charges – by the total kWhs provided in a given year (CO PUC, 2011). While net metering applicable to Solar Gardens has been designed to mimic standard net metering for residential and commercial customer classes, IOUs will be permitted to charge an additional fee, at their discretion, to cover the integration and administration of Solar Gardens (CO PUC, 2011). This fee, which has yet to be set (Martindale, 2011), will make net metering under a Solar Garden net metering regime less economically attractive than standard net metering. The Colorado Public Utilities Commission (CO PUC) finalized rules for Solar Gardens in September 2011.

5.2 California

California's VNM program is comprised of two initiatives aimed at providing renewable energy to low-income multifamily housing tenants in California. These initiatives are the Multifamily Affordable Solar Housing (MASH) program and the New Solar Homes Partnership (NSHP).

In October 2008, the California Public Utilities Commission (CA PUC) established MASH as part of the California Solar Initiative (CSI). VNM was included as a component of the larger initiative to allow electric generation from a single installation to be credited to multiple tenants in a building, without requiring physical connection of the meters (CA PUC, 2008). The MASH program is unique in that it is exclusively focused on providing solar incentives to low-income residential customers and affordable housing projects. The program is a result of a CA PUC decision and subsequent California state legislation, both requiring 10 percent of CSI funds to be directed toward low-income customers and affordable housing (CA PUC, 2008).

Beyond MASH, VNM opportunities are extended to new multifamily affordable housing projects through the NSHP – a 10-year, $400 million program to promote solar in new homes by working with builders and developers to incorporate solar and energy efficiency. While NSHP covers market-rate and affordable housing for single-family and multifamily housing, only multifamily affordable housing projects are eligible for the VNM component (DSIRE, 2010b). The NSHP defines "new" as multifamily affordable housing projects with occupancy permits less than two years. California's VNM policy defines low-income residential housing as housing that receives public financing such as tax credits, bonds, loans, and grants and provides reduced rent or housing in which at least 20 percent of the units are owned or rented by low-income households (PG&E, 2009).

In general, California's VNM eligibility specifications are guided by the state's net metering policy and tariffs submitted by the state's three IOUs: 1.) Pacific Gas and Electric (PG&E), 2.) Southern California Edison (SCE) and 3.) San Diego Gas and Electric (SDGE) (DSIRE, 2010a; PG&E, 2009b; SCE, 2009; SDGE, 2009)[6]. The state's VNM policy allows systems up to 1 MW in capacity, with no limit on the number of participants (PG&E, 2009). However, the multifamily housing eligibility criteria serves as a de facto limit on participants; the number of participants is capped by the number of residents in any given multifamily housing project. The IOUs are allowed to end VNM at the first occurrence of the following criteria: equaling 3.5 percent of an IOU's peak demand; reaching the date of December 31, 2015; or arriving at the point that all program funds have been allocated (PG&E, 2009).

California's VNM establishes three different account types for each VNM system: 1.) Generator; 2.) Common Area; and 3.) Residential Unit Accounts. Generator Accounts represent the account where the solar installation is interconnected. These accounts can have any loads associated with the generating system itself. If the VNM system is comprised of more than one solar generator, all generators must be interconnected through the Generator Account. Common Area Accounts represent load-only shared/common areas such as laundry rooms, hallways, elevators, and other common-use spaces. Residential Unit Accounts are load-only accounts for units in the housing facility (PG&E, 2009).

[6] Because all three IOU tariffs are generally similar, PG&E's tariffs will be assumed to be representative of all IOU tariffs unless specified otherwise.

The VNM generation is distributed by first calculating the annual solar energy credit (ASEC) as read on the generation meter. The owner of the solar installation then determines the percentage of the ASEC that will be allocated to Common Area Accounts and Residential Unit Accounts (PG&E, 2009: 5). The ASEC allocation percentages are proportional to the relative size of each unit and are calculated in the same way that rents in affordable housing units are determined. These solar allocation percentages (SA%) remain fixed for at least five years, after which they may be modified once every 12 months. Customers are then classified as consumers or producers of energy during each billing cycle (PG&E, 2009) and the equations shown in Table 4 are used to determine total usage or production of electricity.

TABLE 4
Net Consumption and Production Based on Solar Allocation Percentages

Net Production = (SA% x solar generator(s) output) – customer usage
Net Consumption = Customer usage – (SA% x solar generator(s) output)

Source: Recreated from PG&E, 2009

Common Area and Residential Unit Accounts are billed for electricity used per a normal bill while the Generator Accounts are paid for excess generation based on the corresponding energy tier of equivalent kWh usage. If utilities provide co-energy metering, time-of-use rate schedules can be incorporated into consumption and production rates (DSIRE, 2010a).

All budgeted funds for the MASH Program were allocated in 2011, and a long waiting list currently exists. The CA PUC has postponed further funding cycles to reassess the program (CA PUC, 2011). Tracking for NSHP VNM interconnected systems has not begun because the program is relatively new and few, if any systems, have been interconnected.

5.3 Maine

Enacted in July 2009, Maine's "shared ownership facilities" law obligates the state's IOUs to offer VNM to community solar systems up to 100 kW (Maine Public Utilities Commission [ME PUC], 2009a: 8). A shared ownership facility is an "eligible facility in which more than one customer has ownership interest" (ME PUC, 2009b: 4). These facilities are limited to no more than 10 customer-owners (ME PUC, 2009c: 7). Maine allows shared ownership between any customers – residential and/or commercial – as long as they are served by the same utility. Additionally, since shared ownership is a form of VNM, no physical connection is required (Tannenbaum, 2010b). Finally, there are no eligibility restrictions between traditional net metering and shared ownership net metering; if one may net-meter, one may also virtually net-meter. While no individuals were participating in the program at the end of 2010, applications were in progress (Tannenbaum, 2010a, 2010b).

5.4 Massachusetts

Massachusetts enacted the Green Communities Act on July 2, 2008 (Massachusetts [MA] Session Laws, 2008). In addition to establishing community solar, the law also increased the size of eligible systems for net metering from 60 kW to 2 MW (Executive Office of Energy and Environmental Affairs, 2010). The Green Communities Act has been characterized as "the most expansive community solar program using virtual net metering" (Coughlin et al. 2010: 21).

Community solar in Massachusetts was originally conceived as “neighborhood net metering.” This concept was born through informal discussions between legislators who wanted to give neighbors the opportunity to enter together into solar ownership. Although the language of neighborhood net metering was included in the Green Communities Act, the VNM law is actually more comprehensive. In order to preserve economies of scale and encourage more participation, Massachusetts’ legislators allowed for a second form of VNM, which permits the virtual transference of net metering credits to any customer within the same ISO-NE load zone (Bingham, 2010a).

Neighborhood net metering, although the original inspiration for the program, is more restrictive and less flexible than the alternative VNM provision. Neighborhood net metering contractually requires 10 or more participants (Code of MA, 2008). The alternative form of VNM includes neither a participant minimum or maximum. Under both policies, the solar installation is required to be sited behind a participating customer’s meter. However, the law is written so that even parasitic load from solar generation qualifies as sufficient load and solar facilities will not be required to be sited at a home or business, and may be sited to maximize the solar resource, rather than the host load (Coughlin et al. 2010: 21). Under either policy, beneficiaries do not have to be physically connected to the generating facility, and the net metering rate received is that of the host customers (Bingham, 2010a). Both residential and commercial customers can participate in VNM. The state’s IOUs are obligated to offer VNM while municipal utilities are not, but the latter may do so voluntarily (Massachusetts Department of Energy Resources [DOER]), 2010).

The Green Communities Act created three classes of net-metered generation:

- Class I includes any generating electricity, not classified as a transmission facility, with a capacity of 60 kW or less;
- Class II facilities range from 60 kW to 1 MW and include agricultural, wind, and solar net-metering facilities; and,
- Class III facilities include agricultural, solar, and wind net-metered facilities between 1 MW and 2 MW (Code of MA, 2008: 3).

Customers are allowed to generate as much electricity as their systems will allow, as long as they are sized under the 2 MW limit. The customer receives the most benefit if the system is sized to their load, instead of attempting to exploit economies of scale. This is because energy-offsetting load is valued at a one-to-one basis. In other words, the customer receives the full retail value of the energy generated, since one unit of energy generated offsets one unit of energy imported. When systems are sized larger than their load requirement, any excess energy generated creates a credit for each excess unit. Customers can either roll credits forward or distribute them to other accounts (virtually net meter). The value of a credit is less than the full retail kWh value; therefore, the value of each kWh generated begins to diminish at the point where the system size exceeds the requirements of the onsite load.

The value of the credit for net-metered and VNM customers depends on their rate schedule and the class of their net-metered facility, as demonstrated in Table 5 (DOER, 2010). VNM and community solar in Massachusetts have yet to achieve wide participation. However, community solar projects in Falmouth and Brewster are in the early stages of project development (MyGenerationEnergy, 2011).

TABLE 5
Value of NEG in Net Metering Calculation in Massachusetts

Rates	Units	Class I	Class I- Wind, PV, Ag.	Class II	Class III	Neighborhood Net Metering
Customer Charge	$/month					
Delivery Distribution Charge	¢/kWh		✓	✓	*	
Transmission Charge	¢/kWh		✓	✓	✓	✓
Transition Charge	¢/kWh		✓	✓	✓	✓
System Benefit Charge	¢/kWh					
Efficiency Charge	¢/kWh		✓			
Renewables Charge	¢/kWh					
Supply: Basic Service	¢/kWh		✓	✓	✓	✓
Generation: Average Monthly Clearing Price at the ISO-NE	¢/kWh	✓				
* Only applies to Class III municipalities and governmental entities						

Source: DOER, 2010

5.5 Vermont

Vermont employs a system known alternatively as either "group net metering" (GNM) (DSIRE, 2010c; Vermont Statutes, 2010) or "joint billing" (IREC, 2010c). For purposes of this report, this policy will be referred to hereafter as GNM, with the understanding that the terms are used interchangeably in the field. GNM allows multiple, individually-metered customers to buy into a renewable energy generating system as shareholders. However, unlike meter aggregation, GNM requires that a physical connection exist between participating customer meters. Additionally, under Vermont law, the utility does not apportion net metering benefits to participants, but pays net-metering benefits to a single intermediary managing an aggregate meter to which participants' sub-meters are physically tied. Such an arrangement reduces administrative oversight and costs to the utility, but increases the burden on participants to designate a customer representative. According to IREC, "joint billing is probably the most complex [community net metering policy] to implement" (IREC, 2010d).

Vermont's GNM law has boosted the system size that can receive net metering benefits to 250 kW. Project participants must be customers of the same utility and are geographically restricted to a small area, as all sub-meters must be physically tied to the aggregate meter. Thus, while not a requirement of GNM law, participants are likely to occupy contiguous properties. No minimum requirement or maximum limit exists on the number of participants within the restrictions of the system size (IREC, 2010c). Net-metered generation capacity for the individual system remains the same as standard net metering, at no more than 100 percent above annual consumption within a 12-month period (Vermont Statutes: Title 20, Ch. 5, Section 219(3)). Utilities may offer further incentives at their discretion, such as the Solar Green Mountain Program offered by Green Mountain Power to its customers at an additional $0.06 per kWh for each kWh produced (both kWh consumed and excess generation) in addition to net metering benefits (DSIRE, 2010).

At the time of this report, a comprehensive level of implementation, along with detailed system descriptions, additional costs, and firsthand participant or administrator evaluations of the group billing policy were unavailable. Conversations with representatives from the Central Vermont Public Service (the largest electric utility provider in the state) and the Vermont Department of Public Service as undertaken for this report have indicated that there are participants taking advantage of group net metering policies, but additional and specific information was unavailable (Dodd, 2010).

5.6 University Park, Maryland

While Maryland lacks VNM, GNM, or any comprehensive community solar policy, it is one of the few states that can boast a community solar project with multiple citizen-owners. A 22 kW PV installation located on the Church of the Brethren in University Park, Maryland, is owned by local community members (Coughlin et al. 2010). The church serves as the installation host and energy consumer, but does not have an ownership stake in the solar array itself. Instead, it purchases electricity from the solar installation through a purchased power agreement (PPA) with the University Park Community Solar LLC – a small company formed by community members for the express purpose of implementing the project (Brosch, 2011). This arrangement circumvents the need for VNM legislation by allowing the LLC to administer the allocation of solar revenues to its members. However, members have expressed the hope that future VNM legislation might simplify the process (Brosch, 2011).

The LLC structure of the project was key in both establishing a PPA with the church and for enabling members to take the 30 percent solar federal tax credit. Given that the residential version of the tax credit could not be gained through purchase of an offsite installation, taking the business federal tax credit as a small business and passing the savings to its members was the most viable option available to the University Park LLC (Brosch, 2011). Yet this financial structure introduced a complex issue of securities compliance and finding an alternative to filing with the Securities and Exchange Commission (SEC) was imperative to avoid making the project uneconomic for LLC members. With the aid of extensive legal consultation and an $11,000 grant, members were able to develop a structure that qualified for a securities exemption (Brosch, 2011). To address the SEC issues, LLC members needed to be Maryland residents at the time of attaining membership.[7] In order to avoid full securities registration with the State of Maryland, the LLC was limited to 35 non-wealthy investors – each of which was required to fill out 10-page financial disclosure forms – and was prohibited from advertising except by word of mouth (Farrell, 2010a). The LLC also has been careful to avoid mentioning financial investment on its official website (Brosch, 2011).

Due to these constraints, projects similar to University Park's may be somewhat difficult to replicate in the U.S. The cost of initial legal consultation alone, for example, is likely to provide a significant barrier for interested citizens who lack experience in community solar project initiation. These constraints exist in every state, even with the existence of VNM or GNM legislation, because constraints are created by limitations of the federal residential tax credit law, which has currently entrenched the LLC model as the go-to model for multi-owner community solar projects.

Not to be deterred, the LLC members are currently considering creating a second LLC, which will initiate a second community-owned solar project (Brosch, 2011). And through communication with the Maryland Securities Commissioner, the LLC may be able to attain a new securities exemption, which would allow them to include approximately 100-125 members for future projects (Brosch, 2011). Willingness by the State of Maryland to work with the LLC is a positive sign that open communication and engagement by community solar developers may help reduce barriers to community solar in other states.

[7] Interestingly, members are not required to stay in the state after joining the LLC. In fact, one LLC founding member now lives in Seattle (Brosch, 2011).

CHAPTER 6
ANALYSIS AND RECOMMENDATIONS

The following sections provide general observations on the structure or performance of the community solar policies reviewed in the case studies. Recommendations are then offered for Delaware based on these observations and specific conditions found in Delaware.

6.1 Analysis of Case Studies

6.1.1 Virtual Net Metering vs. Group Net Metering, Meter Aggregation, and Group Billing

Because of the requirement to have meters physically interconnected, GNM is cumbersome and complex, and deployment of GNM is expensive, geographically limited, and demands a high degree of coordination and cooperation among neighboring customers to develop projects. Of the states that have enacted community solar legislation, only Vermont is using GNM. Although GNM establishes a foundation for community solar, it does so in a much more limiting way than VNM.

Meter aggregation addresses a similar need to GNM – the ability for customers with multiple meters, like farms or campuses, to offset the generation from one meter – but is a better policy because it does not have GNM's requirement for meters to be physically interconnected. However, meter aggregation has a limited capacity to facilitate the expansion of community solar since it is limited to customers with multiple meters/accounts.

Group billing is an attractive option for policymakers as it avoids the issue of administrative burden to utilities. While group billing offers the flexibility for community projects to develop as its participants see fit, the burden of responsibility for all aspects of the group billing arrangement rests upon the initiative of customers rather than utilities or regulatory agencies. Furthermore, the complexity and expense of a third party establishing a billing system, creditworthiness concerns that might be associated with a third-party customer representative handling collection of participants' utility bills (IREC, 2010b), and the lack of clear established procedures for group billing projects will present hurdles to the broad deployment of group billing. Another issue for group billing is that a check from the utility (instead of receiving a credit on a utility bill) is likely to be considered taxable income for participants in a community energy project. For these reasons, community solar programs based on group billing are likely to remain more limited in size and scope than programs based on VNM.

VNM seems to be a superior way to administer a community solar program because utilities have significant experience with complex billing systems and with administering complex energy programs. From the consumer's perspective, VNM seems more like owning a rooftop solar system that directly lowers their consumption vs. receiving a check from the utility, as is done in group billing. Unlike meter aggregation or GNM, VNM is not inherently subject to geographic limitations and it divides responsibilities for project initiation and management more evenly among the customer, developer, and utility.

6.1.2 Program Maximums and Minimums

Several states with community solar policies have included requirements relating to the number of participants in a community solar project. The 10-member minimum (enacted by Colorado and

Massachusetts) incentivizes project developers to create systems large enough for wide participation and to capture economies of scale. While a participant minimum seems to send the correct signal, such minimums may prove somewhat cumbersome for a developer to meet from the first day of operation. On the other hand, a 10-member maximum – enacted in Maine – sends precisely the wrong signal by limiting the ability of developers to construct projects that capture economies of scale, thereby removing one of the primary advantages of community solar.

Colorado's 10-member minimum also exacerbates a flaw in the Solar Gardens law. Solar Garden developers can only finance projects using their own capital or debt and are prohibited from selling shares prior to completion of construction (Martindale, 2011). Once built, but prior to reaching the 10-member minimum, project developers will be paid only the avoided cost of power by the IOU. Even after the 10-member minimum is met, additional unsold portions of the project's generation must be sold to the utility at the wholesale rate, rather than the retail rate (HB-1342, 2010; Martindale, 2011). Thus, the combination of the restrictions on project financing using customer proceeds and the lower rate paid by the utility for solar generation for projects without 10 participants or complete subscription, adds considerable risk to developing a Solar Garden and/or means that a developer has to develop projects in stages to reduce their financial risk (Martindale, 2011).

6.1.3 Geographic/Locational Requirements and Eligibility of Distribution Charges in Credits

Among the justifications for standard net metering are the benefits it brings to a utility's distribution system. A customer that is consuming less energy, because a generator is offsetting its consumption, will generally use less of, and thus put less stress upon, a utility's distribution system than a similarly-situated customer without self-generation. Net-metered distributed generation, that operates in parallel to the grid and feeds energy into the distribution system, can also benefit the distribution system because the energy flowing into the distribution grid is consumed by nearby customers and the distribution system is used less than if the electricity was being delivered from a centralized power plant. Solar energy can be particularly beneficial to the distribution system because it tends to inject energy into the grid during times of high usage or peak demand.

Because the participants/meters are located in close proximity to the generator-host, meter aggregation and GNM are very similar to standard metering in regards to the impact and use of the distribution system. In the case studies above, the states using meter aggregation and GNM applied credits to non-host participants' bills at the full retail rate as is done in their standard net metering policy. Similarly, Delaware's community net metering law recognizes that participants on the same distribution circuit as the generator-host have reduced impacts on and use of the distribution system and are thus treated the same as standard metering customers, in terms of bill crediting.

Some states – such as Colorado and Massachusetts – have included provisions in their community solar programs that limit the distance between participants and the community solar project installation. In Colorado, Solar Garden subscribers must live in the same county as the Solar Garden installation (though there are exemptions for smaller counties). In Massachusetts, participants in a community solar project must live in the same New England Independent System Operator (NE-ISO) load zone as the solar installation (Bingham, 2010a; HB-1342, 2010). Since Massachusetts has only three NE-ISO load zones (FERC, 2011), the burden of this restriction is negligible. Other states, including Delaware, require that all participants in a community solar project be located within one utility's service territory. The primary purpose of this requirement is to avoid the complexity of coordinating VNM among two or more utilities. In

Colorado, which has 64 counties of varying sizes and shapes (U.S. Census, 2011), the use of counties to ensure proximity between a Solar Garden installation and its participants seems to be a fairly blunt instrument.

The case studies indicate that community energy policies developed thus far have made a linkage between the crediting of distribution charges and the proximity of participants to a community energy facility. Colorado and California have made this linkage through restrictive policies, confining community net metering to small geographic units or limiting the types of customers eligible. Research and data are lacking to make a clear case at what distance between a participant and community energy facility does it change from a benefit to a burden to the distribution system. To further complicate this issue, a community energy facility's impact on the distribution grid may be less dependent on the distance between the facility and its participants and more about the distance between a facility and a source of sufficient load that will consume the energy flowing from the facility. While this issue is further explored and refined in the development of community energy policy, Delaware's law may be a good interim solution in its differentiation between participants who are in the same distribution feeder as the facility and those who are not.

6.1.4 Administration of Community Energy Programs

As community solar programs grow in size and complexity, the administrative burden on utilities may increase. Making changes to utility billing software can also be a difficult task and policymakers may be sympathetic to utility claims about the expense of accommodating VNM in their billing system. In Massachusetts, utilities have been reluctant to support community solar because of the administrative burden of manually transferring credits from one account to another (Roughan and Feraci, 2010). In contrast, Colorado utilities have been supportive of the Solar Garden program because utilities are allowed to assess a fee – which has yet to be set – to cover their administrative and distribution costs (Martindale, 2011).

Legitimate utility concerns about administrative burdens should be taken into account in the development of community energy policies. However, utilities that object to community energy projects on the basis of administrative burden need to clearly demonstrate that burden. Sometimes, the administrative burdens are short-term. In Massachusetts, for example, utilities faced challenges in correctly allocating credits to participants' accounts in the early stages of VNM, but those problems have been resolved (Bingham, 2010b). Other options are available to lessen administrative burdens. For example, many states are in the process of installing advanced metering infrastructure (AMI)/smart meters and part of AMI includes new billing systems to accommodate the advanced functions (e.g., dynamic pricing) of smart meters. Delaying the implementation of VNM until billing software is updated for AMI should lessen any administrative burden. Another option is to delay the start of VNM, to allow utilities to make necessary changes to their billing systems, and allow group billing, which is less administratively burdensome, in the interim.

6.1.5 Potential Conflict with Installers Serving the Residential Solar Market

Several states profiled in the case studies have experienced conflicts between the solar installers that serve small customers and installers that serve larger (i.e., commercial and utility) customers over policies related to their states' RPS and other incentives. This conflict might occur if community solar projects in a particular state are mostly large installations (i.e., commercial-scale) and crowd-out residential projects in fulfilling a utility's RPS obligations.

Colorado has attempted to mitigate this potential conflict by instituting a cap on the amount of community solar that can be used to meet the distributed generation (DG) carve-out portion of the RPS. In Colorado, community solar is treated exactly the same as residential solar for the purposes of the RPS obligation (Farrell, 2010b). This means that Colorado's 3 percent DG carve-out and the 1.5 percent onsite DG carve-out can be partially met through community solar – with the amount limited to 20 percent of the total DG carve-out and 40 percent of the onsite DG carve-out (Farrell, 2010b). Even with the caps, the ability of community solar to fulfill the DG carve-out has been controversial because if community solar becomes the first choice of utilities, the remaining DG carve-out available to the residential solar market will be significantly reduced (Farrell, 2010b). On the other hand, there are concerns that the Community Solar Gardens law does not sufficiently incentivize community solar projects and Colorado's IOUs will fail to meet any portion of their RPS obligation through community solar (Martindale, 2011).

6.1.6 Importance of Strong Net Metering Laws

Strong net metering laws are a prerequisite for effective community solar legislation. The states of Colorado, California, Maine, Massachusetts, and Vermont each has a net metering program rated "B" or above by Freeing the Grid 2010, with Colorado's net metering program rated as "number one" in the country for the second year in a row (Rose et al. 2010). Furthermore, Massachusetts strengthened its net metering provisions in the same law that established community solar in the state, raising the system-size cap from 60 kW to 2 MW (EOEEA, 2010).

In many ways, community solar programs can be seen simply as an expansion of net metering. Community solar programs allow more equitable access to net metering programs by all ratepayers; renters and shaded property owners are no longer excluded from participation. This means, however, that the strength of each state's community solar program will be dependent on the state's ability to pass and maintain strong net metering laws as well.

6.1.7 Legislation Does Not Equal Participation

Despite the efforts of each of the states profiled in this report, community solar remains limited in the scope of its adoption. This is partly due to the newness of community solar legislation, but it also reflects that some early adopters (e.g., Maine, Massachusetts, and Vermont) of community solar have flawed, complex, and burdensome laws. Another issue is the 30 percent residential federal investment tax credit. This tax credit is only available for solar installations on the first or second home property – offsite installations are ineligible for the tax credit. Due to this provision of the federal law, community solar developers have been forced to structure themselves as a for-profit entity in order to claim the 30 percent business federal tax credit, which is not restricted to onsite installations (Energy Star, 2011).

The University Park project is notable because it was established in a state without a community solar policy and shows that community solar may be viable in other states without policies (Farrell, 2010b). However, the University Park model faces a significant challenge regarding compliance with securities law. Community solar models that allow for true ownership of a solar project by multiple owners need to structure as a for-profit company (see tax credit issue above). This structure creates the potential need for the issuance of a security that cost hundreds of thousands of dollars, completely eliminating any cost advantage of community solar. Furthermore, even SEC exemptions that avoid this cost are extremely restrictive (Farrell, 2010b).

6.2 Recommendations for Delaware

The following section includes policy and related recommendations for Delaware in light of the general trends identified above alongside specific conditions within the First State. In particular, several of the recommendations offered below respond to rules established or clarified by the PSC in Order No. 7984 (dated June 7, 2011); its Section 8 addresses the process for establishing and operating community energy generating facilities.

6.2.1 Fixes to Community Energy Rules

PSC Order 7984 puts forward rules that govern the establishment, location, and financial benefits of community energy generating facilities. The following minor issues, as part of those rules, merit attention. Section 8.6.4 contains the rules for meter aggregation that require a customer to provide full information and intent to subscribe at least 90 days before construction begins. Since the 90 days requirement is before construction, customers have less flexibility to change plans prior to and during construction. A more reasonable requirement might be 90 days before the installation is operational. Section 8.7.1 requires that an eligible community of subscribers must include customers "sharing a unique set of interests." This language is ambiguous and could benefit from greater clarification or elimination. For Sections 8.4 and 8.5, it is conceivable that a community energy facility could share the NEG of the facility but the overall production of the facility is under 110 percent of its load. In this case, a community energy project would have an identical impact on the distribution system as a standard net metering system but would have the distribution charge subtracted from the kWh credit. Sections 8.4.3 and 8.5.5 allow the utility to opt out of VNM and conduct group billing instead. As discussed in 6.1.1 above, there are complexities and challenges to group billing and customers would be better served by elimination of the group billing option. Changes to the regulations or the underlying law could assist the development and diffusion of community energy generating facilities within the state.

6.2.2 Incentivizing Array Location Based on Local Load and Local Marginal Pricing

Section 8.4 of PSC Order 7984 establishes the rules for customers within the same distribution feeder area to receive the full retail rate (supply and delivery rates), while subscribers outside of the facility's distribution feeder area are compensated only at the supply rate. It may be worth exploring possibilities for a solar installation's location on the grid to be the determination for whether distribution charges are included in the credit, rather than whether or not a customer is located on the same distribution feeder as the community generation facility. For example, if a community solar project is sited in a field 5 miles away from its owners/subscribers, and the local load on the distribution system is negligible, then the distribution charge should be subtracted from the kWh credit. In a scenario where a community solar project is located on a brown field adjacent to a factory 50 miles away from its owners/subscribers and the local load is five times higher than expected PV production that flows to the distribution system, then the distribution charge should not be subtracted from the kWh credit. In other words, the critical factor should not be the distance between the consumption meter and the generation meter, but the distance between the generating facility and the sources of local load, which would consume the facility's energy flowing onto the distribution. If sufficient local load exists in close proximity to the facility, no additional burden is placed on the distribution grid, and subscribers to the community facility should not be penalized. However, utilities' capacity to identify areas of the distribution system that would most benefit from solar is limited. This capacity may improve over the next several years as the smart grid becomes a reality and utilities have better data on the functioning of the distribution system.

6.2.3 Navigating the Issue of Securities Exemptions

As noted above in 6.1.7, the promising model of University Park faces roadblocks by federal tax laws, SEC rules, and state securities rules. Fixes to federal laws could help advance this model. Legislation that allows residential taxpayers to claim the 30 percent federal tax credit as an owner of an offsite community energy project could open the door to securities-exempt nonprofit community solar organizational structures. Laws or rulings that create a securities exemption option specifically for community solar projects could also help advance the University Park model. Furthermore, legislation or rulemaking by Delaware's state regulatory bodies on this issue could be helpful to community solar project developers.

6.2.4 Boosting Consumer Awareness: Information Campaigns and Targeted Marketing

To support Delaware's community solar policies, enhanced efforts to boost consumer awareness of such options may be desirable. The lack of consumer knowledge about the benefits of solar energy and community solar initiatives, in particular, could impede consumers to develop or join such projects. Customers are accustomed to relatively "passive" forms of electricity service, i.e., signing up for conventional electricity service with local utilities, rather than actively developing or joining renewable energy projects in which ownership or output is shared.

Guidance on how to start a PV project – including planning tips, potential ownership models including community models, financial opportunities and costs, lists of certified solar developers, summaries of federal and state incentives, etc. – should be disseminated through numerous channels, in order to reach the broadest possible audience. From traditional media (newspapers, television, and radio) to websites and new social networking platforms, targeted marketing can increase statewide awareness and interest in community solar projects and address information gaps for communities considering a community solar project. In other words, greater publicity and education can help support the functioning of a viable solar market in the state, and thereby, ensure that community solar achieves the greatest possible impact.

CHAPTER 7
CONCLUSION

States and local governments have developed a growing number of policies to diversify energy systems. Community solar projects, as one such policy, appeals to consumers seeking to achieve more predictable energy prices alongside greater community independence and autonomy within larger energy markets. Such benefits only add to the environmental gains to be achieved from greater reliance on renewable energy resources, in particular for air and water quality and for reduced contributions to climate change.

The state policies and case studies profiled in this report illustrate the dynamic character of emerging policies and programs for community solar as well as the diversity of outcomes sought from community solar policies. As community solar policy continues to emerge and evolve, further analysis should help to inform new decision making and planning for even greater effectiveness in crafting energy markets and power systems that respond to ever-changing customer demands and technological innovation.

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