COMMUNITY NET ENERGY METERING: HOW NOVEL POLICIES EXPAND BENEFITS OF NET METERING TO NON-GENERATORS

Laurel Varnado
North Carolina Solar Center
North Carolina State University, Box 7401
Raleigh, NC 27695-7401
E-mail: lavarnad@ncsu.edu

James Rose
Network for New Energy Choices
215 Lexington Ave. Suite 1001
New York, NY 10016
E-mail: james@newenergychoices.org

ABSTRACT

As interest in community solutions to renewable energy grows, more states are beginning to develop policies that encourage properties with more than one meter to install shared renewable energy systems. State net metering policies are evolving to allow the aggregation of multiple meters on a customer's property and to dissolve conventional geographical boundaries. This trend means net metering is expanding out of its traditional function as an enabling incentive to offset onsite customer load at a single facility. This paper analyzes community net energy metering (CNEM) as an emerging vehicle by which farmers, neighborhoods, and municipalities may more easily finance and reap the benefits of renewable energy. Specifically, it aims to compare and contrast the definition of geographical boundaries among different CNEM models and examine the benefits and limitations of each approach. As state policies begin to stretch the geographic boundaries of net metering, they allow inventive solutions to encourage renewable energy investment. This paper attempts to initiate the conversation on this emerging policy mechanism and offers recommendations for further development of these policies.

1. INTRODUCTION

In the traditional sense, net metering is an incentive that allows customer-generators the ability to use their solar (or other renewable) electric system on-site to reduce all or part of their annual electric load. Any excess energy is fed back into the grid as a credit to offset energy used when the onsite system is producing fewer kilowatt-hours (kWh) than required onsite. In recent years, states have been experimenting with variations of net metering regulations. Some states are beginning to develop policies that encourage properties with more than one meter, such as farms, neighborhoods and commercial properties, to install shared renewable energy systems. This paper analyzes community net energy metering (CNEM) as an emerging vehicle by which these various entities may more easily finance and reap the benefits of renewable energy.

States that are creating or have implemented CNEM programs have different terminologies that reflect the nature of the policy. Aggregate net metering generally refers to a single net metering facility whereby the credits will be applied to all metered accounts located on a single property or contiguous properties. In another form of CNEM, Massachusetts's neighborhood net metering applies to "a geographic area including and limited to a unique community of interests that is recognized as such by residents of such area and which, in addition to residential and undeveloped properties, may encompass commercial properties."[1] Virtual Net Energy Metering (VNEM) accounts net metering credits, which are then applied against the customers' accounts at a predetermined percentage. Finally, municipal utilities have taken initiatives to offer their customers shares in a single large solar facility and gain credits based on the size of the share and the facility's output.

These policies are beginning to allow geographical boundaries for net metering to disappear, thereby changing net metering from a mechanism to offset an individual customer's onsite load into something more akin to an investment tool. A single renewable energy system can take advantage of economies of scale, while promoting wider access to customers that may not have the space or renewable resources to exploit on their property. The various definitions of CNEM will be evaluated noting the

benefits and limitations of each approach, including the potential financial, administrative and environmental benefits arising from these policies.

2. METER AGGREGATION

Meter Aggregation refers to the combination of meters for the purpose of applying net metering credits for all accounts on, or in some cases near, a customer-generator's property. States that currently allow net metering for multiple, aggregated meters include, but are not limited to, Oregon, Washington and Rhode Island. This type of policy was traditionally designed for contiguous properties, however some states have expanded their policies to include single customers with non-contiguous properties. This tends to blur the line between meter aggregation and VNEM, therefore some of the policies discussed in this section could also be considered to be virtual net metering.

In Washington, meter aggregation means the "administrative combination of readings from and billing for all meters, regardless of the rate class, on premises owned or leased by a single customer-generator located within the service territory of a single electric utility." [2] In other words, meters of different rate classes may be aggregated and excess kWh credits earned by the renewable system are credited equally to remaining meters on the properties, at the designated rate of each meter. In the policy's regulation, there is no specification that 'premises' owned by a single customer must be contiguous properties. A customer, regardless of rate class, may aggregate up to 100 kilowatts (kW) of renewable facilities.

In Oregon, meter aggregation is allowed for renewable energy facilities located on a single customer-generator's property, or contiguous properties (only in the service territory of Pacific Gas and Electric or PacifiCorp), for the purpose of offsetting on-site energy use.[3] All meters must take service under the same rate class and the customer-generator may designate the rank order for the additional meters to which net metering credits are to be applied. Residential customers may aggregate up to 25 kW and facilities on non-residential rate classes may aggregate up to 2 MW.

Under a 2008 energy bill (HB 7809A), Rhode Island also allows meter aggregation for cities, towns, schools and farms with multiple buildings.[4] Farms may aggregate renewable facilities on either a tract of land contiguous with the farmland or across a public way from the customer-generator's property. Under this same energy bill, non-profit affordable housing units are also allowed to net meter residential units taking electric service either in the same building or "within one-half mile radius from the renewable energy source."[5] Both of these policies also border on VNEM. Customers may aggregate up to 3.5 MW for systems owned by cities, towns or the Narragansett Bay Commission; 2.25 MW for systems sited on land owned by the city or town that provide power to the city or town; or, 1.65 MW for remaining customers. Credits can be applied for up to five accounts. [6]

3. COMMUNITY NET ENERGY METERING

CNEM allows multiple customers with properties that may not necessarily be geographically contiguous to share a portion of net metering credits. This method of net metering provides various means for customers to invest in renewable energy that may or may not be located on their property. Customers, who may not have ideal renewable resources, can still take advantage net metering if they have a neighbor who does have access to ample sun or wind. Vermont is expanding its group net metering; originally an aggregate net metering regulation, to include noncontiguous properties if determined by the Public Service Board (PSB) to promote the general good. [7] Massachusetts is in the process of implementing the Green Communities Act, which allowed for neighborhood net metering among residents in the same electric service territory.[8]

Group and 'farm system' net metering in Vermont were a set of regulations that were primarily intended to allow multiple meters on a single or contiguous properties to aggregate and apply net metering credit to the collective account. Group net metering also allowed municipalities to aggregate accounts on non-contiguous properties.[9] Proposed rules issued to comply with S.B. 209, which was passed in March 2008, consolidated farm systems and group net metering into one group net metering definition. Under the proposed rules, a group net metering arrangement can aggregate multiple electric accounts for applying net metering credits as long as they are within the same electric service territory.[10]

Vermont's neighbor, Massachusetts, is developing a form of CNEM called 'neighborhood net metering'. Established in the Green Communities Act, neighborhood net metering is defined as a facility that "is owned by, or serves the energy needs of, a group of 10 or more residential customers that resides in a single neighborhood and is served by a single distribution company" and which is located in that same neighborhood.[11] Proposed regulations by the Department of Public Utilities (DPU) limit the boundary of a neighborhood to a municipality, but does include a clause that would allow exemptions on a case-by-case basis. Third party ownership is not explicitly addressed, but the proposed rules seem to indicate that if a third party is a "host customer" it could serve the needs of

10 or more residential customers under the definition of "Neighborhood Net Metering Facility." However, the DPU's proposed rules seem to give the electric distribution company the ability to allocate neighborhood net metering credits only to customers who have an "ownership interest" in the facility.[12] If the proposed rules are not further clarified, utility tariffs could potentially exclude third party owners.

The DPU's proposed net metering rules also change the method for calculating credits associated with excess generation for most net metering facilities (less than or equal to 1MW). Net metering customers would be allowed to allocate net metering credits to other customers of the distribution company.[13] This provision appears to allow a similar benefit as in neighborhood net metering, but to a smaller group of customers.

It is also unclear at this point, as to what affect Massachusetts's policy will have on the state's regular net metering. The current limit of net metering is 1% of each utility's peak load.[14] A neighborhood net metering facility could take the form of a MW-sized wind turbine that may face siting and permitting issues. Any delays with these large facilities could trickle down to typical residential net metering applications if they happened to be further down the applicant interconnection queue. In addition, a large number of MW sized facilities could quickly reach the 1% cap.

4. VIRTUAL NET ENERGY METERING

Similar to CNEM, VNEM aggregates customer accounts that may or may not be contiguous. Energy is generated at a facility where the production is recorded for calculating credit. The net metering credit is then applied to customer's bills at a predetermined percentage. Since there is a possibility that no energy from the facility will be used onsite before being exported to the distribution grid, the net metering occurs in a virtual manner.

In California, the concept of VNEM is being implemented for the Multifamily Affordable Solar Housing (MASH) Program as a part of the California Solar Initiative. VNEM allows kWh credits to offset electricity consumed from the grid in the same manner as true net metering; however, the generation device does not need to be located behind each customer's meter. Under the MASH program's VNEM scenario, a solar generator will send power to the utility via a meter that records the output for measuring kWh credits in 15-minute increments. The owner of the building will determine the percentage of credits each tenet will receive based on the relative size of the unit, consistent with how the rents are established. The common area account is also eligible for a percentage of the credits. The owner will provide the credit allocation information to the utility for billing purposes and the percentages will be fixed for a period of five years.[15]
VNEM is only available to participants in the MASH Program, but further investigation is being conducted as to whether apartment complexes or multi-tenant commercial properties, such as shopping malls, will be able to take advantage of VNEM.[16] The MASH program, in addition to VNEM, offers a rebate for the PV system where the portion of output that offsets Common Area Load receive $3.30 per watt and the portion of output that offsets Tenant Area Load receives $4.00 per watt. [17]

Another California CNEM initiative, AB 2466 that was signed into law in 2008, allows municipalities to install a solar energy system and apply excess generation against charges on other accounts owned, operated, or controlled by the municipality. This form of CNEM will apply to projects that are 1 megawatt (MW) in size or smaller.[18]

Pennsylvania also allows virtual meter aggregation in that meters must be located within two miles of a customer-generator's property. While this provision is available to all customers, it can be particularly beneficial to farmers. As farm commodities are becoming more susceptible to price volatility, farmers are diversifying their types of operations in an attempt to reduce the financial risks of a single commodity venture. Through meter aggregation a farmer could, for example, net meter renewable systems attached to a hog facility, chicken house, irrigation system, or other type of process located on different, nearby properties. This allows them to take advantage of the energy resources produced onsite to reduce their electric bills and hedge against rising energy costs.[19]

5. UTILITY INITIATIVES IN SHARED-OWNERSHIP NET METERING

Due to their structure and purpose, utilities are in a unique position to offer community-based net metering solutions to their customers. Utilities often already have the administrative, technical and financial systems to install and manage a large solar project. Below are a few examples of some innovative utility-initiated projects that allow customers to invest into their renewable energy needs.

In Washington State, the City of Ellensburg Municipal Utility installed the first community solar project in the nation, a 36 kW system with another 20.8 kW under construction. The project currently has 73 investors which have contributed a minimum of $250 (some over $11,000), which allows them to receive a credit on their electric bill, proportionate to their investment, for 20 years.[20]

The City of St. George Energy Services Department in Utah has built a large solar photovoltaic (PV) facility allowing residents to get solar power through SunSmart, a community solar farm. Customers must own property in the service territory of St. George and contribute $3,000 to $24,000 to the project. In return, the customers receive monthly credits on their electric bills for the "pro-rata share" of the net electrical output of the SunSmart Project for the initial commercial life of the project, estimated to be nineteen years.[21]

Sacramento Municipal Utility District's (SMUD) SolarShares Program operates a 1 MW system. "For a fixed monthly price based on a customer's usage, the SolarShares pilot program gives a credit on your bill every month for solar power produced on a local 'solar farm.'" With SolarShares, the fixed monthly fees to participate start at $10.75 per month for a 0.5kW share. After the monthly fee is paid, the amount of power generated by the customer's share shows as a credit on the customer's bill—expected to average $4 a month.[22]

Los Angeles Department of Water and Power (LADWP) is also about to launch the SunShares program as part of a long term solar power plan. SunShares will allow residential customers to purchase shares of an LADWP solar power plant. In return for their shares, customers will receive their "dividend" through credits on their monthly energy bills. The goal of SunShares is to install 100 MW of solar systems by 2020, which is part of the larger LADWP program goal of installing 1.3 Gigawatts.[23]

It is important to note that the projects mentioned here are all derived from municipal utilities. To date, the authors are not aware of any cooperative or investor-owned projects similar to these. Now that investor-owned utilities have the added benefit of being able to claim the investment tax credit for renewable energy investments, they could soon be considering similar programs.[24]

6. DISCUSSION

After a glimpse at the types of policies being considered and implemented, it is possible to draw a few conclusions as to what types of advantages—above and beyond those associated with traditional net metering options—CNEM policies can offer. These advantages include an expansion of financial applications, taking advantage of economies of scale, administrative simplification and environmental benefits.

6.1 Financial Benefits

By expanding the borders of net metering, CNEM and VNEM could increase the availability of renewable energy to more customers and expand the pool of potential system owners. Businesses or residences interested in pursuing renewable energy may currently face space constraints, shaded properties, or restrictive covenants, which prohibit ideal placement of renewable energy systems and therefore preclude the opportunity to participate in net metering. In addition, larger systems are cheaper per watt to install, at the right price and incentive structure, so a shared system could offer a quicker rate of return on the community's collective investment.

These policies also increase the number of participants in the financial chain, thus boosting the project's overall impact on the local economy. These policies would create opportunities for new business models that allow companies to sell 'community-based' solar products to retail customers. They would also carve out a place for third parties to act as a bridge between the utility and system owners, while also facilitating billing, operations and maintenance of the system. The landowner of the property where the system is placed could also participate in the financial chain by leasing space to the community or aggregator.

Meter aggregation in several states allows farmers and other customers to invest more capital in their energy future and take better advantage of onsite resources. By allowing net metering for a combination of diverse systems (that produce energy through varying ways and at different times of the day), a farmer or other business could offset a greater portion of his or her energy use. In energy-intensive operations, this could translate into increased profit and more secure economic footing for the organization.

Virtual net metering could offer municipalities, condominiums, shopping complexes and other organizations the added benefit of increased visibility for marketing and public relations purposes. With increased environmental awareness factoring into consumer choice, added to the current economic recession, environmental responsibility could play a large part in the success or failure of an organization.

6.2 Administrative Simplification

Increasing administrative efficiency also works to the financial benefit of an organization by decreasing person-hours needed and increasing operational effectiveness. Community and virtual net metering can help ease the administrative burden on utilities and private sector companies. Facing greater customer interest in net metering, utilities may be able to see an advantage in community systems in that they would only process one

interconnection request for many customers as opposed to many individual requests. If the utility works through a third party, billing issues could also be simplified by working directly with the third party as opposed to many shared-system owners on an individual basis. Third party investors could also realize an administrative benefit to community systems. While commercial, large-scale third-party arrangements have been implemented across the country with relative success, third-party arrangements for residential customers has yet to really take off as a viable business plan. Community-owned systems could allow third-party companies to break into the residential market by decreasing the number and location of systems and increasing the profitability of system management.

6.3 Environmental Advantages

Environmental benefits, mainly in the form of reduced emissions, can also be readily seen in shared and aggregated systems. Meter aggregation allows farmers with biodigesters to decrease the amount of polluting waste by-products that can be associated with farm operations.

Investor owned utility programs, akin to SMUD's SolarShares, could help utilities meet their RPS goals while allowing customers to invest in solar. As these policies are developed, renewable energy credit (REC) ownership should be addressed, whereby the REC remains with the entity that investing in the project. If a group of customers are paying the capital costs associated with the facility, such as the Ellensburg or St. George examples, they should receive the RECs generated from that portion of the facility. If the utility or a third-party are the owners of the system, they should be the entities that receive the RECs. Utilities can ensure RPS compliance and begin to offset the need to build additional, conventional generation facilities with added renewable forms of generation.

Because these policies are so new, more advantages could present themselves over time, due to changes in the structure of third-party ownership options; net metering and interconnection regulation; financing options and incentives; and federal and state regulation of carbon emissions.

7. THE FUTURE OF CNEM

As trailblazing states like Vermont, Massachusetts and California clear paths in CNEM policy structure, other states are likely to follow. For example, as of the writing of this paper, Illinois has pending legislation that would allow meter aggregation and the Virginia legislature is considering a bill to allow community net metering. Interestingly, Colorado's Renewable Energy Standard currently allows kWh credits from community-based projects (defined as projects up to 30 MW, owned by individual residents of a community, a local nonprofit organization, a cooperative, a local government entity, or a tribal council) to be counted at 150% of their actual value for electric cooperatives' and eligible municipal utilities' RES compliance purposes.[25]

Despite the early promise of innovative states' work, however, CNEM faces several challenges ahead. One of the major challenges will be in determining a legal definition of 'community.' Organizational and billing responsibilities will be complex for these projects so project participants may find it easier to turn to an outside party to work through these issues with the utility. Another challenge these projects face will be at the regulatory level, in determining whether or not third parties will be subject to state jurisdiction. The rate structure and customer class involvement could also affect the economics of a project either positively or negatively. Additionally, for VNEM projects, utilities may request compensation for use of their distribution lines, if power wheeling becomes a point of contention. There are certainly ways around all of these challenges. To the issue of wheeling power for example, proposed rules in Massachusetts specify that credits for large-scale projects will not contain the distribution portion of the kWh credit. As states work through these issues however, policymakers will begin to have examples to turn to, which they can adapt for their own purposes.

Considering the challenges and opportunities that CNEM faces, improved technology could be a big factor in determining success. Smart grid and advanced metering infrastructure could make CNEM, VNEM and Meter Aggregation much simpler to accommodate. Plug and play technology will allow interconnections to happen more quickly and safely. The adoption of digital, real-time communication could help automate complex billing issues for utilities, making them easier to administer. Utility-operated community solar investment programs could also be on the rise, as they require less up-front capital for the utility and could possibly help contribute toward RPS compliance requirements. Real-time pricing could also help realize solar energy's true value.

Based on early experience, we offer some recommendations to increase the implementation and feasibility of community-based renewable energy projects, when revising or adopting net metering and/or interconnection rules:

1. Expand the definition of system owner, in net metering and interconnection policies, to include third parties, groups of individuals and businesses, municipalities, and other groups that could

constitute or provide renewable energy to a community.
2. Create a set-aside for community projects either within, or in addition to, the aggregate net metering participation cap.
3. Increase the eligible system size limit for community systems, or set no limit.
4. Value community systems at a higher rate for RPS compliance purposes.
5. Pass through financial benefits to all owner-members of a community project.
6. Initiate CNEM by exploring virtual net metering options for low-income housing and then expand the policy to commercial applications.
7. Explore meter aggregation policies, especially in those states that are agriculturally endowed, as a way to help farmers take advantage of renewable resources.
8. Deploy smart meter technology in conjunction with community systems.
9. Educate state regulatory bodies about CNEM regulations, since they will most likely be tasked with creating rules for customer-based projects.
10. Develop a long term, transparent incentive program that will foster the adoption of community-based projects.

While it is unclear at this time what these policies will eventually look like in several years, it is certain that an increasing number of states will initiate the discussion on community-based solutions to renewable energy investments.

8. REFERENCES

(1) The Green Communities Act. G.L. c. 164, § 138 http://www.mass.gov/legis/laws/seslaw08/sl080169.htm
(2) DSIRE, Washington – Net Metering, May 1, 2008 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=WA01R&state=WA&CurrentPageID=1&RE=1&EE=1
(3) Or. Admin. R. 860-039: http://apps.puc.state.or.us/orders/2007ords/07-319.pdf
(4) DSIRE, Rhode Island – Net Metering, January 16, 2009 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=RI01R&state=RI&CurrentPageID=1&RE=1&EE=1
(5) Segal, Rice, Lewiss, Kennedy, and Gallison, H.B. 7809A, Renewable Energy Standard, July 5, 2008: http://www.rilin.state.ri.us/billtext08/housetext08/h7809aaa.htm
(6) DSIRE, Rhode Island – Net Metering, January 16, 2009 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=RI01R&state=RI&CurrentPageID=1&RE=1&EE=1
(7) Vermont Public Service Board, PSB Rule 5.100 – Relating to Net Metering (Proposed Rules), 2008 http://www.state.vt.us/psb/rules/proposed/5100/2008amdrule.pdf
(8) Collins, S., Agenda and Topics for Technical Conference To Be Held on October 30, 2008 and Clarification of Filing Requirements, Massachusetts Department of Public Utilities, October 17, 2008 http://www.mass.gov/Eoeea/docs/dpu/gas/08-75/101708nttcnag.pdf
(9)Vermont Public Service Board, PSB Rule 5.100 – Relating to Net Metering, November 1, 2007 http://www.state.vt.us/psb/rules/proposed/5100/5100adopterule2007.pdf
(10) Vermont Public Service Board, PSB Rule 5.100 – Relating to Net Metering (Proposed Rules), 2008 http://www.state.vt.us/psb/rules/proposed/5100/2008amdrule.pdf
(11) The Green Communities Act. G.L. c. 164, § 138 http://www.mass.gov/legis/laws/seslaw08/sl080169.htm
(12) Massachusetts D.P.U. 08-75. Order Instituting a Rulemaking Proceeding 220 C.M.R. 18.00 Proposed Regulations. Attachment A. March 6, 2009. http://www.mass.gov/Eoeea/docs/dpu/gas/08-75/3609dpucmr18.pdf
(13) Ibid.
(14) DSIRE, Massachusetts - Net Metering, July 16, 2008 http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=MA01R&state=MA&CurrentPageID=1&RE=1&EE=1
(15) Hirsch, Harold, Virtual Net Metering (VNM) for Multifamily Affordable Solar Housing–or –How one solar array can provide Net Energy Metering to many individually metered, low income/affordable housing electric customers, Presentation for the California Public Utilities Commission Workshop, 505 Van Ness Avenue, Golden Gate Room, San Francisco, CA, January 8, 2009
(16) Interstate Renewable Energy Council, California PUC Allows Virtual Net Metering for MASH Program, Connecting to the Grid News, November 17, 2008 http://irecusa.org/index.php?id=56&tx_ttnews%5Btt_news%5D=1256&cHash=a2998334db
(17) Hirsch, Harold, Virtual Net Metering (VNM) for Multifamily Affordable Solar Housing–or –How one solar array can provide Net Energy Metering to many individually metered, low income/affordable housing electric customers, Presentation for the California Public Utilities Commission Workshop, 505 Van Ness Avenue, Golden Gate Room, San Francisco, CA, January 8, 2009
(18) Laird, J., AB 2466, Laird. Local government renewable energy self-generation program, Signed into California law, September 28, 2008

http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_2451-2500/ab_2466_bill_20080928_chaptered.html
(19) DSIRE, Pennsylvania - Net Metering, December 15, 2008
http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=PA03R&state=PA&CurrentPageID=1&RE=1&EE=1
(20) Nystedt, Gary, City of Ellensburg's Energy Services Division, personal conversation, November 3, 2008.
(21) City of St. George, Utah, SunSmart Purchase Agreement http://www.sgsunsmart.com/index.htm
(22) Sacramento Municipal Utility District, SolarShares http://www.smud.org/en/community-environment/solar/pages/solarshares.aspx
(23) Villaraigosa, Antonio (Mayor), Press Release, Mayor Villaraigosa Unveils Largest Solar Power Plan in America, November 28, 2008
http://mayor.lacity.org/villaraigosaplan/EnergyandEnvironment/ClimateChange/LACITY_004983.htm
(24) DSIRE, Business Energy Investment Tax Credit (ITC), February 18, 2009
http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US02F&State=federal&currentpageid=1&ee=1&re=1
(25) DSIRE, Renewable Energy Standard (Colorado), May 29, 2008
http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CO24R&state=CO&CurrentPageID=1&RE=1&EE=1