The Vermont Legislative Research Service

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Renewable Energy Incentive Policies

As more households and businesses install renewable energy systems and begin taking part in net metering (NEM), Vermont will continue inching towards filling its 15% peak demand cap. Vermont is projected to reach its cap by 2019.[1] Additionally, in order to reach the Comprehensive Energy Plan's goal of being 90% renewable by 2050, Vermont will want to explore ways to incentivize homeowners and businesses to install renewable energy systems.[2] Thus, this report will discuss actions that other states have taken to accommodate increased energy flows through net metering and net metering alternatives.

What is Net Metering?

The power generated by a building's renewable energy system is allocated to the energy needs of the building. Any extra power that is generated by a renewable energy system that is not used by the home or commercial building is fed back into the electric grid of the building's utility meter. The power that is fed back into the grid acts as credit that is used on cloudy days when the renewable energy system is not generating enough energy to meet the energy needs of the building.[3] Thus, net metering is a financial incentive for homeowners and businesses to install renewable energy systems.

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[1] J. Heeter, Gelman, R., and Bird, L., "Status of Net Metering: Assessing the Potential to Reach Program Caps, National Renewable Energy Laboratory," NREL/TP-6A20-61858, Golden, Colorado, U.S. Department of Energy, September, 2014, accessed April 20, 2015, http://www.nrel.gov/docs/fy14osti/61858.pdf.

[2] "State Renewable Energy Goals," Public Service Department, January 1, 2015, accessed April 20, 2015. http://publicservice.vermont.gov/topics/renewable_energy/state_goals.

[3] "Vermont Solar Consumer Guide: Solar Photovoltaic," Renewable Energy Vermont, January 1, 2015, accessed April 17, 2015. http://www.revermont.org/main/go-renewable/photovoltaic/.

Peak Demand and the 15% Cap

The state of Vermont defines peak demand as "the highest monthly peak reported in either the electric company's FERC [Federal Electric Reporting Commission]...or the electric company's Electric Annual Report to the Vermont Department of Public Service for the Year."[4] In other words, peak demand refers to the maximum amount of energy that could possibly be needed at one time from a specific utility company. Thus, Vermont's 15% of peak demand cap refers to the maximum amount of excess energy sent back into the grid for which that a utility company will reimburse a resident.

Act 99, which increased the net metering cap, also demanded that the Public Service Board redesign the net metering program for 2017. Act 99 required the Public Service Department to create a report explaining new net metering programs in October 2014, which was most recently updated November 14, 2014.[5] This report recognizes the rapid growth of net metering in Vermont during the last seven years, by comparing the annual number of net metering applications with the annual number of net metering permits granted. The report also discusses some net metering programs that other states have adopted. In considering redesigning Vermont's net metering program the Public Service Board ultimately concludes that "...there is no 'one size fits all' policy framework that can simply be adopted. Instead, the design of future programs must begin with a critical review of the pertinent issues relevant to Vermont."[6]

History of and Current Net Metering in Vermont: Percent Peak by Capacity

Vermont has a net-metering system regulated by the Standard Offer law. The system guarantees owners of renewable energy facilities a specific price for their power (19 cents per kilowatt hour [kWh] in Vermont). This requires the electric utility that the renewable system is connected to, to buy all the excess power generated by the renewable system until the state regulated cap is reached.[7] This state mandate is outlined in H.56 Vermont

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[4] Vermont Public Service Board, *Regulations Pertaining to Construction and Operation of Net Metering Systems for the Purchase and Sale of Electricity from Small Electrical Generating Systems to and from Electric Companies*, April 15, 2009, accessed May 1, 2015, http://www.state.vt.us/psb/rules/OfficialAdoptedRules/5100adoptedrule_2.pdf.

[5] "Gov. Signs 'net Metering' Economic Development Bill," State of Vermont, April 1, 2014, accessed April 30, 2015, http://governor.vermont.gov/newsroom-net-metering-bill-signing.

[6] Vermont Public Service Board, "Evaluation of Net Metering in Vermont Conducted Pursuant to Act 99 of 2014," November 7, 2014, accessed April 30, 2014, http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Net_Metering/Act%2099%20NM%20Study%20Revised%20v1.pdf.

[7] "Vermont: State Profile and Energy Estimates," U.S. Energy Information Administration, December 18, 2013, accessed April 17, 2015, http://www.eia.gov/state/analysis.cfm?sid=VT.

Energy Act of 2011; this provision was passed with the support of the state's largest electricity provider, Green Mountain Power.[8]

An electrical customer has the ability to net meter in Vermont once the customer has been granted a Certificate of Public Good. The maximum size of a system that Vermont allows for net metering is 500 kilowatt (kW) for photovoltaic, wind turbines, anaerobic digestion of agricultural products, by-products or waste, biomass, and fuel cells.[9] Vermont's net metering program also allows for virtual net metering, which is a type of community solar program that allows customers to purchase solar panels from a large, existing array of panels not located on their homes or buildings. The program allows these customers to reap the same benefits of net metering even though the source of renewable energy is not on their property.[10]

Utilities provide net metering services to customers on a first come, first serve basis. Vermont regulates net metering based on percent of peak capacity. In Vermont, peak capacity is calculated with respect to the inverter capacity of a system, which is lower than installed capacity. The inverter capacity is the maximum watts of energy the system has the ability to convert from solar generated power to usable energy for the building. Therefore, considering inverter capacity allows for more systems to participate in net metering compared to if installed capacity was considered. In Vermont, utilities must allow net metering up to 15% of the utility's peak capacity. This regulated percentage was increased from 4% (42 megawatts [MW]) to the current 15% (156 MW) with the enactment of Act 99 in 2014.[11] If the total amount of energy produced by the utility's net metering customers exceeds 15% of the peak capacity of the individual utility, then the utility is not obligated to credit the customer for the excess energy generation. Vermont has the second highest net metering cap in the country, behind Utah at 20%.[12] Additionally, with the enactment of Act 99, the payback for each kW decreased from 20 cents to 19 cents (this payback rate represents the highest residential rate). After the first 10 years of solar credit the payback per kW hour will be calculated based on the blended rate, not the highest residential rate.[13] The blended rate is calculated by the total electricity cost divided by the total kWh used during a defined period of time, incorporating factors such as facility and demand charges into the kWh rate of electricity.[14]

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[8] "Vermont Solar Consumer Guide: Solar Photovoltaic," Renewable Energy Vermont, January 1, 2015, accessed April 17, 2015. http://www.revermont.org/main/go-renewable/photovoltaic/.
[9] "Net Metering," Public Service Department, January 1, 2015, accessed April 17, 2015, http://publicservice.vermont.gov/topics/renewable_energy/net_metering.
[10] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."
[11] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."
[12] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."
[13] Public Service Department, "Evaluation of Net Metering in Vermont Conducted Pursuant to Act 99 of 2014."
[14] "Glossary of Energy and Efficiency Related Terms," Energy Smart Program, 2015, accessed May 6, 2015, http://www.mienergysmart.com/glossary.html.

From 2011-2013 Vermont saw an increase of net metering generation from 12 MW to 36 MW. Though this number tripled in a two year period it still only accounts for 1% of the total electricity used in Vermont each year.[15] Previously when the state's peak demand cap was at 4% Vermont was filling 92% of that allowance. The enactment of Act 99 increased Vermont's net metering cap from 4% of peak demand to 15% peak demand. As of September 2014 Vermont had filled less than this 25% of megawatt allowance established by the 15% peak demand cap. Projections by National Renewable Energy Laboratory estimate that Vermont will reach the 15% cap in 2019.[16] If this cap is reached net metering customers will not be entitled to the entirety of the payout for the extra energy their systems are producing, and therefore will not be reaping the full benefits from their utility companies for their investment in renewable energy. A utility is required to notify their net metering customers if their 15% peak capacity cap is reached, but Vermont legislation does not specify what type of notification is required.[17]

Alternative Net Metering Options

As of August 2014, 44 states have net metering legislation, of which "25 (57%) have some type of restriction, 16 (37%) place no restriction on the aggregate capacity, and 3 (7%) have notification or 'trigger' policies."[18]

Fixed Megawatt (MW) Cap: Maryland and New Hampshire

Maryland and New Hampshire have both established caps based on a fixed number of MW. Maryland caps net metering at 1500 MW and New Hampshire caps net metering at 50 MW.[19] New Hampshire specifically calculates its 50 MW cap by multiplying statewide cap by utility's share of "total 2010 annual coincident peak energy demand."[20] "Total annual coincident peak energy demand," is the baseline that the 50 MW cap is measured against.[21]

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[15] Kathryn Flagg, "Too Much of a Good Thing? Inside Vermont's Solar Standoff," *Seven Days,* October 9, 2013, accessed April 17, 2015, http://www.sevendaysvt.com/vermont/too-much-of-a-good-thing-inside-vermonts-solar-standoff/Content?oid=2266298.
[16] Heeter, J, et al. Status of Net Metering: "Assessing the Potential to Reach Program Caps."
[17] Heeter, J, et al. Status of Net Metering: "Assessing the Potential to Reach Program Caps."
[18] Heeter, J, et al. Status of Net Metering: "Assessing the Potential to Reach Program Caps."
[19] Heeter, J, et al. Status of Net Metering: "Assessing the Potential to Reach Program Caps."
[20] Stephen Eckberg, New Hampshire PUC- Sustainable Energy Division, "New Hampshire Policies Supporting Distributed Generation," December 15, 2014, accessed April 17, 2015, http://www.iso-ne.com/static-assets/documents/2014/12/nh_dgfwg_presentation_121515.pdf.
[21] Eckberg, "New Hampshire Policies Supporting Distributed Generation."

Currently, New Hampshire has a system capacity limit of 1 MW and an aggregate capacity limit of 50 MW.[22] Net Excess Generation is credited to the customer's next bill and carried forward indefinitely.[23] Installing rooftop solar has been growing as a business in New Hampshire, and has become so popular that New Hampshire has nearly exceeded the number of customers legally permitted to sell their excess electricity back to the grid.[24]

This led State Senator Donna Soucy to introduce Senate Bill 117 in March, proposing for the cap to double to 100 MW. However, after hearing the concerns of the utilities, Soucy added an amendment, ultimately removing the increased cap.[25] According to the New Hampshire Union, the Bill "no longer requires doubling the net metering allowance in the state, but only calls for further study of the issue," and "eliminates many of the criteria that have been in place regarding the construction of solar projects by utilities."[26] According to the director of governmental affairs for Eversource, a utility like Eversource "does not like expanding net metering" because customers with solar arrays are dodging their share of the distribution costs.[27]

Maryland has a current aggregate limit of 1,500 MW. This limit represents approximately 10 percent of the peak demand, which in 2014 was 15,000 MW. As of June 30, 2014, the level of installed capacity is 9.6 percent of the current limit, and the rate of installation does not indicate that the cap will be approached in the near future. The Maryland General Assembly was considering legislation that would have established Community Renewable Energy Generation systems, but the legislation did not pass.[28]

Percent of Non-Coincident Customer Peak Demand or Aggregated Customer Monthly Demand: California

California regulates net metering based on percent of total aggregate peak demand. As with Vermont's peak capacity cap, the way California defines aggregate (or non-coincident) peak determines the total quantity of net metering systems allowed in the state.[29] California

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[22] Database of State Incentives for Renewables & Efficiency, "Net Program Overview: New Hampshire," September 2, 2014, accessed April 17, 2015, http://programs.dsireusa.org/system/program/detail/283.
[23] Database of State Incentives for Renewables & Efficiency, "Net Program Overview: New Hampshire."
[24] Dave Soloman. "Solar Bill before NH House Panel has Both Sides Shifting Stances," 24 March 2015, *New Hampshire Union Leader*, accessed April 17, 2015, http://www.unionleader.com/article/20150324/NEWS05/150329553.
[25] Soloman, "Solar bill before NH House panel has both sides shifting stances."
[26] Soloman, "Solar bill before NH House panel has both sides shifting stances."
[27] Soloman, "Solar bill before NH House panel has both sides shifting stances."
[28] All of the information in this paragraph comes from: The Public Service Commission of Maryland, "Report on the Status of Net Energy metering In the State of Maryland," September 10, 2014, accessed April 17, 2015. http://webapp.psc.state.md.us/intranet/Reports/2014%20MD%20PSC%20Report%20on%20the%20Status%20of%20Net%20Energy%20Metering.pdf.
[29] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."

defines aggregate peak demand as "the sum of individual customer peak demands."[30] The current net metering cap is 5% of total aggregated peak demand during any calendar year. According to the National Renewable Energy Laboratory, as of September 2014, California's cap was estimated at 5,258 MW statewide.[31]

California is projected to reach its 5% total aggregate peak demand cap in 2017. The state has legislation (AB 327) in place requiring utilities to provide net metering to all of their qualified customers until July 2017 or until the cap is met (whichever comes first). The California Public Utilities Commission (CPUC) is responsible, under AB 327, for developing a standard contract or tariff for utilities to abide by when one of these two events occurs and the current net metering program ceases to exist.[32] The new standard contract or tariff plan, which is an alternative program to net metering (explained in greater detail in Texas: Value of Solar Tariff [VOST] section below), is still being developed but the CPUC did announce (on March 27, 2014) that all solar customers who have installed or will install their systems before July 2017 (or before the utility reaches their cap), will continue to reap the benefits of net metering for a full 20 years from the date the system was installed. California is considering a Value of Solar Tariff (VOST) to replace its current net metering program. (Texas currently has a VOST program in place, which is explained in the "Alternative to Net Metering" section below.)[33]

Trigger Mechanism: New Jersey

Instead of a cap, a few states have implemented trigger mechanisms, which act as alarms that prompt a review of net metering policies and standards. New Jersey, Maine, and Minnesota have implemented trigger mechanisms. New Jersey and Maine base their trigger on percentage of peak demand. New Jersey's trigger is 499 MW, or 2.5% of peak demand.[34] Trigger mechanisms prompt "regulatory discussion about the status of net metering," without requiring utilities to suspend net metering or requiring states to take immediate action to update net metering policies.[35] New Jersey surpassed its trigger in 2013, and as of March 2014, was at 174.1% of peak demand.

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[30] Craig Morris, "Solar as Share of Peak Power Demand," Renewables International, June 4 2012, accessed April 17, 2015, http://www.renewablesinternational.net/solar-as-share-of-peak-power-demand/150/510/37944/.
[31] Morris, "Solar as Share of Peak Power Demand."
[32] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."
[33] Susannah Churchill, "California Decision Creates Certainty for Solar Customers," Vote Solar, March 27, 2014, accessed April 17, 2015. http://votesolar.org/2014/03/27/cpuc-decision-creates-certainty-for-existing-net-metering-customers/.
[34] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."
[35] Heeter, J, et al. "Status of Net Metering: Assessing the Potential to Reach Program Caps."

Act 2420 was introduced in the New Jersey Senate in September 2014, to triple the trigger to 7.5% of peak capacity.[36] The bill passed the Senate in December 2014 and was referred to the Assembly Telecommunications and Utilities Committee in January 2015.[37]

Alternatives to Net Metering

Value of Solar Tariff (VOST): Texas

Texas implemented a Value of Solar Tariff (VOST) program in 2006 as a way to benefit its photovoltaic (PV) solar panel customers (the program does not apply to other renewable energy sources) as a policy alternative to net metering. A VOST program is similar to a net metering system. The customer receives an electric bill for energy consumption, the customer is credited a set amount for every kW a renewable energy system generates, and this credit is subtracted from the customer's electric bill. The difference between net metering and a VOST program relates to the mechanism that determines how much the customer is credited per kW generated. In a net metering system, the credit is based on the retail cost of energy. In a VOST program the credit a customer receives is based on a solar algorithm that is updated annually. The algorithm that is currently used in Texas was originally developed by Clean Power Research in 2006, and accounts for the following factors: "avoided fuel costs, which is valued at the marginal costs of the displaced energy, avoided capital cost of installing new power generation due to the added capacity of the solar PV system, avoided transmission and distribution expenses, line loss savings, fuel price hedge value and environmental benefits."[38] Currently Texas's VOST program only benefits residential systems and there is not a program in place for commercial-sized systems.[39] The only other jurisdiction in the US that has adopted a VOST system is Minnesota, which implemented its program in 2014.[40]

A VOST program uses a different approach to calculate the credit due to the customer than the approach used by net metering programs. A VOST program considers two measurements separately: 1) the electricity consumed by the customer and 2) the energy generated by the customer. This alternative calculation method of a VOST program allows for utility companies to gain a better understanding of customer load, timing and volume of

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[36] New Jersey State Legislature, "S2420," September 2014, accessed April 17 2015. http://www.njleg.state.nj.us/2014/Bills/S2500/2420_I1.PDF.
[37] New Jersey State Legislature, "S2420."
[38] Anne Lappé, "Austin Energy's Value of Solar Tariff: Could It Work Anywhere Else?" Green Tech Solar, March 8, 2013, accessed April 17, 2015, http://www.greentechmedia.com/articles/read/austin-energys-value-of-solar-tariff-could-it-work-anywhere-else.
[39] Lappé, "Austin Energy's Value of Solar Tariff: Could It Work Anywhere Else?"
[40] National Renewable Energy Laboratory, "Value-of-Solar Tariffs," March 20, 2015, accessed April 17, 2015. http://www.nrel.gov/tech_deployment/state_local_governments/basics_value-of-solar_tariffs.html.

energy use. There are some drawbacks to the calculation technique of VOST programs. For example, it is difficult to find a consensus on the methodology for determining customer compensation per kW generated. Additionally, the rate is re-calculated annually, therefore, the extent of the benefit a PV system customer will experience in any given year is not guaranteed and a lot of room for uncertainty exists. Another difference of the VOST system, compared to net metering, is that the customer receives credit based on utility-specific benefits, and not fixed retail sale rates of electricity. In net metering programs there also are concerns of cross-subsidizing; in contrast, in a VOST program the cost of transmission and distribution are included in the rate calculation, and therefore concerns of cross-subsidizing are eliminated.[41]

Interconnection Study Requirements for Circuits That Have Reached Specific Penetration Levels: Hawaii

According to Solar Electric Power Association, Hawaii has the highest percentage of customers with rooftop solar PV systems. Thus, Hawaii has been innovative in altering its net metering program to minimize safety and reliability risks created by the amount of energy feeding into the system.

Hawaii's NEM system is based on circuit penetration and daytime minimum load (DML). Circuit penetration is the amount of energy that a given system feeds into a given circuit. Daytime minimum load (DML) is defined by Hawaii Electric as the energy generated by a given system between 9AM and 5PM.[42]

Prior to installing a renewable energy system, property owners must check the status of the circuit that their property connects to using a Locational Value Map, which is provided by Hawaii Electric. Depending on how much distributed generation is currently on the circuit, system interconnection "may require further review and/or upgrades."[43] There are three possible phases of review a customer must pass in order to become part of Hawaii's NEM program and interconnect to the local circuit. There is an Initial Technical Review (ITR) of the customer's NEM agreement (paperwork) and the proposed renewable energy system. If the system is eligible for immediate interconnection, then the customer may continue with the city and county interconnection permitting process. If the system is not approved the process progresses to the Supplemental Review (SR) phase, where Hawaii

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[41] National Renewable Energy Laboratory, "Value-of-Solar Tariffs."
[42] Hawaii Electric Company Inc., "Location Value Maps: Welcome to the Location Value Maps (LVM) for Oahu, Maui County, and Hawaii Island," 2013, accessed April 18, 2015, http://www.hawaiianelectric.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnextoid=47a22314e39e8310VgnVCM10000005041aacRCRD&vgnextchannel=f1230488c7d00410VgnVCM10000005041aacRCRD&vgnextfmt=default.
[43] Hawaii Electric Company Inc., "Guide to Going Solar: Understanding Net Metering."

Electric determines what modifications are necessary for the system to be interconnected. Then Hawaii Electric can require that an Interconnection study (IRS) be conducted, which is "an in-depth safety and reliability study that establishes specifications for linking a PV system with Hawaiian Electric's distribution grid."[44] An IRS is required if the system in question has a circuit penetration greater than 250% of DML. If the circuit penetration is between 75% and 250% of DML, then an IRS is "possible," but not mandatory.[45] If the system has a circuit penetration of 75% or less of DML, then neither an IRS nor any upgrades are required prior to approval.[46]

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[44] Hawaii Electric Company Inc., "Guide to Going Solar: Understanding Net Metering."
[45] Hawaii Electric Company Inc., "Reducing the Time and Cost of an Interconnection Study," accessed April 18 2015, http://www.hawaiianelectric.com/heco/_hidden_Hidden/CorpComm/Reducing-Time-and-Cost-of-an-Interconnection-Study?cpsextcurrchannel=1.
[46] Hawaii Electric Company Inc., "Guide to Going Solar: Understanding Net Metering."