The Vermont Legislative Research Service

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Net Metering in Vermont

Net metering, also known as net energy metering (NEM) is a program that allows for electric utility customers to generate their own energy, using small-scale renewable energy systems.[1] The energy generated from NEM can be used by a customer in lieu of energy generated from traditional utility companies. Surplus power generated by the renewable energy system that is not used by the customer can be fed back into the electric grid through an electric meter. This power acts as credit that the customer can use on days when their renewable energy system is not generating enough energy to power the whole building.[2] In this report we examine the costs and incentives of NEM and the distinctions between different NEM sectors and types. We also examine regional aspects of NEM and how renewable energy can be transferred throughout New England.

Types of Net Metering

NEM is categorized into four main types: conventional, virtual, aggregated and community. The National Conference for State Legislatures describes how each of these systems operates. Conventional NEM, also referred to as individual NEM, "connects a generating source to a single meter, such as a house or a building."[3] Aggregated NEM allows for a property owner with multiple meters on a single property, or adjacent properties, to implement NEM. Popular examples of aggregated NEM include adjacent agricultural buildings and universities that own multiple buildings. Virtual NEM, an expanded aggregated NEM system, refers to having several customers net meter the output of a single

[1] State of Vermont Department of Public Service, "Net Metering," Montpelier, VT: State of Vermont Department of Public Service, 2016, accessed March 22, 2016, http://publicservice.vermont.gov/renewable_energy/net_metering.
[2] Renewable Energy Vermont, "Vermont Solar Consumer Guide: Solar Photovoltaic," Montpelier VT: Renewable Energy Vermont, 2015, accessed March 20, 2016, http://www.revermont.org/go-renewable/photovoltaic/.
[3] Jocelyn Durkay, "Net Metering: Policy Overview and State Legislature Updates," Washington DC: National Conference of State Legislatures, 2014, accessed March 15, 2016, http://www.ncsl.org/research/energy/net-metering-policy-overview-and-state-legislative-updates.aspx#virtual.

system. Customers that are, "tenants in a multi-family property or condominium owners" can use virtual NEM to divide energy credit between separate accounts.[4] Along with virtual NEM are buy-all sell-all systems.[5] According to the U.S. Department of Energy, "in a buy-all, sell-all arrangement, the subscriber to a project sells all of the energy produced at a price (value of solar, standard offer, etc.) and buys all of their energy from the utility."[6] Power purchase agreements, described below, are a common example of these systems.[7] In virtual NEM a subscriber buys or leases a portion of a system and then receives credit for the energy that is produced by the system. Community net metering, more commonly known as group net metering, allows individuals within a community to construct a renewable energy project and distribute NEM credits to participants who are individual account holders. In group NEM, the group as a whole receives an itemized electricity bill from their local utility, and the individual participants decide how to divide the generation credits among themselves.[8]

Recent Developments in Vermont

In 2014, the Vermont Legislature raised the net metering cap for each utility in Vermont from 4% to 15% of the utility's peak load of the prior year. The peak load is the maximum amount of demand a utility has for electricity in a year.[9] The 15% NEM cap was met in 2015, six years before what had been expected by the Vermont Legislature.[10] Vermont's largest utility company, Green Mountain Power, and other smaller utilities including Washington Electric Company, Hyde Park Electric Company, and Hardwick Electric Company have all reported being near or already meeting the 15% cap.[11,12] Until the Public Service Board finalizes its new rule for NEM, several utilities are reducing their NEM

[4] Jocelyn Durkay, "Net Metering: Policy Overview and State Legislature Updates."
[5] Jocelyn Durkay, "Net Metering: Policy Overview and State Legislature Updates."
[6] U.S. Department of Energy Solar Market Pathways Program, "Vermont Solar Deployment Plan," Burlington VT: Vermont Energy Investment Corporation, 2015, accessed March 20, 2016, https://portal.veic.org/sunshot/SiteAssets/SitePages/Home/Net Metering and Focus Area Briefs.pdf.
[7] Vermont League of City and Towns, "Template for Group Net Metering Agreements for Vermont Municipal and School District Solar Projects," Montpelier, VT: Vermont League of Cities and Towns, 2015, accessed April, 12, 2016, http://vlct.org/assets/Resource/Models/2015-solar-group-net-metering-agreements-template.pdf.
[8] Michael Dworkin, Dan Ingold, Ralph Meima, Carey Rosser, Jonathan Voegele and Mary Westervelt, "Vermont Group Net Metering Information and Guidelines," Vermont's Clean Energy Development Fund and Powersmith Farm, 2010, accessed March 15, 2016, http://www.vecan.net/wp-content/uploads/GNM-Information-Guidelines-r2-1.pdf.
[9] State of Vermont Department of Public Service, "Net Metering."
[10] Ed Mcnamara, "Vermont Distributed Generation 2016-2025 Expectations," Montpelier, VT: Vermont Department of Public Service, 2015, accessed April 12, 2016, http://www.iso-ne.com/static-assets/documents/2015/12/vermont_dgfwg_12082015.pdf
[11] Distributed Generation Forecast Working Group, "Vermont Distributed Generation 2016-2025 Expectations," Montpelier, VT: State of Vermont Department of Public Service, 2015, accessed March 22, 2016, http://www.iso-ne.com/static-assets/documents/2015/12/vermont_dgfwg_12082015.pdf.
[12] State of Vermont Department of Public Service, "Net Metering."

programs, only accepting applications for systems less than 150 kW, which are except from the utility cap.[13,14]

Vermont's electricity is provided by sixteen municipal or cooperative utilities and one investor-owned distribution utility. Figure 1 shows the coverage of Vermont's electric utilities. Vermont used 27.9% of its electricity from renewable sources in 2014 including: hydroelectric power, biomass, wind and solar. In 2014, hydroelectric accounted for 16.7% of renewable energy produced, biomass power accounted for 6.4%, wind accounted for 4.4% and solar accounted for 0.4%.[15] With the shutdown of Vermont Yankee Nuclear Power Plant in 2014, the State lost 55% of its electrical generating capacity.[16] In 2015, renewable sources accounted for 99.9% of the total electricity generated in Vermont; 65.7% was hydroelectricity and 34.2% were other renewable sources including solar, wind and biomass.[17]

Act 99 (H.702), amended in 2014, outlines the rules and regulations for NEM in Vermont. In April 2016, the Vermont Public Service Board drafted a new proposal for Vermont's NEM system, which is to be updated by 2017. The proposal would utilize price to encourage siting of renewable energy systems in developed settings such as "roofs, parking lots, landfills, and gravel pits and on town-preferred sites."[18] Currently all solar photovoltaic (PV) systems over 15 kW are priced identically regardless of location.[19]

[13] Kristin Carlson, "Green Mountain Power Proposes Strategic Extension of Net Metering for Vermont Homeowners & Businesses," Colchester, VT: Green Mountain Power, 2015, accessed April 25, 2016, http://news.greenmountainpower.com/manual-releases/Green-Mountain-Power-Proposes-Strategic-Extension-?feed=d51ec270-a483-4f6c-a55e-8e5fbe2238c2.
[14] Vermont Electric Cooperative, "Statement about VEC's Net Metering Program," Johnson, VT: Vermont Electric Cooperative, 2015, accessed April 25, 2016, http://www.vermontelectric.coop/important-notices/611-statement-about-vecs-net-metering-program.
[15] U.S. Energy Information Administration, "Net Generation by State" Washington DC: U.S. Energy Information Administration, 2014, accessed April 16, 2016, https://www.eia.gov/electricity/data/state/.
[16] U.S. Energy Information Administration, "Vermont State Profile and Energy Estimates," Washington DC: U.S. Energy Information Administration, 2015, accessed March 22, 2016, http://www.eia.gov/state/?sid=VT#tabs-1.
[17] U.S. Energy Information Administration, "Vermont State Profile and Energy Estimates."
[18] State of Vermont Public Service Board, "Vermont Public Service Board Proposes Changes to Net Metering," Montpelier, VT: State of Vermont Public Service Board, 2016, accessed April 7, 2016, "http://psb.vermont.gov/sites/psb/files/Net%20Metering%20Press%20Release.pdf"
[19] State of Vermont Public Service Board, "Vermont Public Service Board Proposes Changes to Net Metering."

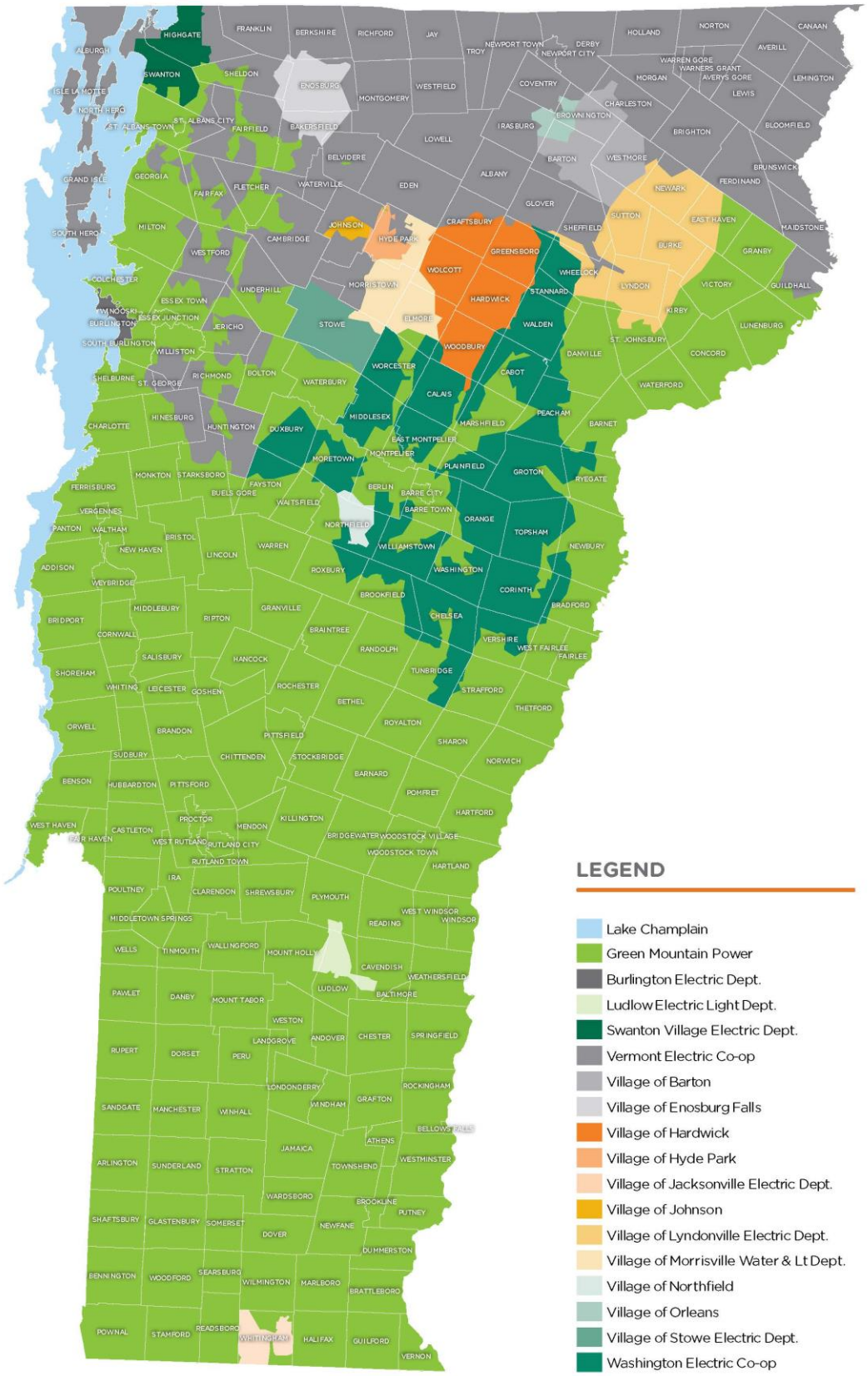

Figure 1: Map of Service Territories of Vermont Electric Utilities as of 2016.
Data from: The Vermont Public Service Board, "Service Territory Map," Montpelier, VT: 2016, accessed April 13, 2016, http://psb.vermont.gov/sites/psb/files/utility_info/Service%20Territory%20Map.pdf.

Vermont NEM Sectors

NEM in Vermont is organized into residential, commercial and industrial sectors. According to the U.S. Energy Information Administration, the residential sector is defined as "an energy-consuming sector that consists of living quarters for private households" excluding institutional living facilities.[20] The commercial sector of NEM is defined as "an energy-consuming sector that consists of service-providing facilities and equipment of businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups."[21] The commercial sector includes institutional living quarters and sewage treatment facilities. The industrial sector of NEM systems is defined as "an energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods." The five industrial NEM customers in Vermont use all the electricity they produced for their own operations, and do not sell any energy back to utilities. The transportation sector is defined as "an energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another."[22] Vermont does not have any net metering customers in the transportation sector.[23]

Table 1 outlines the capacity (MW) of each sector's net metering generation and the amount of energy (MWh) sold back to utilities.[24] In 2015, the residential sector accounted for the majority of NEM customers in Vermont. Of the 5,233 total NEM customers, 4,844 were residential customers.[25] But the 384 commercial NEM customers sold a total of 2,122.9 MWh of electricity back to utilities while residential customers sold 158.9 MWh back to utilities.[26] NEM solar capacity in Vermont is equal to 56.2 MW out of the total NEM capacity of 58.3 MW. Residential NEM capacity accounts for 37.4 MW, commercial systems account for 20.7 MW and industrial systems account for 0.24 MW. [27]

[20] U.S. Energy Information Administration Independent Statistics and Analysis, "Glossary," Washington, DC: U.S. Energy Information Administration Independent Statistics and Analysis, 2016, accessed April 2016, http://www.eia.gov/tools/glossary/index.cfm?id=A
[21] U.S. Energy Information Administration Independent Statistics and Analysis, "Glossary."
[22] U.S. Energy Information Administration Independent Statistics and Analysis, "Glossary."
[23] U.S. Energy Information Administration Independent Statistics and Analysis, "Glossary."
[24] U.S. Energy Information Administration Independent Statistics and Analysis, "Glossary."
[25] U.S. Energy Information Administration, "Electricity," Washington, DC: 2016, accessed April 14, 2016, https://www.eia.gov/electricity/data/eia826/.
[26] U.S. Energy Information Administration, "Electricity."
[27] U.S. Energy Information Administration, "Electricity,"

Table 1: Vermont's NEM Customers as of 2015 by month											
All Technologies (Solar PV, Wind, Biomass, Other)											
Capacity MW				Customers				Energy Sold Back to Utility in MWh			
Residential	Commercial	Industrial	Total	Residential	Commercial	Industrial	Total	Residential	Commercial	Industrial	Total
26.035	9.586	0.235	35.856	3,534	254	5	3,793	2.642	30.862	0.000	33.504
26.331	9.631	0.235	36.197	3,584	263	5	3,852	0.000	21.840	0.000	21.840
27.185	13.373	0.235	40.793	3,643	291	5	3,939	6.890	34.865	0.000	41.755
29.298	14.094	0.235	43.627	3,798	304	5	4,107	19.681	59.257	0.000	78.938
30.248	14.828	0.235	45.311	3,946	321	5	4,272	23.020	42.987	0.000	66.007
31.990	15.851	0.235	48.076	4,107	335	5	4,447	963.111	57.121	0.000	1,020.232
33.551	16.258	0.235	50.044	4,259	343	5	4,607	974.275	45.701	0.000	1,019.976
35.342	17.680	0.235	53.257	4,423	358	5	4,786	24.848	45.175	0.000	70.023
36.589	18.873	0.235	55.697	4,538	366	5	4,909	22.630	43.170	0.000	65.800
38.024	19.749	0.235	58.008	4,646	374	5	5,025	621.969	30.334	0.000	652.303
39.456	20.344	0.235	60.035	4,754	379	5	5,138	207.270	18.276	0.000	225.546
37.385	20.734	0.235	58.354	4,844	384	5	5,233	158.886	2,122.889	0.000	2,281.775
Data From: U.S. Energy Information Administration, "Electricity," Washington, DC: 2015, accessed April 14, 2016, https://www.eia.gov/electricity/data/eia826/.											

Costs of Net Metering

State data available regarding the average costs of biomass, wind, hydroelectric and solar PV residential small-scale renewable energy systems is limited. Nationally, small-scale biomass electric plants have a mean installment price of $5,792/kWh capacity.[28] Solar and wind energy installment become more cost effective as generation capacity increases. A wind grid-connected system generally 1-10 kW in size has a mean cost of $7,645 /kWh in capacity, while a system ranging from 10-100 kW in size has a mean cost of $6,118 /kWh capacity.[29] A solar PV system ranging from 1-10 kW in size has a mean cost of $3,897 /kWh in capacity, while a system ranging from 10-100 kW in size has a mean cost of $3,463 /kWh in capacity.[30] The National Renewable Energy Laboratory updated this information (shown below) in February 2016.[31]

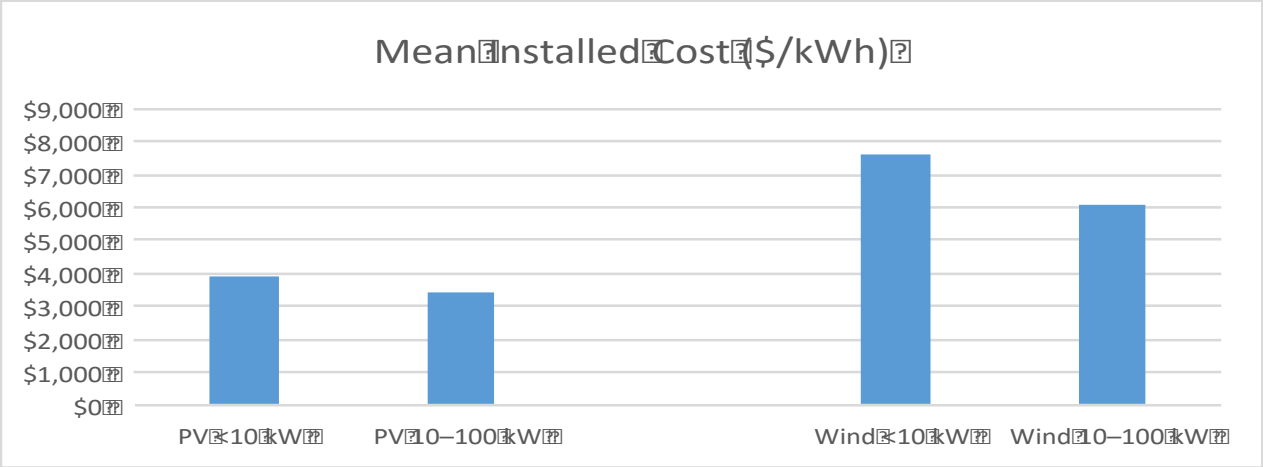

Figure 2: Average installation cost for solar and wind systems of varying capacities

Data From: National Renewable Energy Laboratory, "Distributed Generation Renewable Energy Estimate of Costs," Washington, DC: U.S. Department of Energy, 2016, accessed April 5, 2016, http://www.nrel.gov/analysis/tech_lcoe_re_cost_est.html.

Renewable Energy Credits (RECs)

In addition to electricity, renewable energy generation also produces a bundle of environmental benefits, such as avoided mercury, carbon dioxide, and other environmentally harmful emissions.[32] These benefits can be packaged into renewable

[28] National Renewable Energy Laboratory, "Distributed Generation Renewable Energy Estimate of Costs," Washington, DC: U.S. Department of Energy, 2016, accessed April 5, 2016, http://www.nrel.gov/analysis/tech_lcoe_re_cost_est.html.
[29] National Renewable Energy Laboratory, "Distributed Generation Renewable Energy Estimate of Costs."
[30] National Renewable Energy Laboratory, "Distributed Generation Renewable Energy Estimate of Costs."
[31] National Renewable Energy Laboratory, "Distributed Generation Renewable Energy Estimate of Costs."
[32] U.S. Department of Energy, "A Guide to Community Shared Solar," Washington, DC: U.S. Department of Energy, 2012, accessed April 5, 2016, http://www.nrel.gov/docs/fy12osti/54570.pdf.

energy credits (RECs) and sold separately from the produced electricity.[33] Each State must recognize RECs as a tradable environmental attributes, currently 36 states and territories recognize RECs.[34] At the federal level, RECs are recognized as tradable attributes by the Department of Energy's Federal Management Energy Program.[35]

RECs are a method used to "label" and differentiate energy generated by renewable sources from conventional/non-renewable energy.[36] One REC certificate represents one megawatt-hour of renewable energy. This allows for the environmental benefits associated with renewable generation to be carried with the energy even after being blended with conventional energy by utility companies.[37] RECs can be included with the electricity they represent (bundled) or sold separately (unbundled).[38] With bundled RECs, the electricity customer receives both the electricity and related RECs. Under this arrangement, the consumer is utilizing renewable energy and retires the associated RECs on consumption. When RECs are unbundled from electricity, one consumer can purchase the electricity (now classified as non-renewable) and another customer can purchase the remaining RECs.[39] These RECs can be used by the customer to foster a "green" public image or to help them comply with a mandatory renewable standard.[40] Renewable Portfolio Standards (RPSs) are regulatory requirements, created by a legislature other state regulator, that force a utility to purchase a certain percentage of its energy from qualifying renewable sources by a certain date.[41] In New England, RECs are monitored by the New England Power Pool Generation Information System (GIS).[42] GIS creates, tracks and retires RECs to ensure that they are accounted for and used correctly.[43]

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[33] U.S. Department of Energy, "A Guide to Community Shared Solar."
[34] Todd Jones, Robin Quarrier and Maya Kelty, "The Legal Basis for Renewable Energy Certificates," San Francisco, CA: Center for Resource Solutions, 2015, accessed April 25, 2016, http://resource-solutions.org/site/wp-content/uploads/2015/07/The-Legal-Basis-for-RECs.pdf.
[35] Todd Jones, Robin Quarrier and Maya Kelty, "The Legal Basis for Renewable Energy Certificates."
[36] Gregg Freeman, Heather Huebner and Aaron Kelly, "An Analysis of Renewable Energy Credits in Vermont," South Royalton, VT: Vermont Law School Institute for Energy and Environment, 2016, accessed April 5, 2016, http://www-assets.vermontlaw.edu/Assets/iee/VLS%20Energy%20Cinic%20Report%20on%20RECs%20Final%20for%20SNRE.pdf.
[37] Freeman, Huebner and Kelly "An Analysis of Renewable Energy Credits in Vermont."
[38] U.S. Environmental Protection Agency (EPA), U.S Department of Energy (DOE), the World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power," Washington DC: U.S Environmental Protection Agency, 2010, accessed April 8, 2016, https://www.epa.gov/sites/production/files/2016-01/documents/purchasing_guide_for_web.pdf.
[39] EPA, DOE, World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power."
[40] EPA, DOE, World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power."
[41] Environmental Tracking Network of North America, "The Intersection Between Carbon, RECs, and Tracking: Accounting and Tracking the Carbon Attributes of Renewable Energy," San Francisco, CA: Environmental Tracking Network of North America, 2010, accessed April 5, 2016, http://etnna.org/images/PDFs/Intersection%20btwn%20Carbon%20RECs%20and%20Tracking.pdf.
[42] New England Power Pool Generation Information System, "NEPOOL GIS System," San Jose, CA: New England Power Pool Generation Information System, 2014, accessed April 5, 2016, http://www.nepoolgis.com/contact-us/.
[43] New England Power Pool Generation Information System, "NEPOOL GIS System."

Under Vermont's NEM laws, there are several options for how renewable energy generators can utilize their RECs. The most common option used by small scale NEM (under 100kW) is to keep the RECs bundled with the produced electricity. When the customers use the energy, they can also claim the environmental benefits, such as greenhouse gas (GHG) reduction associated with RECs.[44] When NEM customers use and retire their own RECs, it increases the overall consumption of renewable energy statewide and contributes to GHG reduction initiatives.[45] Another option for NEM generators is to sell their RECs to their utility company.[46] This allows the generator to profit from the sale of RECs and the utility to insure that it is in compliance with the State's renewable energy standard.[47] Because the RECs and energy are unbundled, the generator cannot claim the environmental benefits associated with their energy production, as these benefits have been transferred to the utility.[48] Instead, the energy used by a consumer is considered to be the part of the utility's average fuel mix, which contains energy from conventional sources.[49] When a utility purchases RECs to comply with a renewable energy standard, it increases both the utility's and State's renewable energy consumption.[50] Act 56 sets the renewable energy standard for Vermont.[51] NEM customers can also sell their RECs to buyers other than their own utility. These other buyers are typically out of state utilities attempting to comply with their own state's renewable energy standard.

Power Purchase Agreements

NEM agreements also known as Power Purchase Agreements (PPA) allow for a solar array's owner to sell generated power and RECs to a 3rd party power consumer.[52] Under these agreements the facility owner is granted permission to install and operate a solar system on the energy consumer's land.[53] In return, the energy consumer is guaranteed 100% of the produced energy at a long-term, reduced rate.[54] These programs are often utilized by towns or schools to obtain low-cost energy without having to raise the upfront

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[44] Green Power Network, "Community Renewable Energy," Washington DC: Office of Energy Efficiency & Renewable Energy, 2015, accessed April 8, 2016, http://apps3.eere.energy.gov/greenpower/community_development/community_solar_faq.html.
[45] Green Power Network, "On-site Renewable Energy," Washington DC: Office of Energy Efficiency & Renewable Energy, 2014, accessed April 8, 2016, http://apps3.eere.energy.gov/greenpower/onsite/index.shtml.
[46] Green Power Network, "Community Renewable Energy."
[47] Green Power Network, "Community Renewable Energy."
[48] U.S. Environmental Protection Agency, U.S Department of Energy, the World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power."
[49] Green Power Network, "Community Renewable Energy."
[50] Green Power Network, "Community Renewable Energy."
[51] VT LEG #309802 v.1, Vermont State Legislature, "No. 56 An act relating to establishing a renewable energy standard," H, 2015, accessed April 5, 2016, http://legislature.vermont.gov/assets/Documents/2016/Docs/ACTS/ACT056/ACT056%20As%20Enacted.pdf.
[52] National Renewable Energy Laboratory, "Power Purchase Agreement Checklist for State and Local Governments," Golden CO: U.S. Department of Energy, 2009, accessed April 7, 2016, http://www.nrel.gov/docs/fy10osti/46668.pdf.
[53] National Renewable Energy Laboratory, "Power Purchase Agreement Checklist."
[54] National Renewable Energy Laboratory, "Power Purchase Agreement Checklist."

costs to construct the solar array.[55] The owners of the solar system are often able to take advantage of tax credits that would not be available to tax-exempt organizations such as government agencies.[56] Like other renewable generation, the energy generated by these arrays can be unbundled and the RECs can be sold separately.[57] Depending on the contract between the owner and consumer, the RECs can be either be retained by the owner for sale to another party or sold with the energy to the consumer. If the consumers do not purchase the RECs with the energy then they cannot claim they are consuming renewable energy.[58]

Vermont Net Metering Incentives

Vermont has several programs offering tax credits, "buy-downs" including direct grants and rebates, and loan programs. These incentives are available for the following NEM technologies: "photovoltaic, wind turbines, anaerobic digestion of agricultural products, by-products or waste, biomass, and fuel cells (when fueled by renewable sources)."[59] During the 2015 fiscal year the Clean Energy Development Fund (CEDF) allocated $5,458,310 to renewable energy projects.[60] Table 2 shows the amounts allocated by grants and incentive programs to renewable electrical generation projects in 2015 by the CEDF. In June 2015, the Clean Energy Development Board approved changes to the allocation of funds from the CEDF. The Small-Scale Renewable Energy Incentive Program (SSREIP) was discontinued at the end of June 2015.[61] As of FY16 the CEDF will continue funding for the Windham County Solar Finance Program, Community Solar Finance Program, and Interest Rate Buy-Down Funds including Residential Property Assessed Clean Energy "PACE" and NeighborWorks of Western Vermont.[62] In addition to allocations for solar PV funding, the Food Waste Pilots Program will continue to be funded in 2016. This program allows for food waste collected by Casella Waste Management and Grow Compost to be converted to energy via the Vermont Technical College's anaerobic digester facility.[63]

[55] Vermont League of City and Towns, "Template for Group Net Metering Agreements."
[56] Vermont Energy and Climate Action Network (VECAN), "Going Solar," Montpelier, VT: VECAN, 2016, accessed April, 14, 2016, http://www.vecan.net/power-purchase-agreements-group-net-metering/.
[57] EPA, DOE, World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power."
[58] Vermont League of City and Towns, "Template for Group Net Metering Agreements."
[59] State of Vermont Department of Public Service, "Net Metering."
[60] Vermont Clean Energy Development Fund Public Service Department, "Clean Energy Development Fund Annual Report to the Vermont Legislature," Montpelier, VT: Vermont Clean Energy Development Fund Public Service Department, 2016, accessed March 27, 2016, http://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/CEDF%20Annual%20Report_FY%202015.pdf.
[61] Vermont Clean Energy Development Fund Public Service Department, "Clean Energy Development Fund Annual Report to the Vermont Legislature,"
[62] Vermont Clean Energy Development Fund Public Service Department, "Clean Energy Development Fund Annual Report to the Vermont Legislature,"
[63] Vermont Clean Energy Development Fund Public Service Department, "Clean Energy Development Fund Annual Report to the Vermont Legislature,"

CEDF Awards for FY15					
GRANTS	**Award Recipient**	**Technology, Capacity or Type of Activity**	**Funds Awarded**	**Total Project Cost Estimated Upon Award**	**Estimated Annual Energy Production**
Solar PV	Franklin NE Supervisory Union (Richford High School)	• 54 kW Solar PV System	$45,500	$130,000	52,623 kWh/yr
	Shrewsbury Mountain School	• 22.5 kW Solar PV System	$31,250	$98,350	29,486 kWh/yr
	Strafford Energy LLC	• 55 kW Solar PV System	$32,250	$238,500	76,000 kWh/yr
	Thetford School Board	• 120 kW Solar PV System	$125,000	$470,000	170,000 kWh/yr
	Town of Waitsfield	• 85 kW Solar PV System	$80,000	$306,609	102,106 kWh/yr
	Town of Warren	• 126 kW Solar PV System	$80,000	$462,829	165,304 kWh/yr
BIOMASS	Casella Waste Management	• Food Waste Pilot	$139,000	$179,500	
	Grow Compost	• Food Waste Pilot	$131,549	$172,349	
FINANCE PROGRAMS	VSECU	• Windham Co. Solar Finance Program	$300,000	$300,000	
		• Community Solar Finance Program	$125,000	$125,000	
	NeighborWorks of	• Interest Rate Buy-Down Fund	$255,167	$255,167	
	Vermont Energy Investment Corp	• PACE Interest Rate Buy- Down Fund	$200,000	$200,000	
INCENTIVES	Solar PV				
SSREIP	1014	6,526 kW (AC)	$1,755,123	$29,099,945	7971 MWh/yr
TOTAL					
	1014	Electric 6.99 MW (AC)	$3,299,839	$32,038,249	Electric 8,566.5

Table 2: CEDF Allocated Resources to Renewable Energy Projects 2015

Data from: Vermont Clean Energy Development Fund Public Service Department, "Clean Energy Development Fund Annual Report to the Vermont Legislature," Montpelier, VT: Vermont Clean Energy Development Fund Public Service Department, 2016, accessed March 27, 2016, http://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/CEDF%20Annual%20Report_FY%202015.pdf.

Vermont also offers a sales tax and property tax incentive for NEM systems. The Vermont Sales Tax Incentive originally introduced as part of the Miscellaneous Tax Reduction Act of 1999 (H.B. 0548) only applied to NEM systems, but now applies to systems up to 500 kilowatts (kW) in capacity that generate electricity using eligible renewable energy resources.[64] "Renewable energy" resources as defined under 30 V.S.A § 8002 include "energy produced using a technology that relies on a resource that is being consumed at a harvest rate at or below its natural regeneration rate" or micro-combined heat and power (CHP) systems up to 20 kW. [65] Under this definition, solar PV, wind, biomass, anaerobic digestion and fuel cells using renewable fuels are eligible to qualify for the 100% of sales tax for purchase. In addition to the Vermont sales tax, there is a Vermont Investment Tax Credit. According to the Database of State Incentives for Renewables and Efficiency, the investment tax credit for Vermont is equal to 7.2% for solar, fuel cells and small wind placed in service on or before December 31, 2016 and 2.4% for geothermal and microturbines.[66] Small wind includes systems up to 100 kW, fuel cells in systems .5 kW or greater and microturbines include systems 2 megawatts (MW) or less.[67]

The Vermont Uniform Capacity Tax offers a 100% property tax exemption for solar PV systems up to and including 50 kW. For systems greater than 50 kW, the state assesses a uniform $4.00 /kW property tax payment.[68] The Vermont Solar Adder was introduced into the Vermont Energy Act of 2011 (H.56) creating a statewide solar customer benefit. It requires utilities to issue an additional credit on top of their base residential per kWh credit to customers to make a total of $0.20/kWh.[69] A system under 15 kW in capacity receives a $0.20 adder sum per kWh, while systems over 15 kW receive $0.19/kWh.[70] As well as statewide NEM incentives for solar PV, certain individual towns and utilities in Vermont offer incentives per kWh of electricity produced (see Table 4).

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[64] Database of State Incentives for Renewables and Efficiency, "Renewable Energy Systems Sales Tax Exemption," Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 27, 2016, http://programs.dsireusa.org/system/program/detail/44

[65] VT LEG #298503 v.1, Vermont State Legislature, "No. 99 An act relating to self-generation and net metering," H702, 2014, accessed March 31, 2016, http://legislature.vermont.gov/assets/Documents/2014/Docs/ACTS/ACT099/ACT099%20As%20Enacted.pdf.

[66] Database of State Incentives for Renewables and Efficiency, "Investment Tax Credit" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 27, 2016, http://programs.dsireusa.org/system/program/detail/3428

[67] Database of State Incentives for Renewables and Efficiency, "Investment Tax Credit."

[68] Database of State Incentives for Renewables and Efficiency, "Uniform Capacity Tax and Exemption for Solar" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 27, 2016, http://programs.dsireusa.org/system/program/detail/5209

[69] Renewable Energy Vermont, "Vermont Solar Consumer Guide: Solar Photovoltaic."

[70] VT LEG #298503 v.1, Vermont State Legislature, "No. 99 An act relating to self-generation and net metering," H702, 2014, accessed March 31, 2016, http://legislature.vermont.gov/assets/Documents/2014/Docs/ACTS/ACT099/ACT099%20As%20Enacted.pdf.

Vermont Standard Offer Program

The Sustainably Priced Energy Enterprise Development (SPEED) Program was Vermont's alternative to a RPS program. However, "In 2015, Act 56 established a Renewable Energy Standard (RES), repealing the SPEED program except for the standard offer program. The RES established a goal of 55% renewable by 2017."[71] The Standard Offer Program is a feed-in tariff (FIT), designed to provide a reasonable return on investment to renewable energy facility developers in order to increase the development of renewable energy. The Standard Offer Program is available to solar PV, wind, biomass, hydroelectric, and anaerobic digestion. The minimum capacity per project is 150 kW and the maximum system capacity of 2.2 MW.[72] In May 2012, Act 170 increased the program's maximum capacity to 127.5 MW by 2022.[73,74] The Standard Offer Program allows Vermont utilities to sell RECs to utilities and companies in other New England states though the GIS system.[75] Out of state utilities and companies buy RECs to comply with their own RES. When RECs are sold out of state, the environmental benefits associated with them are also transferred out of state, therefore, Vermont's conventional energy consumption increases. Under Act 56 (H.40), all RECs are required to be retired in Vermont with the exception of systems with Standard Offer Program contracts.[76] Table 3 at the end of this report shows the current Standard Offer Projects with contacts in Vermont.

[71] U.S. Energy Information Administration, "Hawaii and Vermont Set High Renewable Portfolio Standard Targets," Washington, DC: U.S. Energy Information Administration, 2015, accessed March 31, 2016, http://www.eia.gov/todayinenergy/detail.cfm?id=21852

[72] Vermont Electric Power Producers, "Renewable Energy Credits (RECs)," Manchester, VT: Vermont Electric Power Producers, 2016, accessed April 14, 2016, http://www.vermontstandardoffer.com/recs/.

[73] VT LEG #309802 v.1, Vermont State Legislature, "No. 56 An act relating to establishing a renewable energy standard."

[74] VT LEG 281076.1, Vermont State Legislature, "No. 170 An act relating to the Vermont energy act of 2012," H, 2012, accessed April 5, 2016, http://www.leg.state.vt.us/docs/2012/Acts/ACT170.pdf.

[75] Vermont Electric Power Producers, "Renewable Energy Credits (RECs)."

[76] VT LEG #309802 v.1, Vermont State Legislature, "No. 56 An act relating to establishing a renewable energy standard."

Table 4: Vermont Utility Net-Metering Incentives			
Utility	**Solar**	**Non-Solar**	**Capacity (residential, commercial, industrial, transportation)**
City of Burlington Electric[77]	$0.052265	**X**	Total Capacity .833 MW
Green Mountain Power[78]	$0.053 (less than 15 kW) $0.043 (greater than 15 kW)	**X**	Total Capacity 25.309 MW
Town of Hardwick Electric Company[79]	$0.02115 (less than 15 kW) $0.01115 (greater than 15 kW)	**X**	Residential Capacity .242 MW
Town of Stowe[80]	$0.1564	**X**	Commercial .255 MW
Village of Morrisville[81]	$0.04642/kWh (less than 15 kW) $0.03642/kWh (greater than 15 kW)	**X**	Residential and Commercial .216 MW
Village of Swanton[82,83]	Commercial $0.08184/kWh Residential 15 kW or under $0.08072/kWh Residential 15 kW or over $0.07072	**X**	Commercial .056 MW Residential any kW size system
Vermont Electric Cooperative, Inc[84]	$0.0238/kWh	**X**	Residential and Commercial 3.162 MW
Washington Electric Coop[85]	$0.0957	**X**	Residential and Commercial 1.473 MW

[77] City of Burlington Electric Department, "Net Metering," Burlington, VT: City of Burlington Electric Department, accessed March 29, 2016, https://www.burlingtonelectric.com/my-home/my-bill/net-metering-0

[78] Database of State Incentives for Renewables and Efficiency, "GMP Solar Power" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 27, 2016, http://programs.dsireusa.org/system/program/detail/3015

[79] Town of Hardwick Electric Department, "Net Metering," Hardwick, VT: Town of Hardwick Electric Department, 2014, accessed March 29, 2016, http://www.hardwickelectric.com/images/pdf/hardwick_nm-1_050814-clean.pdf

[80] Stowe Town Electric Department, "Stowe Electric Department Small Commercial Rate 20," Stowe, VT: Stowe Town Electric Department, 2015, accessed April 14, 2016, http://www.stoweelectric.com/images/rates/FINAL_-_20_-_Small_Comm._-_CLEAN.pdf.

[81] Village of Morrisville Water and Light Department, "Net Metering," Morrisville, VT, 2014, accessed April 14, 2016, http://www.mwlvt.com/Net%20Metering%20Tariff.pdf.

[82] Swanton Village Electric Department, "Industrial and Large Commercial Service," Swanton, VT: Swanton Village Electric Department, 2014, accessed April 14, 2016, http://www.swanton.net/publicworks/wp-content/uploads/Industrial-sched-D.pdf.

[83] Swanton Village Electric Department, "Net Metering," Swanton, VT: Swanton Village Electric Department, 2014, accessed April 14, 2016, http://www.swanton.net/publicworks/wp-content/uploads/Net-Metering.pdf.

[84] Vermont Electric Cooperative, "Net Metering Information and FAQ," Johnson, VT: 2013, accessed April 14, 2016, http://www.vermontelectric.coop/programs-services/renewable-energy/net-metering#incentives.

[85] Patty Richards, "Washington Electric Cooperative Net Metering Program," Montpelier, VT: Vermont Public Service Board, 2015, accessed April 16, 2016,

Federal Net Metering Incentives

The U.S. Department of Agriculture's Rural Energy for America Program (REAP) provides financial assistance to agricultural and small-businesses with renewable energy systems. The Renewable Energy Systems and Energy Efficiency Improvement Guaranteed Loan and Grant Program distributed by REAP is available for wind, solar, biomass, and geothermal.[86] The grant is for up to 25% of total eligible project costs; the guaranteed load and the combined grant and loan funding is available up to 75% of total eligible project costs.[87]

The Modified Accelerated Cost-Recovery System (MACRS) is a federal corporate depreciation. It allows businesses to recover some investments through certain property depreciation deductions.[88] "The Consolidated Appropriations Act, signed in December 2015, extended the "placed in service" deadline for bonus depreciation. Equipment placed in service before January 1, 2018 can qualify for 50% bonus depreciation. Equipment placed in service during 2018 can qualify for 40% bonus depreciation, and equipment placed in service during 2019 can qualify for 30% bonus depreciation."[89] MACRS is available for properties with solar, fuel cells, geothermal, and small wind (up to 100 kW).[90]

The Business Energy Investment Tax Credit (ITC) is a federal tax credit available to all sectors of net metering. The tax credit amount is equal to 30% for solar and small wind with no maximum credit, 30% for fuel cells capped at $1,500 per 0.5 kW and 10% for geothermal and microturbines capped at $200 per kW of capacity.[91] Table 5 shows tax credit amounts by year. Eligible systems of the ITC tax include small wind turbines up to 100 kW in capacity and microturbine systems 2 MW or less. As of January 1st 2015, wind energy systems are only eligible to claim the ITC in lieu of the Production Tax Credit (PTC). The PTC "is an inflation-adjusted per-kilowatt-hour (kWh) tax credit for electricity generated by qualified energy resources and sold by the taxpayer to an unrelated person

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http://psb.vermont.gov/sites/psb/files/WEC%20Net%20Metering%20PSB%20Workshop%203-19-2015.pdf.

[86] United States Department of Agriculture Rural Development, "Rural Energy for America Program Renewable Energy Systems and Energy Efficiency Improvement Loans and Grants," Washington, DC: United States Department of Agriculture Rural Development, 2015, accessed March 31, 2016, http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency.

[87] United States Department of Agriculture Rural Development, "Rural Energy for America Program."

[88] Database of State Incentives for Renewables and Efficiency, "Modified Accelerated Cost-Recovery System (MACRS)" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 31, 2016, http://programs.dsireusa.org/system/program/detail/676

[89] Database of State Incentives for Renewables and Efficiency, "Modified Accelerated Cost-Recovery System (MACRS)."

[90] Database of State Incentives for Renewables and Efficiency, "Modified Accelerated Cost-Recovery System (MACRS)."

[91] Database of State Incentives for Renewables and Efficiency, "Business Energy Investment Tax Credit (ITC)" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 29, 2016, http://programs.dsireusa.org/system/program/detail/658

during the taxable year."[92] For wind, the incentive is $0.02/kWh (10 years), for biomass and hydroelectric the incentive is $0.01/kWh (5 years).[93] In December 2015, the Consolidated Appropriations Act extended this tax credit for wind facilities until December 31, 2019 and for all other eligible renewable energy technologies until December 31, 2016.[94] Organizations that are tax exempt, including local governments and schools, can take advantage of Clean Renewable Energy Bonds (CREBs). CREBs are federal loans available to the same renewable technologies as the PTC.[95]

Table 5: Expiration dates for the ITC tax credit

Technology	12/31/16	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21	12/31/22	Future Years
PV, Solar Water Heating, Solar Space Heating/Cooling, Solar Process Heat	30%	30%	30%	30%	26%	22%	10%	10%
Hybrid Solar Lighting, Fuel Cells, Small Wind	30%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Geothermal Heat Pumps, Microtubines, Combine Heat and Power Systems	10%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Geothermal Electric	10%	10%	10%	10%	10%	10%	10%	10%
Large Wind	30%	24%	18%	12%	N/A	N/A	N/A	N/A

Note: Solar and wind is based on when constriction begins. For all other technologies the expiration date is based on when the system was placed in service (installed and being used for its intended purpose).

Data From: Database of State Incentives for Renewables and Efficiency, "Business Energy Investment Tax Credit (ITC)" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 29, 2016, http://programs.dsireusa.org/system/program/detail/658

[92] Database of State Incentives for Renewables and Efficiency, "Renewable Energy Production Tax Credit (PTC)" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed March 29, 2016, http://programs.dsireusa.org/system/program/detail/734

[93] Database of State Incentives for Renewables and Efficiency, "Renewable Energy Production Tax Credit (PTC)"

[94] Database of State Incentives for Renewables and Efficiency, "Renewable Energy Production Tax Credit (PTC)"

[95] Database of State Incentives for Renewables and Efficiency, "Clean Renewable Energy Bonds (CREBs)" Raleigh, NC: N.C. Clean Energy Technology Center, 2016, accessed April 16, 2016, http://programs.dsireusa.org/system/program/detail/2510.

Conclusion

The NEM program in Vermont is rapidly expanding. The majority of growth has occurred in the residential sector. Additionally, solar PV continues to grow at the fastest pace of all NEM renewable energy system types. Under the new NEM guidelines currently under review by the Vermont Public Service Board, RECs will be required to be retired in state with the exception of current Standard Offer Program contracts. Currently the majority of incentives are geared toward solar NEM at both the state and federal level. Furthermore, collaborations between private and public sectors such as PPAs allow for further savings though "combining" incentives available to each individual sector. Additionally as the State' largest utilities reach the NEM cap, it is likely that new project development will slow as NEM programs are scaled back. [96,97]

Glossary

Anaerobic digestion: Decomposition in the absence of oxygen, as in an anaerobic lagoon or digester, which produces CO2 and CH4.[98]

Biomass: Organic non-fossil material of biological origin constituting a renewable energy source.[99]

Conventional energy: electricity generated from non-renewable sources such as coal, oil, natural gas, and nuclear.[100]

Kilowatt (kW): One thousand watts.[101]

Kilowatthour (kWh): A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt (1,000watts) of power expended for 1 hour.[102]

Megawatt (MW): One million watts of electricity.[103]

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[96] Kristin Carlson, "Green Mountain Power Proposes Strategic Extension of Net Metering for Vermont Homeowners & Businesses," Colchester, VT: Green Mountain Power, 2015, accessed April 25, 2016, http://news.greenmountainpower.com/manual-releases/Green-Mountain-Power-Proposes-Strategic-Extension-?feed=d51ec270-a483-4f6c-a55e-8e5fbe2238c2.

[97] Vermont Electric Cooperative, "Statement about VEC's Net Metering Program," Johnson, VT: Vermont Electric Cooperative, 2015, accessed April 25, 2016, http://www.vermontelectric.coop/important-notices/611-statement-about-vecs-net-metering-program.

[98] U.S. Energy Information Administration, "Glossary," Washington DC: U.S. Energy Information Administration, 2016, accessed April 16, 2016, http://www.eia.gov/tools/glossary/.

[99] U.S. Energy Information Administration, "Glossary."

[100] EPA, DOE, World Resources Institute and the Center for Resource Solutions, "Guide to Purchasing Green Power."

[101] U.S. Energy Information Administration, "Glossary."

[102] U.S. Energy Information Administration, "Glossary."

[103] U.S. Energy Information Administration, "Glossary."

Megawatthour (MWh): One thousand kilowatt-hours or 1million watt-hours.[104]

Renewable Energy Credit (REC): a market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource.[105]

This report was completed on April 26, 2016 by Frances Workman, Christopher Thomas and Jackson Berman under the supervision of Professors Jack Gierzynski, Robert Bartlett and Eileen Burgin in response to a request from Senator Bray and Senator Rogers.

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Disclaimer: This report has been compiled by undergraduate students at the University of Vermont under the supervision of Professor Anthony Jack Gierzynski, Professor Robert Bartlett and Professor Eileen Burgin. The material contained in the report does not reflect the official policy of the University of Vermont.

[104] U.S. Energy Information Administration, "Glossary."
[105] U.S. Environmental Protection Agency, "Renewable Energy Certificates (RECs)," Washington DC: U.S. Environmental Protection Agency, 2016, accessed April 16, 2016, https://www.epa.gov/greenpower/renewable-energy-certificates-recs.

Table 3: Standard Offer Projects with Contracts

STANDARD OFFER PROGRAM
DEVELOPER PROJECTS WITH CONTRACTS
10/19/09 - 4/12/16

TECHNOLOGY	CAPACITY (kW)	PROJECT NAME	PROJECT LOCATION	HOST UTILITY
Biomass	800	Cersosimo Lumber Biomass	Brattleboro	GMP
Biomass	400	RPC Power	Rutland	GMP
Farm Methane	680	Audets Cow Power	Bridport	GMP
Farm Methane	600	Berkshire Cow Power - EXISTING	Richford	VEC
Farm Methane	375	Central Vermont Recovered Biomass Facility	Randolph Center	GMP
Farm Methane	300	Chaput Family Farms	North Troy	VEC
Farm Methane	450	Dubois Energy, LLC	Addison	GMP
Farm Methane	450	Four Hills Digester	Bristol	GMP
Farm Methane	200	Gervais Digester - EXISTING	Enosburg Falls	ENOSBURG
Farm Methane	200	Gervais Farm Engine 2	Enosburg Falls	ENOSBURG
Farm Methane	600	Green Mountain Dairy	Sheldon	GMP
Farm Methane	225	Kane's Cow Power	Enosburg	GMP
Farm Methane	150	Maplehurst Farm Methane	Greensboro	HARDWICK
Farm Methane	300	Montagne Cowpower - EXISTING	Swanton	GMP
Farm Methane	225	Neighborhood Energy - EXISTING	Newport	VEC
Farm Methane	180	Riverview Farm Digester	Franklin	VEC
TECHNOLOGY	CAPACITY (kW)	PROJECT NAME	PROJECT LOCATION	HOST UTILITY

Farm Methane	450	Westminster Energy Group - EXISTING	Westminster	GMP
Hydroelectric	2200	Ball Mountain Hydroelectric Project	Jamaica	GMP
Hydroelectric	150	Factory Falls	Springfield	GMP
Hydroelectric	138	North Hartland	Hartland	GMP
Hydroelectric	960	Townshend Dam Hydroelectric	Townshend	GMP
Hydroelectric	816	Troy Hydro Project	Troy	VEC
Hydroelectric	675	West Charleston Hydro	West Charleston	VEC
Landfill Methane	560	BCH Landfill Gas to Energy	Brattleboro	GMP
Solar PV	50	100 Bobbin Mill Road	Newport	VEC
Solar PV	32	Advance Transit Building Expansion	White River Junction	GMP.
Solar PV	2000	Apple Hill Solar Project	Bennington	GMP
Solar PV	1800	Barton Solar Farm	Barton	VEC
Solar PV	2000	Bridport West Solar Farm	Bridport	GMP
Solar PV	100	Butternut Mountain Farm Solar	Morrisville	MORRISVILLE
Solar PV	2000	Champlain Valley Solar Farm	Middlebury	GMP
Solar PV	2200	Charlotte Hinesburg Rd Project	Charlotte	GMP
Solar PV	2000	Chelsea Solar Project	Bennington	GMP
Solar PV	2200	Chester Solar Farm	Chester	GMP
TECHNOLOGY	CAPACITY (kW)	PROJECT NAME	PROJECT LOCATION	HOST UTILITY
Solar PV	2200	Claire Solar Farm	South Burlington	GMP

Solar PV	2200	Clarendon Solar Project	Clarendon	GMP
Solar PV	800	Clarke Solar Center, LLC	Rutland	GMP
Solar PV	2200	Coventry Solar Project	Coventry	VEC
Solar PV	2200	Cross Pollination One	New Haven	GMP
Solar PV	1000	Ferrisburgh Solar Farm Project	Ferrisburgh	GMP
Solar PV	37	IRA Rentals Solar	Newport	VEC
Solar PV	50	Kingsbury Solar	East Montpelier	GMP
Solar PV	26	Leunig's Building	Burlington	BED
Solar PV	2200	Limerick Road Solar Farm	Shelburne	GMP
Solar PV	2100	Next Generation Solar Farm	New Haven	GMP
Solar PV	16	Northshire	Manchester Center	GMP
Solar PV	2200	Otter Valley Solar Farm	Florence	GMP
Solar PV	2200	Sheldon Springs Solar	Sheldon	VEC
Solar PV	2200	South Burlington Solar Farm	South Burlington	GMP
Solar PV	2200	Southern Vermont Energy Park Solar	Pownal	GMP
Solar PV	1000	Springfield Solar Alliance I	Springfield	GMP
Solar PV	2200	St Albans Solar Farm	St. Albans	GMP
Solar PV	2000	Sudbury Solar	Sudbury	GMP
Solar PV	2200	SunGen1Solar	Sharon	GMP
Solar PV	2000	Technology Drive Solar	Brattleboro	GMP
TECHNOLOGY	CAPACITY (kW)	PROJECT NAME	PROJECT LOCATION	HOST UTILITY
Solar PV	2100	Triland BlueWave Pownal	Pownal	GMP

Solar PV	2100	Triland BlueWave Williamstown	Williamstown	WEC
Solar PV	2200	Whitcomb Farm Solar	Essex Junction	GMP
Solar PV	2200	White River Junction Solar Farm	Hartford	GMP
Solar PV	2000	Williamstown Solar Project	Williamstown	WEC
Small Wind	100	Highgate Wind 1 Project	Highgate Center	VEC
Small Wind	100	Highgate Wind 2 Project	Highgate Center	VEC
Small Wind	100	Highgate Wind 3 Project	Highgate Center	VEC
Small Wind	100	Highgate Wind 4 Project	Highgate Center	VEC
Small Wind	24	Baily Hill Wind	Readsboro	GMP
Small Wind	96	Hedgehog Hill Wind B	Mount Holly	GMP
UTILITY PROJECTS WITH CONTRACTS				
Solar PV	485	Lyndonville Solar 1	Lyndonville	LED
Solar PV	500	Lyndonville Solar 2	Lyndonville	LED
Data from: Vermont Electric Power Producers, "Standard Offer Projects with Contracts," Manchester Center, VT: Vermont Electric Power Producers, 2016, accessed April 16, 2016, http://vermontspeed.squarespace.com/storage/projects-with-contracts/STANDARD%20OFFER%20PROJECTS%20WITH%20CONTRACTS%204-12-16.xlsx.				