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Financial Features of Large-Scale Solar Array Projects in Vermont

In our report, we examine the financial framework surrounding large-scale solar array projects in Vermont. For the purposes of our report, we define "large-scale" within the range of generating 500 Kilowatts (kW) to what is considered "utility-scale," defined as installations whose generating capacity is 1 Megawatts (MW) or more.[1] For reference, a Megawatt can power between 400-900 homes a year.[2] Our analysis includes an overview of existing utility-scale solar arrays in Vermont, key financial mechanisms including Renewable Energy Credits (RECs), Power Purchase Agreements (PPAs), and the solar development costs associated with the construction and installation of large-scale solar developments, as well as federal and state mechanisms that affect solar projects in the state.

Vermont Overview

Vermont ranks 42nd for total installed solar capacity with a total of 440.5 MW of solar installed, providing 17% of Vermont's energy. Specifically, the state ranks 45th in total installed utility-scale solar capacity and 31st in non-residential distributed generation. Per capita, Vermont ranks 24th in utility-scale solar and 9th in non-residential distributed generation.[3]

Current data shows there are 54 utility-scale solar installations in Vermont with a total operating capacity of 155 MW.[4] There are 66 solar companies throughout the state providing 1,168 jobs and a total solar investment of $915 million.[5] Vermont has 17 electricity distribution companies including one investor-owned utility, 14 municipal electric departments, and 2 member-owned rural electric cooperatives.[6]

The electricity providers listed above are regulated monopolies that operate under a Certificate of Public Good granted by the Vermont Public Utility Commission, meaning their rates and policies are subject to review by the Vermont Department of Public Service with approval by the

[1] Energy Information Administration, *Most U.S. Utility-Scale Solar Photovoltaic Power Plants are 5 Megawatts or Smaller.* Accessed November 25, 2025. https://www.eia.gov/todayinenergy/detail.php?id=38272
[2] Nuclear Regulatory Commission, *What is a Megawatt?* February 24, 2012. https:///www.nrc.gov/docs/ML1209/ML120960701.pdf
[3] Solar Energy Industries Association, "Vermont State Solar Overview," accessed November 25, 2025. https://seia.org/state-solar-policy/vermont-solar/
[4] Cleanview, "Vermont Solar Farms," accessed November 25, 2025. https://cleanview.co/solar-farms/vermont
[5] Solar Energy Industries Association, "Vermont State Solar Overview."
[6] Solar Energy Industries Association, "Vermont State Solar Overview."

Vermont Public Utility Commission. Vermont is the only New England state that has not restructured its electricity industry to allow retail competition.[7] Vermont is served by Independent System Operator New England (ISO-NE), a non-profit corporation, which oversees the New England region's electricity grid operations.[8]

Vermont has a tax and two incentives regarding large-scale solar installations. The Uniform Capacity Tax, imposes a tax of $4.00 per KW of plant capacity for owners of a solar energy generating facility with a capacity of 50 KW or more.[9] One incentive comes through the Vermont Economic Development Authority which offers the Commercial Energy Loan Program, a loan program to commercial systems to help businesses finance qualifying renewable energy generation and energy efficiency improvement projects. The maximum loan size is $6 million with a variable rate and $500,00 with a fixed rate. It can cover up to 90% but is generally limited to 60% of the project's cost. The funds must go towards the purchase of land or buildings, construction, installation, design, engineering, and permitting.[10] The other incentive is that solar equipment is exempt from Vermont's 6% sales tax and applies to systems up to 500 KW in capacity.[11]

Development Costs

To provide the most accurate estimate of solar development costs for large-scale projects in Vermont (over 500 kW), in this section we will use an average of 500 kW and 2 MW Vermont solar case studies. Overall, the reported costs cover the broad systems, technology, and manpower required to install a large-scale solar project in Vermont. These costs can be divided into two primary subsets: 1) material and labor 2) permitting, land, and utility interconnection.[12]

Material and Labor Costs

On average, the total material and labor cost for a 500 kW to 2 MW project is $820,000- $3.1 million.[13] On average, the material costs, including solar panels, mounting systems, and electrical components, for large-scale solar projects, are around $1.10 per watt. This produces a range of approximately $550,000 to $2.1 million for material costs in large-scale projects. For materials, the main expenses are the solar panels themselves, string inverters that help harness and distribute the energy produced by solar, and electrical components, such as wiring. Most of these costs remain consistent across large-scale solar projects, except for string converters. Since

[7] Department of Public Service, "Electric," *State of Vermont*, accessed November 25, 2025. https://publicservice.vermont.gov/regulated-utilities/electric
[8] Energy Information Administration, *Vermont State Profile and Energy Estimates*, December 19, 2024. https://www.eia.gov/state/analysis.php?sid=VT; ISO-New England, *Operating the Power System*. Accessed December 8, 2025.
[9] Vermont Department of Taxes, "Solar Plants Subject to the Uniform Capacity Tax," *Agency of Administration,* accessed November 25, 2025. https://tax.vermont.gov/municipal-officials/solar-plant-taxation
[10] Vermont Economic Development Authority, *Commercial Energy Loan Program*. Accessed November 25, 2025. https://www.veda.org/financing-options/vermont-commercial-financing/commercial-energy-loan-program/
[11] Vt. Acts & Resolves § 9741 (46), (2014).
[12] Leigh Seddon, "Vermont Solar Cost Study: A Report on Photovoltaic System Cost and Performance Differences Based on Design and Siting Factors," CleanEnergy States Alliance, 2016. https://www.cesa.org/wp-content/uploads/Vermont-Solar-Cost-Study.pdf
[13] Seddon, "Vermont Solar Cost Study."

these converters have similar capacity for both 500 kW and 2 MW projects, the 2 MW project saw lower per-watt inverter costs, despite having more panels, because it uses the same converter type as the 500 kW project. Therefore, the per-watt costs are lower because the inverter costs for the projects remain the same, but the 2 MW project distributes more solar energy.[14]

Labor costs average around $0.54 per watt, resulting in a range of $270,000 to $1 million for the mentioned projects. Similar to inverter costs, labor costs per watt also decrease as solar projects grow larger because installation becomes less complex, is typically done on open land, and construction can become more streamlined. Therefore, the larger a solar project is the lower its per-watt installation costs.[15]

Permitting, Land, and Utility Interconnection Costs

The costs related to permitting, land, and utility interconnection are more complex than material and labor costs due to Vermont's Section 248 process. Section 248 requires approval for all solar projects over 150 kW in Vermont through a 12-step process of documentation, deliberation, and analysis. After a solar project is approved, the party involved in constructing the project will receive a Certificate of Public Good and must comply with 17 regulatory criteria in order to retain the certificate.[16] This process adds additional costs in the form of legal representation throughout the 12-step process, as well as expert consultants to ensure that all criteria are met. These consultancy and legal costs average around $50,000 for large-scale solar projects and are required to obtain permitting for those projects.[17]

The land costs for solar range from $36,000 to $100,000 as of November 2025. However, these costs are influenced by the real estate market and can increase or decrease depending on the location and when the land is purchased.[18]

Utility interconnection costs related to linking the solar project to Vermont's energy grid vary across projects. For all projects, an interconnect application must be submitted to the state, regardless of size. Following approval of this application, solar projects undergo a fast-track analysis to determine the impact of this new energy on the broader energy grid. A significant number of 500 kW projects incur interconnection costs that are much lower than those of 2 MW projects in this analysis, as they can be integrated into existing energy infrastructure without additional electrical components. Therefore, 500 kW projects have interconnection costs of around $11,000. For larger solar projects, such as a 2 MW project, the energy generated cannot be easily integrated within existing energy infrastructure and requires additional analysis to determine whether the energy grid can handle the amount of energy the project produces. These studies can range from $10,000 to over $40,000 and add more costs to larger solar projects in Vermont.[19]

[14] Seddon, "Vermont Solar Cost Study."
[15] Seddon, "Vermont Solar Cost Study."
[16] An Act Relating to the Vermont Energy Act of 2012, Vt. Acts & Resolves § 8005a, (2012).
[17] Seddon. "Vermont Solar Cost Study."
[18] Seddon. "Vermont Solar Cost Study."
[19] Seddon, "Vermont Solar Cost Study."

While material and labor costs remain consistent and decrease per watt as project size increases in large-scale solar projects, permitting, land, and utility interconnection costs exhibit significant variability. Due to more complex processes and analytical studies required for solar energy projects, large-scale projects incur higher costs as their size increases for this portion of overall costs.

Renewable Energy Credits

Renewable Energy Credits (RECs) are a market-based legal instrument that represent the non-power attributes of one megawatt-hour (MWh) of electricity generated from a renewable energy source. Once power is sent to the grid, the source from which the power came is unidentifiable. RECs make it possible to track and differentiate between renewable energy and energy from other sources. They also provide details about the kind of energy source such as wind, solar or hydro, date of generation, and location.[20] In Vermont, non-power attributes, called "environmental attributes," represent the benefits the renewable energy provided to the environment such as avoided emissions or reduced pollution. [21] An REC can be sold bundled, both the electricity and its environmental attributes, or energy generators can unbundle the REC, separating the environmental attributes from the electricity itself and sell the two commodities separately.[22]

The legal basis on which RECs operate varies by state as statutes and regulations differ.[23] In Vermont, RECs can be sold and used to comply with Renewable Portfolio Standard requirements, to retail electricity providers, or utilities looking to increase their renewable generation voluntarily.[24] In New England, RECs are created, tracked, and retired by the Generation Information System governed by New England Power Pool.[25] An REC is retired and counts toward Renewable Portfolio Standard compliance or to a utility's claims of renewable energy generation when the environmental attributes of the REC are formally claimed and cannot be used again.[26]

In the state of Vermont, RECs are closely tied to fulfilling the plans laid out in its Renewable Energy Standard, the state's version of a Renewable Portfolio Standard, which mandates a minimum share of the state's electricity supply must be generated using renewable resources. The Renewable Energy Standard was initiated in 2017 and updated in 2024 through *An Act relating to the Renewable Energy Standard*.[27] This act increased the amount of total renewable energy electric distribution utilities are required to purchase pursuant to the Renewable Energy

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[20] U.S. Environmental Protection Agency, *Renewable Energy Credits (RECs)*. Accessed November 25, 2025. https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs
[21] Vt. Acts & Revolves § 8002 (7), (2024).
[22] Center for Resource Solutions, "The Legal Basis for Renewable Energy Certificates," April 2023. https://resource-solutions.org/wp-content/uploads/2015/07/The-Legal-Basis-for-RECs.pdf
[23] Center for Resource Solutions, "The Legal Basis for Renewable Energy Certificates."
[24] Vt. Acts & Resolves § 8002-8005, (2024).
[25] Vt. Acts & Resolves § 8006a, (2024).
[26] U.S. Environmental Protection Agency, *EPA Clean Energy-Environment Technical Forum Renewable Energy Certificates: Background & Resources*, October 21, 2008. https://www.epa.gov/sites/default/files/2016-03/documents/background_paper_3.pdf#:~:text=Once%20a%20buyer%20makes%20an%20environmental%20claim,allow%20RECs%20to%20count%20towards%20RPS%20compliance
[27] An Act relating to the Renewable Energy Standard, Vt. Acts & Resolves § 8002-8005, (2024).

Standard be 100% by 2030 or 2035, depending on the type of utility. To satisfy this requirement, utilities may use RECs whether traded or generated by renewable energy plants whose energy is capable of delivery in New England and fulfills the requirements listed in the five tiers of the Renewable Energy Standards.[28]

Power Purchase Agreements

Solar Power Purchase Agreements

Power Purchase Agreements are contracts between private power producers and public sector purchasers, which are often publicly owned utility providers.[29] These agreements provide a primary revenue stream to the power producer and offer cost predictability throughout the duration of the contract.[30] In the context of solar Power Purchase Agreements, the producer and purchaser negotiate a price per kilowatt-hour of electricity that is delivered to the grid.[31] This price guarantee offers project feasibility by offsetting the high upfront costs and providing consistent, secure revenue to the power producer.[32] These agreements can also include the transfer of RECs from renewable energy producers to the purchaser, or producers may choose to sell their RECs on the market.[33]

The Standard Offer Program

The Vermont Standard Offer Program was established in 2009 pursuant to Vermont state law *An Act Relating to Renewable Energy and Energy Efficiency* to aid in the development of renewable power generation facilities.[34] The program was amended in 2012 by the *Vermont Energy Act* which mandates market-based pricing and increases the program capacity.[35] Under the Standard Offer Program, electricity distribution utilities in the state are required to buy renewable power from eligible generation facilities.[36]

The Standard Offer Program is administered by Vermont Electric Power Producers, a non-profit corporation under contract with the Vermont Public Utility Commission (VPUC).[37] The VPUC is required to allocate a cumulative 127.5 MW capacity of each of the following renewable energy sources: solar power, wind power, methane derived from a landfill, hydroelectric power, and biomass power. To be eligible for the Standard Offer Program, power production plants can be no larger than 2.2 MW. The term of the standard offer contract for solar power is 10-15 years,

[28] Vt. Acts & Resolves § 8002-8005, (2024).
[29] World Bank, "Power Purchase Agreements (PPAs) and Energy Purchase Agreements (EPAs)," accessed November 20, 2025. https://ppp.worldbank.org/sector/energy/energy-power-agreements/power-purchase-agreements
[30] World Bank, "Power Purchase Agreements (PPAs) and Energy Purchase Agreements (EPAs)."; Environmental Protection Agency, *Green Power Supply Options,* August 4, 2025. https://www.epa.gov/green-power-markets/financial-ppa
[31] Environmental Protection Agency, *Green Power Supply Options.*
[32] World Bank, "Power Purchase Agreements (PPAs) and Energy Purchase Agreements (EPAs)."
[33] U.S. Environmental Protection Agency, *Green Power Supply Options.*
[34] An Act Relating to Renewable Energy and Energy Efficiency, Vt. Acts & Resolves § 8005, (2009).
[35] Vt. Acts & Resolves § 8005a, (2012).
[36] Vt. Acts & Resolves § 8005a, (2012).
[37] Vermont Electric Power Producers, "About Us," accessed November 25, 2025. https://vermontstandardoffer.com/about-us/

and the price for each kilowatt-hour of power produced shall be determined by the VPUC. Once a standard offer contract is in place, the power producer shall continue to receive the agreed upon price for the duration of the contract.[38]

For new projects under the Standard Offer Program, the VPUC is required to use market-based mechanisms in obtaining the specified allocation of a category of renewable energy production.[39] One such market mechanism is a reverse auction in which multiple energy producers compete against each other to obtain a government contract, in this case a standard offer contract.[40] Reverse auctions are used to obtain the lowest possible price while still offering timely development.[41]

Vermont Electric Power Producers distributes electricity obtained via standard offers to Vermont retail electricity providers at the same price paid to electricity producers. Electricity is allocated to retail electricity providers based on their proportional share of retail kilowatt-hour sales for the previous year. When calculating these shares, they are adjusted to ensure that any greenhouse gas reduction credits go to the provider whose customer provided such credits. Additionally, Vermont Electric Power Producers shall transfer any renewable energy credits of electricity purchased under a standard offer to the retail electricity provider.[42]

Federal Tax Credits and Depreciation System

The federal government provides tax credits for investment in renewable energy to encourage their development. Two such tax credits are the Investment Tax Credit (ITC) and the Production Tax Credit which support the investment in renewable electric energy generation.[43] The federal ITC, under Section 48 of the U.S. tax code, regarding commercial and utility solar energy property, provides a 6% base credit and can provide up to a 30% tax credit, depending on whether certain criteria are met.[44] The signing of US House Bill 1 (H.1) of 2025, *One Big Beautiful Bill Act*, changed the federal ITC. In order to qualify, solar installations must be placed in service by December 31st, 2027, or construction must begin by July 4, 2026. Beyond these dates, new solar projects will not qualify for federal solar tax credit.[45]

Vermont offers a state tax credit for installations of renewable energy equipment on business properties that works in tandem with the federal Investment Tax Credit (ITC). The project must

[38] Vt. Acts & Resolves § 8005a, (2012).
[39] Vt. Acts & Resolves § 8005a, (2012).
[40] United States Government Accountability Office, *Reverse Auctions,* July 2018. https://www.gao.gov/assets/gao-18-446.pdf
[41] Vt. Acts & Resolves § 8005a, (2012).
[42] Vt. Acts & Resolves § 8005a, (2012).
[43] Internal Revenue Service, *Clean Energy Tax Incentives for Businesses,* March 2024. https://www.irs.gov/pub/irs-pdf/p5886.pdf
[44] Database of State Incentives for Renewables & Efficiency, "Business Energy Investment Tax Credit (ITC)," July 16, 2025. https://programs.dsireusa.org/system/program/detail/658d
[45] Internal Revenue Service, *Beginning of Construction Requirements for Purposes of the Termination of Clean Electricity Production Credits and Clean Electricity Investment Credits for Applicable Wind and Solar Facilities,* August 15, 2025. https://www.irs.gov/pub/irs-drop/n-25-42.pdf

be eligible for and receive the federal tax credit to receive the state credit. The credit amount is equal to 24% of the federal investment tax credit.[46]

The Production Tax Credit is a federal tax credit also under Section 45 of the U.S. tax code, but is a per kilowatt-hour tax credit occurring up to 10 years after the renewable energy is placed in service.[47] In order to qualify, solar installation must be placed in service by December 31, 2027, or construction must begin by July 4, 2026.[48] The Solar For All program, which, according to the Vermont Department of Public Service's website "allow[ed] low-income households to benefit from clean solar energy," has been paused and funding from the US Environmental Protection Agency terminated due to language in H.1.[49]

The Modified Accelerated Cost Recovery System is a federal tax depreciation system that allows businesses to recover the cost of certain equipment over a set number of years through annual tax deductions. Qualifying solar energy equipment is eligible for a cost recovery period of five years. This program was also impacted by H.1 which put into effect a 100% bonus depreciation attained in one year rather than over five.[50]

Conclusion

Our report has outlined the financial framework surrounding large-scale solar array projects in Vermont including an overview of Vermont's current solar profile, Renewable Energy Credits, Purchasing Power Agreements, solar development costs, and the federal and state mechanisms affecting solar energy development in the state.

This report was completed on December 15, 2025, by Bella Scholl, Peyton Paquette, and Sophie VanOrden under the supervision of VLRS Director, Dr. Anthony "Jack" Gierzynski and VLRS Deputy Director, Dr. Jonathan "Doc" Bradley in response to a request from Representative Burtt.

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[46] Vermont Department of Taxes, "Tax Credits for Business," *Agency of Administration*, accessed November 25, 2025. https://tax.vermont.gov/business/tax-credits
[47] U.S. Environmental Protection Agency, *Renewable Electricity Production Tax Credit Information.* Accessed November 25, 2025. https://www.epa.gov/lmop/renewable-electricity-production-tax-credit-information
[48] Internal Revenue Service, "Beginning of Construction Requirements for Purposes of the Termination of Clean Electricity Production Credits and Clean Energy Investment Credits for Applicable Wind and Solar Facilities."
[49] Department of Public Service, "Solar For All Vermont," *State of Vermont*, September 12, 2025. https://publicservice.vermont.gov/renewables/solar-all-vermont
[50] Database of State Incentives for Renewables & Efficiency, "Modified Accelerated Cost-Recovery System (MACRS)," July 25, 2025. https://programs.dsireusa.org/system/program/detail/676