Virginia
Solar Development Analysis

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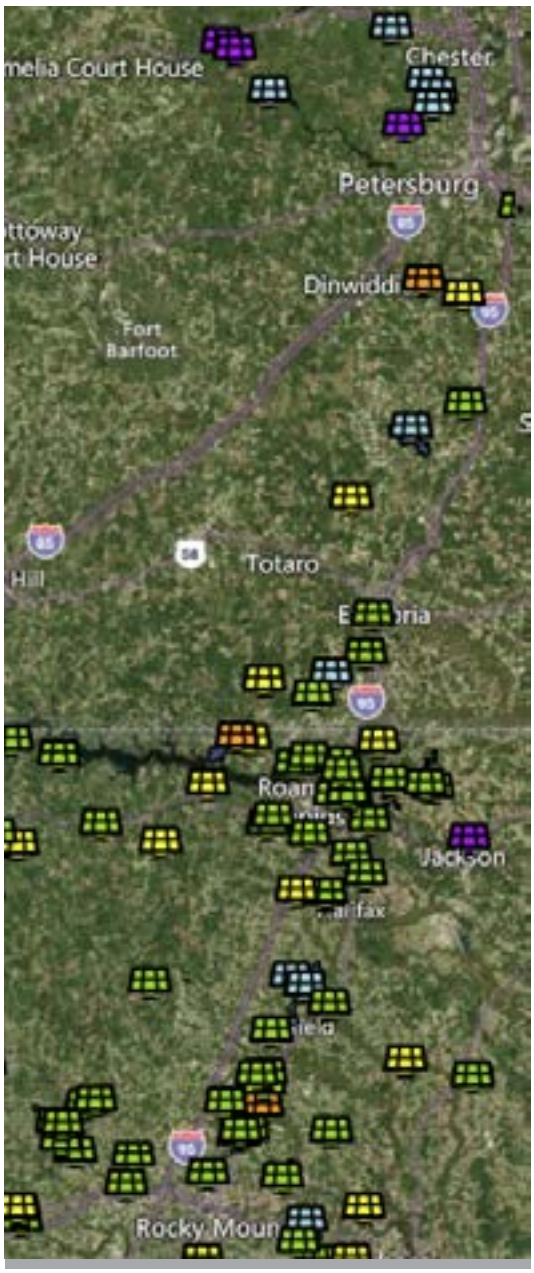
Virginia Solar Development

ANALYSIS

The state of solar development in Virginia can be evaluated by key factors such as federal and local regulations, incentives, grid interconnection and integration. The current state of development activity in Virginia is rapidly growing and can be seen in this analysis summarizing all facets of solar energy project development.

We will break down the various federal and state incentives available to solar energy developers in Virginia and how to access them.

LandGate provides key data to the top developers and financiers in the country. To learn more about access to this platform, or to talk about how to apply the information below to your business, book time with a member of our dedicated energy markets team.



Virginia Solar Energy
ACTIVITY

Status	VA Solar Farm Count	VA Solar Farm Capacity (MWac)	VA Solar Farm Generation (MWh)
Operating	66	2,774	617,203
Under Construction	15	186	22,969
Planned	61	1,890	66,592
Queued Projects	56	1,751	46,687
Site Control (Lease Options)	4	339	2,185

*est is the estimated peak total electricity generation that those solar farms will produce once operational

As of August 2023, Virginia has 66 solar farms already operating with a current capacity of 2,774 MW1 and a current electricity generation of 617,203 MWh. Virginia has a significant amount of operating solar farms compared to the other states in the US, and it has one the largest development of solar farms with 15 solar farms under construction of 186 MW capacity total, 61 planned solar farms with 1,890 MW capacity total, as well as 56 Utility-Scale Queued projects and 4 site control projects.

Overall, if all planned and under construction farms go into operating status, Virginia will expand its capacity by 2,075 MW. That's a 75% growth in capacity for the state! In Virginia, the average solar farm size is 217 acres producing 42.7 MW of electricity under ideal conditions. So a solar farm in Virginia needs an average of 5 acres per MW of capacity.

Utility-Scale vs. Community-Scale **SOLAR**

Utility-scale solar refers to solar farms often created and managed by utilities, independent power producers, or energy firms. These projects aim to produce electricity on a large scale and deliver it directly into the distribution grid. These solar farms generally have **more than 10 MW** in capacity. Contrarily, community-scale solar refers to smaller-scale solar power facilities, **under 10 MW**, that are primarily intended to serve local communities or particular user groups. Below is a breakdown of the different

Utility-Scale

Virginia is a state for solar development where the entire state is regulated by Pennsylvania-New Jersey-Maryland Interconnection (PJM).

Projects Queued for Development in Virginia

ISO	Number of Solar Farms	Capacity (MWac)
PJM	202	6,937

A project in queue means that the project enters the interconnection queue of that region waiting for regulatory approval. During this period, the analysis of possible engineering and land factors is conducted to determine the feasibility of the project to be constructed and connected to the grid. The average amount of time it takes for a farm to go from queue to operational in Virginia is 46 Months! As per the projected in-service dates for the current projects in queue, Virginia will most likely add 11 GW of Utility Scale farms by the end of 2025, which is a 158% increase in operational capacity.

Projects Under Site Control in Virginia

Site Control is land under lease or under option to lease. Solar developers run an initial assessment of the suitability of parcels for solar farms. After they put the land under option, they need time to run their due diligence and submit the project to the queue. When the solar project is about to be approved by the queue, the solar developer exercises the solar farm option agreement to convert it to a solar farm lease agreement. These site control projects have not entered the interconnection queue yet. Currently there are 4 project leases with an estimated capacity of 339 MW. LandGate analyzes county tax & deed assessor records to find lease agreements already in place between developers and landowners. This unique dataset is continuously updated by a process that locates new lease documents within days of new agreements being filed with each county.

How do developers screen and run due diligence for those solar farm projects in site control?

Factors to take into consideration:

- Electricity generation
- Electricity commodity prices (LMP, incentives, PPA)
- Capital costs
- Operating costs
- Timing
- Risks

Using the factors above and a standard solar panel size, the buildable acreage and a land coverage ratio (encompassing row spacing and maintenance spacing) we calculate the maximum number of panels that could fit on the parcel. This helps us estimate the capacity the project lease will add to the grid and calculates a Market Value of the solar project.

LandGate's Solar PowerVal tool enables similar capabilities to evaluate land parcels for solar development and get an independent economic report for solar projects of all statuses. This tool allows developers and project financiers to fast-track the process of submitting a feasibility study to the queue for approval through independently produced Engineering & Economic analytics and Solar 8760 reports or evaluate projects and parcels for origination and M&A.

How is a utility-scale solar project submitted to the queue to connect to the Electric Grid?

Typically, the queue submission process within an ISO or Utility area follows similar steps.
The solar developer needs to complete and submit an official interconnection request form provided by the ISO or utility, that captures essential project details and starts the interconnection process. Project specifications should include details like name, location (latitude and longitude), point of interconnection, capacity, expected energy production, environmental impact, technology layout-inverters, solar panels, system layout through a Feasibility study with an 8760 report to help initially assess the project's compatibility with the existing grid infrastructure. The Solar developer will also have to pay an initial payment to secure a position in the interconnection queue and contribute towards the cost of initial studies and evaluations conducted by the ISO/Utility. Post the submission of the form, reports and payment, the project is now effectively in the queue.

After the project has entered the queue, Injection reliability study and system impact study is conducted. These studies determine the exact impact of the project on existing infrastructure and identifies any potential network updates required to reliably interconnect the solar project to the grid. Once the study is completed, the developer gets a complete picture of the financial cost of the solar farm with regards to the complete CAPEX and Budget. This helps the decision making process of whether to move forward with

the development of the solar project or withdraw the application from the queue. If the project seems viable to move forward the developer signs an interconnection agreement with the ISO/Utility and essentially looks to produce Economic and Financial reports for Bankers and Investors to help facilitate the construction of the solar project.

Commercial, Community, & Behind-the-Meter Solar Farms Projects under development in Virginia

Virginia is a state where Dominion Energy Virginia (Dominion) and Appalachian Power Company (APCO), are the two largest utility suppliers that take up the majority of the market supply. Below is an analysis of community solar farms and other small-scale solar projects in the queue.

Projects Under Development in Virginia

Property Type	Count	Capacity (MWac)
Commercial/Business	84	39
Community Supply	499	2,018
Industrial	113	108

Glossary

Commercial/Business: Commercial solar is simply solar for a commercial business

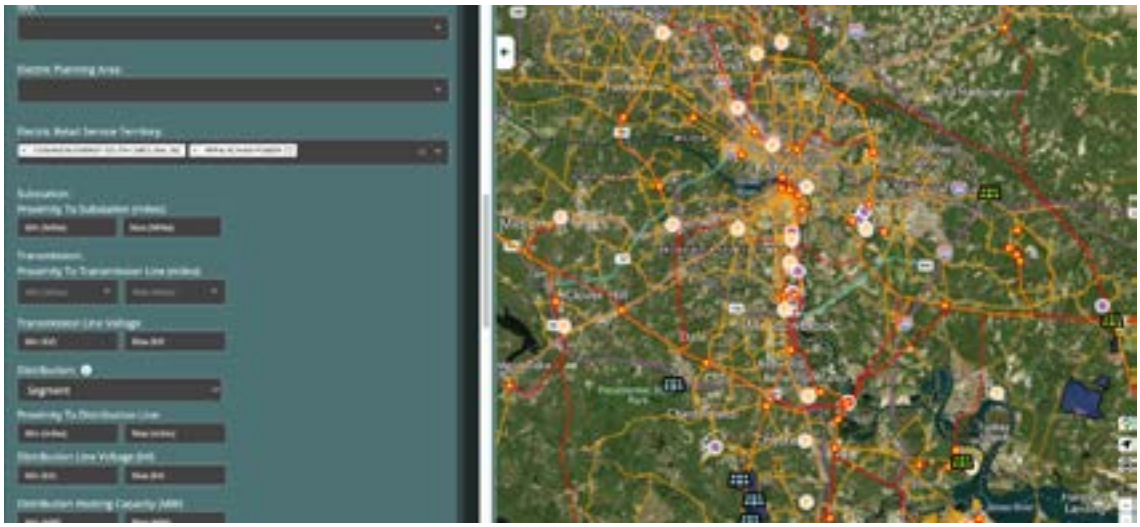
Community Supply: Community Solar

Industrial: An industrial photovoltaic system or industrial solar PV system refers to a system with a power output greater than 100 kWp, an ideal capacity for many types of companies for purposes of self-consumption as well as production and sale of electrical energy.

Residential/Home: “Residential solar” means solar panels to power a single house. The panels are typically mounted on a homeowner’s roof, but could also be mounted in the backyard.

With over **690 applications** being processed, Virginia will see a growth of **2.1 GW** in Community and Distributed generation by 2025. This supports the fact that Virginia is one of the fastest growing states for small scale gen-

How does a Community or Distributed Generation project connect to the electric grid?



These projects almost always connect to a three-phase distribution line. A distribution line is conceptually the same as a transmission line but moves electricity at a much lower voltage. A distribution line must be within one mile of your property (or preferably much less) to make interconnection cost-effective. Through LandGate's accessible distribution line data, developers and landowners can evaluate land parcels based on segments & feeders, proximity to existing distribution lines and distribution hosting capacity.

Virginia
LMP Data

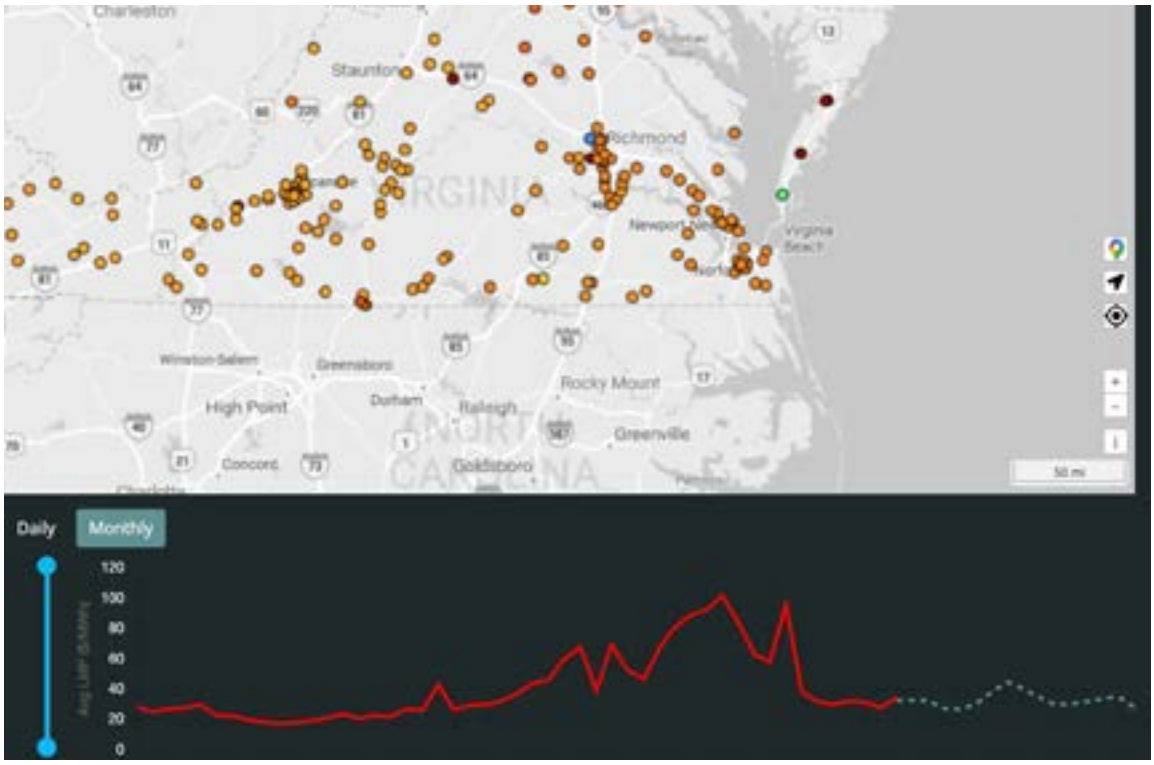
LMP (Locational Marginal Price) is a pricing mechanism used in wholesale/merchant energy markets to determine the cost of electricity at specific locations (node) within the grid. LMP considers a number of variables, including the cost of generating power, transmission constraints, grid congestion, losses, and load at certain nodes or locations within the electrical grid. The prices at which electricity is bought and sold in the market in real time or on an hourly basis are reflected in its calculation, which is done through market procedures.

Virginia saw the average LMP price increase by 67.3% in the past 3 years with an average price of $35 $/MWh in 2023. This price is expected to increase by 8.3% in 2024 and attract several renewable energy developers for utility and community scale solar projects. Similarly, consumer electricity purchase cost has also increased for the past few years in Virginia. The current commercial electricity rate is 12.40 ¢/kWh which is a 4.1% increase compared to the commercial electricity rate of 11.91 ¢/kWh in 2020.

Higher LMP prices correspond to higher electricity costs, which could mean more money for solar installations. When compared to solar projects in areas with lower LMP pricing, locations with higher LMP prices may result in higher revenue. Power purchase agreements (PPAs) and solar project participation in energy markets are both impacted by LMP. The ability to engage in market transactions and maybe land more advantageous PPAs gives solar projects situated in areas with favorable LMP pricing a competitive edge in the electricity markets. LMP can affect the PPAs for solar projects' pricing conditions, lengths, and general allure.

By offering participants in community solar more potential power bill savings, higher LMP pricing can improve the value proposition. Greater adoption of community solar may result from community solar projects situated in regions with higher LMP prices being more economically feasible and appealing to potential members.

Virginia
LMP Scorecard



Merchant Energy Pricing: **Market: PJM** **Hub: Virginia Hub**	
Number of price nodes active:	**210**
Average LMP price as of 07/01/23:	**$35.00**
Average retail price as of 07/01/23 (how much a community solar farm or behind the meter electricity generation sales electricity for + consumer purchase cost)	**12.40¢/kWh** Current commercial electricity rate **11.91¢/kWh** Rate in January 2020, +4.11% incr.
Percentage change in average LMP in the past 3 years	**+67.38%**
Forecasted percentage change in average LMP Price for 2024:	**+8.31%**

Average LMP Prices: Historical & Forecasts

Year	Avg LMP Price ($/MWh)
2018	$51.07
2019	$27.35
2020	$20.93
2021	$40.49
2022	$76.61
2023	$31.70
2024 (est.)	$33.92
2025 (est.)	$37.99
2026 (est.)	$42.76

Based on the LMP and ISOs data in Virginia, the 2024 average LMP is estimated to be $33.92/MWh, increasing by 7.0% compared to 2023.

Virginia
PPA Data

Utility-scale solar can be integrated into the grid and electricity can be sold at a predetermined price thanks to PPAs (Power Purchase Agreements) with utilities or power purchasers. Even if they are unable to put solar panels on their own homes, PPAs for community-scale solar projects allow local participants to profit from solar energy generation. The time and amount of power sales are governed by the PPA's terms, which guarantees a steady market for the solar installation.

The average Utility-Scale PPA price in Virginia is 45.91/MWh. This price has decreased by 5.37% in the past 3 years. A lower PPA price means that the cost of power from the particular project is now more competitive when compared to other energy sources. It implies that a solar or wind farm, for example, has become more cost-effective and is now able to offer electricity at a cheaper cost, making it a more alluring option for consumers. Electricity consumers may benefit from cheaper electricity prices as a result of a drop in PPA prices. This can lower consumers' overall energy expenses and have a positive effect on their electricity bills, whether they are residential, commercial, or industrial customers.

Virginia
PPA Scorecard

Average PPA price 2023:	**$45.91/MWh**
Average PPA price change in the last 3 years	**-5.37%**
Largest PPA buyers:	**Amazon**

Average PPA Prices:

Year	Price ($/MWh)
2020	$48.52
2021	$46.70
2022	$45.91
2023	$45.91

Federal & Virginia State

Tax Incentives for Solar Developers

There are several federal and state incentives available for solar development in Virginia, intended to encourage the use of solar energy by making solar power more affordable for businesses and organizations that install solar systems. These incentives can improve the financial viability of solar projects since they lower the initial costs and increase the return on investment. Solar project incentives aid in the switch to clean, renewable energy sources, which lower greenhouse gas emissions and slow climate change. Incentives aid in increasing the deployment of solar projects by making solar energy more financially appealing, replacing fossil fuel-based power and lowering the environmental effects related to traditional energy sources.

Virginia offers two primary incentive programs for solar energy. You can combine both with the nationwide federal tax credit. The programs are: A property tax exemption for the increase in home value after going solar Solar Renewable Energy Certificates (SRECS), which are financial incentives for generating clean electricity

VA Solar Development Incentive	Type	About
Federal Solar Tax Credit (ITC)	Federal	Developers can claim 30% of the installation cost as a credit on their federal income taxes.
Renewable Portfolio Standard (RPS)	State	The Virginia Power Agency sets targets for the RPS which is the percentage of energy that utilities must derive from renewable sources. Under the RPS the Virginia Power Agency manages RECs (Renewable Energy Credits)
The Virginia SAVES Green Community Program	State	The Virginia SAVES Green Community Program offers low-interest financing for energy efficiency, renewable energy and electric vehicle charging projects. Unfortunately, homeowners cannot apply directly. The program is only available
Solar Renewable Energy Certificates (SRECs)	State	Virginia's SRECs are a financial boon for those generating clean electricity through solar power. By participating in this program, solar system owners not only contribute to a greener future but also enjoy economic benefits, making the transition to solar energy even more appealing.

Federal Solar Tax Credit, also known as the Investment Solar Tax Credit (ITC)

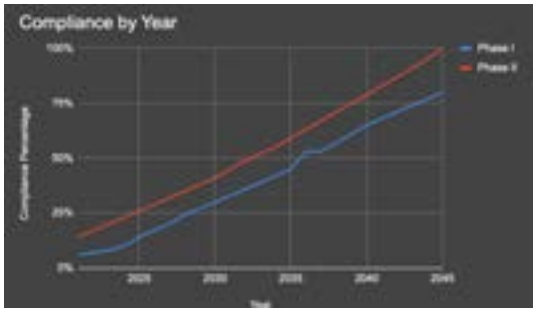
Federal Solar Tax Credit (ITC) is 30% until 2032 which can be claimed in Virginia as well. Developers of community-scale and utility-scale solar projects are eligible for the Federal Solar Tax Credit as long as the solar energy systems they install meet the requirements. The tax credit percentage for community-scale solar and utility-scale solar projects is also 30% of the total project Cost. This means that developers can claim 30% of the installation cost as a credit on their federal income taxes.

Renewable Portfolio Standard (RPS)

Virginia's Renewable Portfolio Standard (RPS) requires Phase II Utilities to generate 100% of their power from renewable sources by 2045. The RPS requires Phase I Utilities to generate 100% of their power from renewable sources by 2050.

The Re-Regulation Act, including the triennial review provisions contained in Va. Code § 56-585.1(A), only applies to APCo and Dominion. In the Re-Regulation Act, APCo is referred to as a Phase I utility, and Dominion is referred to as a Phase II utility.

Details: In 2021, the state increased its RPS targets to 50% of electricity sales from renewables by 2040, replacing the earlier target of 25% by 2026. Of the target amount 45% is required to be procured from wind projects and 55% from photovoltaic projects.



The Virginia SAVES Green Community Program

The Virginia SAVES Green Community Program offers low-interest financing for energy efficiency, renewable energy and electric vehicle charging projects. Unfortunately, homeowners cannot apply directly. The program is only available for businesses, local governments and nonprofits.

Solar Renewable Energy Certificates

Virginia's SRECs are a program meant to benefit solar system owners and not just aim for a greener future but also reap economic benefits, making the transition to solar energy even more appealing for solar system owners in Virginia. These are the SREC's offered in Virginia.

3-Year (2023-2025) $45.00 (12-months paid in first payment, then quarterly)

5-Year (2023-2027) $38.00 (12-months paid in first payment, then quarterly)

15-Year Upfront $180 per kW DC

With such a wealth of new data on the state of Solar Development in Virginia, we imagine you might have questions about how to apply these trends, data, and tools to your own solar development efforts in Virginia. Our dedicated energy markets team can help walk you through how to access and interpret this information in a way that is relevant to your business needs. Scan the code to the right to schedule time with our team to talk one on one.

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