# SOLAR DEVELOPMENT IN WEST VIRGINIA:

## A pathway to a brighter economic future

Downstream Strategies
Ideas that sustain.

The Nature Conservancy

WVU LAW
CENTER FOR ENERGY & SUSTAINABLE DEVELOPMENT

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# INTRODUCTION

West Virginia has the potential to generate a significant amount of electricity from solar photovoltaic (PV) systems to power homes, businesses and the grid. Solar development represents a huge economic opportunity for West Virginia to continue as a domestic energy leader into the future. If the state embraces solar-friendly policies, jobs will be created, tax revenues will increase, existing industries will secure cheap electricity and new companies seeking renewable energy will locate in West Virginia. States that make early investments in solar will reap the greatest rewards.

## Solar development creates direct and indirect jobs

- Solar installation companies
- Solar panel and component manufacturers
- Large industrial and commercial employers can grow their businesses by securing predictably priced, cheap electricity
- New growth industries and companies with renewable energy targets are more likely to choose to locate where they have access to clean energy

As illustrated in this report, one need only look at the nearby area—Virginia, Maryland, Pennsylvania, Ohio, Kentucky, Tennessee, North Carolina and Washington D.C.—to see how quickly solar can be developed and to identify the economic benefits that solar brings. In addition to jobs, it can stabilize and potentially reduce electricity rates and can increase local revenues through taxes and payment in lieu of taxes (PILOT) agreements.

Solar development has proceeded at very different paces in different states. The most important driver is not necessarily the amount of sunlight—it is state policies. Once enabling policies are in place, local jobs will be created—even in states like West Virginia with regulated electricity markets.

This is the first of two companion reports that provide a roadmap for facilitating solar development on mined lands in West Virginia. This report discusses the drivers of solar development across the region and identifies benefits that are accruing to states that are already pursuing solar development. The second report, entitled "Roadmap for Solar on Mine Lands," provides recommendations that will result in the deployment of solar on mine lands in West Virginia.

## Rooftop and Utility-scale solar

### Rooftop solar

Small rooftop systems installed on homes and businesses produce all or part of the electricity consumed onsite. Excess electricity may be sold back to the grid.

### Utility-scale solar

Large utility-scale solar arrays can cover hundreds of acres and typically feed directly into the grid.

## SOLAR IS BECOMING AN IMPORTANT ENERGY RESOURCE ACROSS THE COUNTRY

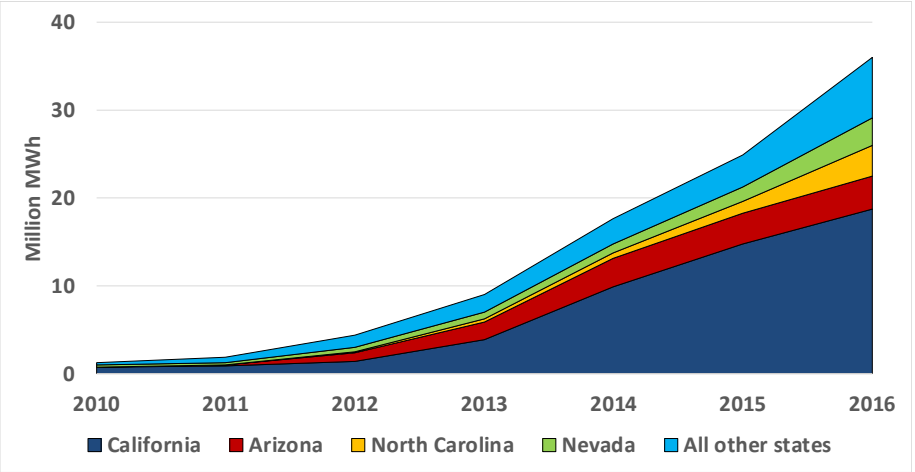
While solar arrays have generated electricity across the country for decades, only in the mid-2010s did generation begin to rise significantly. North Carolina is among the top four solar-producing states, which also include California, Arizona and Nevada (Figure 1). Among the states near West Virginia, North Carolina generated more solar electricity than all other states combined (Figure 1) but now other states are catching up fast. North Carolina, Virginia, Maryland, and Pennsylvania can provide good examples of the impact of state policies on the development of solar.

Solar development will continue at a fast pace due to supportive policies and declining costs. In fact, as the cost of solar has declined, the unsubsidized costs of utility-scale solar are now competitive with fossil fuels. Utility-scale solar is the lowest cost source of electricity in parts or all of Colorado, Missouri, Illinois, Wisconsin, Minnesota, Iowa and Nebraska (The Solar Foundation, 2018).

SOLAR DEVELOPMENT IS PROGRESSING RAPIDLY FOR UTILITIES THAT SERVE STATES NEAR WEST VIRGINIA.

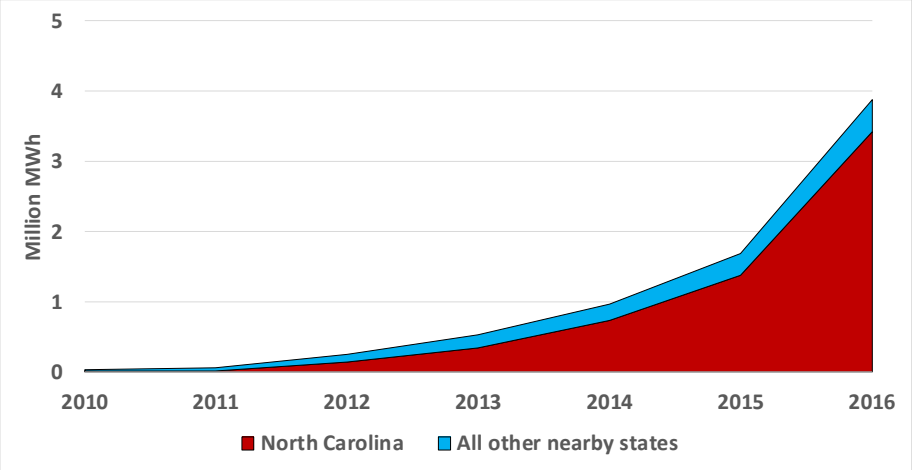
Solar development is progressing rapidly for utilities that serve states near West Virginia. For example, American Electric Power (AEP)—which serves parts of West Virginia, Virginia, Ohio and Kentucky, along with states outside the region—plans to add up to another 3,065 MW of solar generation by 2030 (American Electric Power, 2018). In 2017, its subsidiary, Appalachian Power, issued a request for proposals for up to 25 MW of solar electricity in its West Virginia or Virginia service territory (Appalachian Power, 2017). Appalachian Power then issued a second request for proposals in 2018 for up to 200 MW of solar electricity—but projects must be in Virginia (Appalachian Power, 2018). Dominion Energy, another utility that serves Virginia, is seeking bids for up to 500 MW of solar and onshore wind generation. This is part of a plan to develop 3,000 MW of solar and wind power in Virginia (Dominion Energy, 2018).

**FIGURE 1: GROWTH IN SOLAR GENERATION: ALL STATES (2010-2016)**




Source: EIA (2017a).

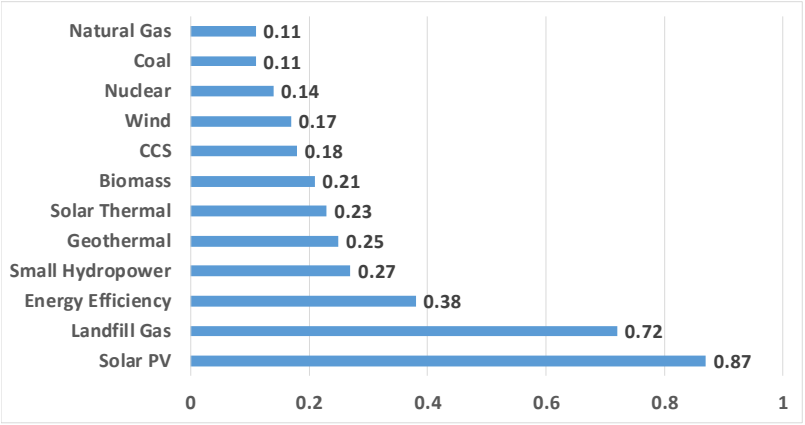
**FIGURE 1: GROWTH IN SOLAR GENERATION: NEARBY STATES (2010-2016)**




Source: EIA (2017a).

**NO MATTER THE SCALE, ALL TYPES OF SOLAR DEVELOPMENT CREATE ECONOMIC BENEFITS, AND THE SOLAR INDUSTRY CREATES MORE JOBS PER UNIT ELECTRICITY PRODUCED THAN ANY OTHER TYPE OF FUEL (FIGURE 2).**

**FIGURE 2: AVERAGE TOTAL JOB-YEARS PER GWH OUTPUT**




Source: Wei et al. (2010).

## Solar growth in North Carolina

The driver of solar growth in North Carolina from 2012-2016 was its Renewable Energy and Energy Efficiency Portfolio Standard (REPS), established in 2007. In 2008, the North Carolina Utilities Commission issued an order adopting final rules to implement the REPS. As Renewable Portfolio Standards (RPSs) go, North Carolina was fairly late to the game, but moved aggressively once it got in the game.

In North Carolina, Duke Energy—the largest public utility operating in North Carolina—also began to move very aggressively with solar resources in early 2014. It made a $500 million commitment to a major expansion of solar power in North Carolina by acquiring and constructing three solar facilities—totaling 128 MW—and signing Power Purchase Agreements (PPAs) for five new solar projects in the state, representing 150 megawatts of capacity. Together, the eight projects will have a capacity of 278 MW.

In response to HB 569, Duke Energy proposed a number of options to make solar available to its customers, including: (1) a $62 million solar rebate program for customers installing solar PV systems of 10 kW or less; (2) a “Shared Solar” program that would allow customers to subscribe to the output of a nearby solar facility, thereby providing an alternative for customers who do not want, nor can't have, a solar array on their property; and (3) a “Green Source Advantage” program that would allow large customers to secure solar power to offset the amount of power purchased from Duke Energy, thereby accommodating the needs of large customers seeking to fulfill sustainability objectives by procuring a percentage of their electricity

### Competitive Solutions for North Carolina bill

North Carolina should see continued strong growth in solar. During the 2017 legislative session, the North Carolina General Assembly passed the "Competitive Solutions for North Carolina" bill (HB 569). This legislation included provisions designed to stimulate solar development.

It allows for third-party leasing of solar energy so that customers can enter into PPAs with solar companies and avoid the significant up-front capital costs associated with typical rooftop solar installations.

The law also modifies the implementation of the Public Utility Regulatory Policies Act (PURPA) in North Carolina and allows only very small producers to secure standard contracts at avoided cost rates, while larger projects are shifted to a competitive bidding process to ensure that the resource is captured at a reasonable price for utility customers.

In addition, the law requires public utilities in the state to procure a significant amount of solar (2,660 MW over a 45-month period)—and to do so using a competitive bidding process. The law permits utilities to construct their own utility-scale solar projects (for up to 30% of the procurement requirement) or to purchase renewable energy facilities from third parties.

## WEST VIRGINIA'S SMALL SOLAR INDUSTRY COULD BE BOOMING LIKE NEARBY STATES

There are significant opportunities for West Virginia's small solar industry to grow substantially. A total of 4,412 megawatts (MW) of solar capacity has been installed in North Carolina, and hundreds of MW have been installed in Maryland, Virginia, Pennsylvania, Tennessee and Ohio. As illustrated in Figure 6, the total in West Virginia is only 6 MW.

Historically, West Virginia's deployment of solar has been limited to small distributed systems, with the largest being a 400-kilowatt (kW) system at American Public University. The average system size in West Virginia, 9 kW, is the smallest in the region ().

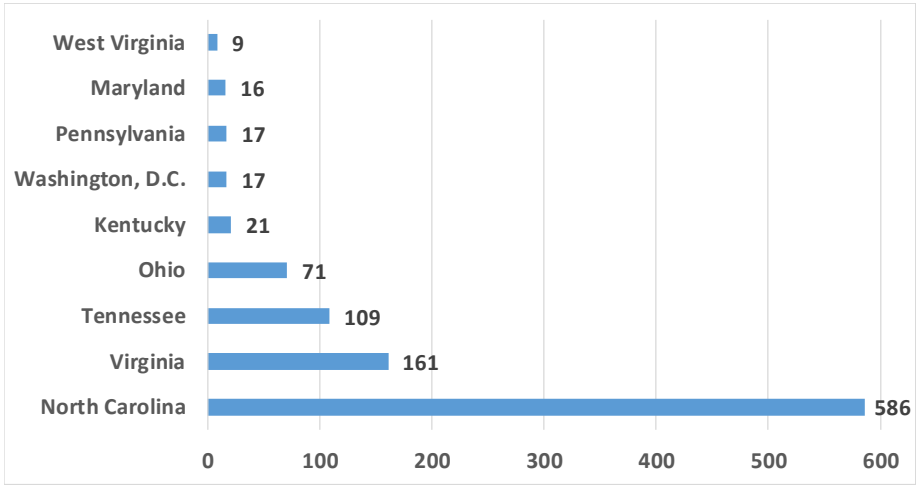


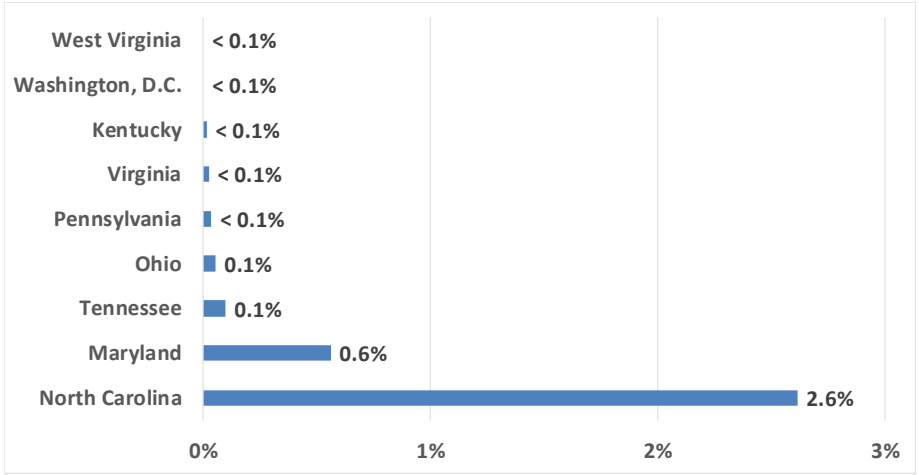

**FIGURE 3: AVERAGE SIZE OF SOLAR ARRAYS (KW) SOURCE: SEIA (2018A).**

## Distributed solar in West Virginia

West Virginia Solar United Neighbors (SUN) has facilitated the growth of distributed solar on homes and business through solar cooperatives, which have installed over 1 MW of solar capacity since 2014 (Long, 2018).

| Location | Year | kW |
|---|---|---|
| Morgantown | 2015 | 147 |
| Lewisburg/Beckley | 2017 | 112 |
| Wheeling | 2015 | 110 |
| Jefferson County | 2018 | 106 |
| Mid-Ohio Valley | 2017 | 86 |
| Monroe County | 2015-16 | 68 |
| Upper Ohio Valley | Ongoing | 66 |
| Kanawha County | 2015 | 54 |
| New & Gauley Rivers | Ongoing | 50 |
| Huntington | 2017 | 48 |
| Statewide Ag & Small Business | Ongoing | 42 |
| North-Central WV | 2017 | 37 |
| Tucker/Randolph | 2015 | 33 |
| Fayette County | 2014 | 33 |
| Berkeley & Morgan Counties | 2018 | 23 |
| Charleston | 2017 | 18 |
| Potomac Highlands | 2018 | 17 |
| **Total** | | **1,050** |

**FIGURE 4: SOLAR GENERATION AS A PERCENTAGE OF TOTAL GENERATION (2016)**




Source: EIA (2018a).

WEST VIRGINIA'S DEPLOYMENT OF SOLAR HAS BEEN LIMITED TO SMALL DISTRIBUTED SYSTEMS.

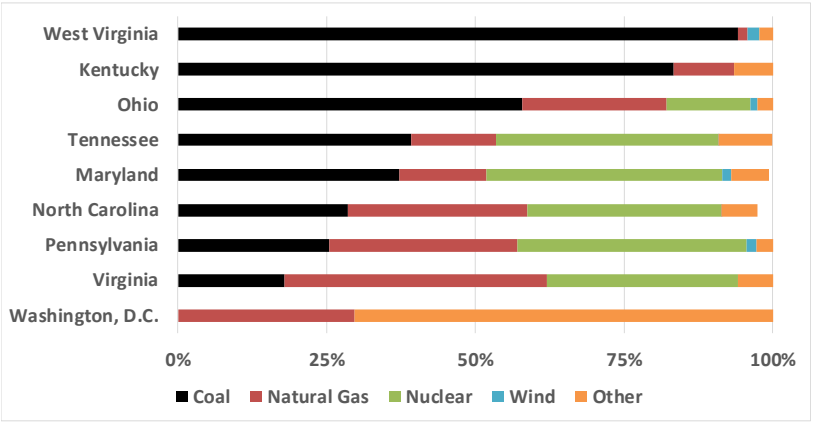
In West Virginia, electricity generated by solar arrays is relatively insignificant at this point. The fuel mix used to generate electricity in the state is an outlier in both the region and in the country. In 2016, 94% of West Virginia's electricity was still generated from coal, more than any state in the region and the highest percentage of any state in the country. Only two other coal-producing states come close: Wyoming (86%) and Kentucky (83%).

POLICY TOOLS ARE AVAILABLE THAT WOULD DIVERSIFY A STATE'S FUEL MIX TO INCLUDE A RANGE OF FUELS, INCLUDING SOLAR.

As illustrated in Figure 5, all the other states in the region have a much more diversified electricity generation portfolio than West Virginia. Natural gas makes up a significant amount of the energy mix in all other states, and nuclear generates a large percentage of electricity in all other states except Kentucky.

Two of the most diversified states, North Carolina and Pennsylvania, are instructive because North Carolina has a regulated electricity market, while Pennsylvania's is deregulated. As discussed below, policy tools are available in both regulated and deregulated states that would diversify a state's fuel mix to include a range of fuels, including solar.

**FIGURE 5: NON-SOLAR GENERATION AS A PERCENTAGE OF TOTAL GENERATION (2016)**



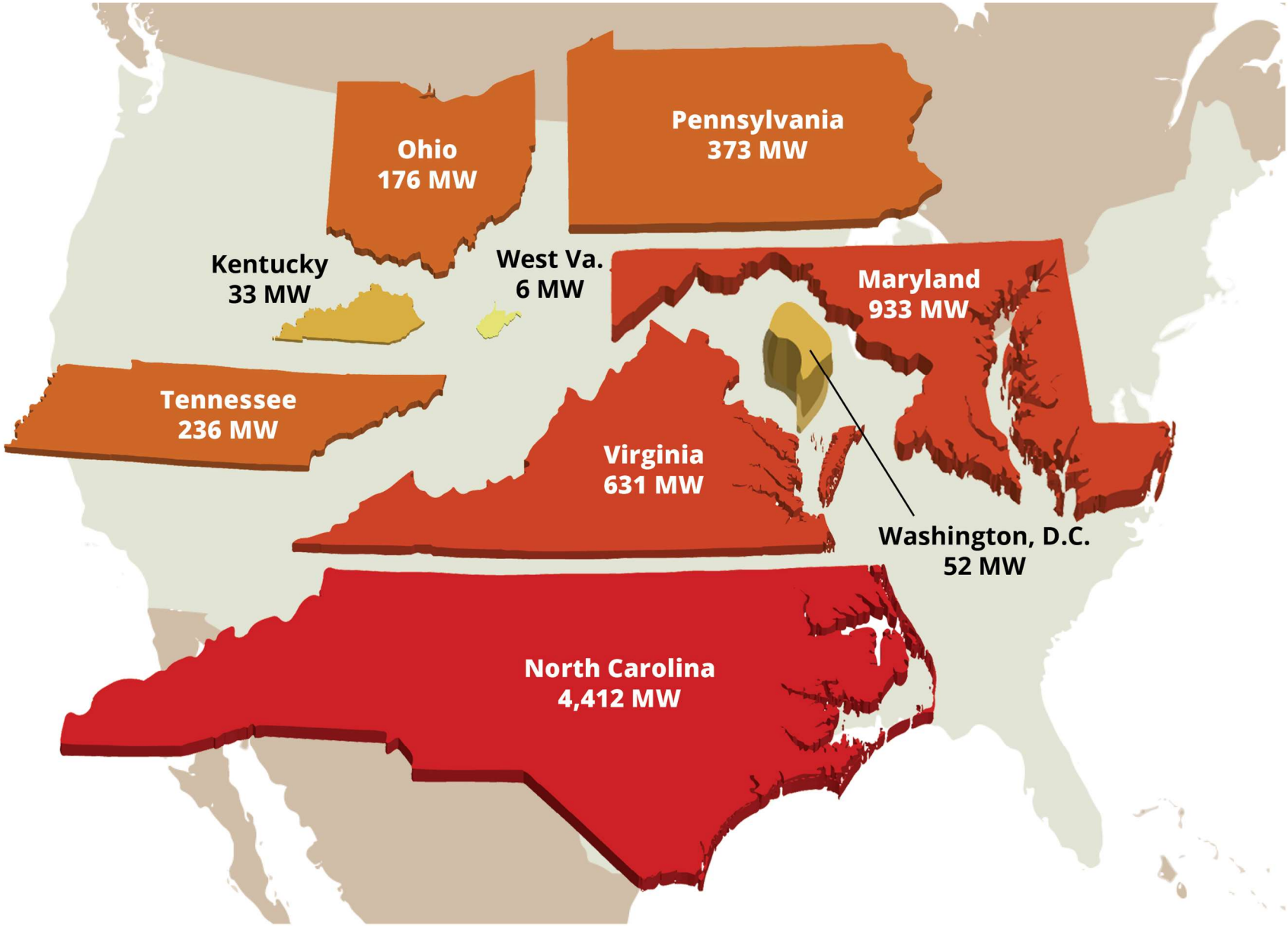

Source: EIA (2018a). Note: This chart shows all fuels other than solar.

## One of West Virginia's largest solar arrays

While several new solar larger solar systems are currently in the development cycle in West Virginia, in 2011, Mountain View Solar installed more than 1,600 solar panels on a car canopy structure on American Public University's (APUS) campus in Charles Town, WV. This solar array is the largest in the state and has produced 3.07 GWh of electricity that otherwise would have been purchased from the grid (Christensen, 2018).

According to APUS President & CEO Wallace E. Boston, "The array supports our core mission to expand access to affordable online higher education to our students in a manner that supports local communities and respects the environment. In 2017, it produced 480,000 kWh of energy, enough to provide roughly 27 percent of the total needed to power our adjacent LEED Gold-certified Finance Center. When compared to 2016, this represents a year-over-year savings of approximately 255,000 kWh due to decreased HVAC usage and related efficiencies. The array features 14 universal electric car charging stations and produces enough electricity to power 30 average-sized homes annually or to enable the average gas-powered vehicle to travel 1.9 million miles, equal to 120 commuters driving 15,000 miles each year" (Muys, 2018).

**FIGURE 6: TOTAL INSTALLED SOLAR CAPACITY**




Source: SEIA (2018a).

**FIGURE 7: EXAMPLES OF SOME OF THE LARGEST SOLAR ARRAYS IN EACH STATE**

**West Virginia: American Public University**

- 0.4 MW
- Owned by American Public University
- Built in 2012

**Ohio: Bowling Green Solar**

- 20 MW
- Owned by DG AMP, LLC
- Built in 2017

**Kentucky: E.W. Brown**

- 10 MW
- Owned by Kentucky Utilities
- Built in 2016

**Pennsylvania: PA Solar Park**

- 10.1 MW
- Owned by Consolidated Edison Development
- Built in 2012

**Tennessee: Selmer 1**

- 16 MW
- Owned by Selmer North Solar 1, LLC
- Built in 2016

**Virginia: Southampton Solar**

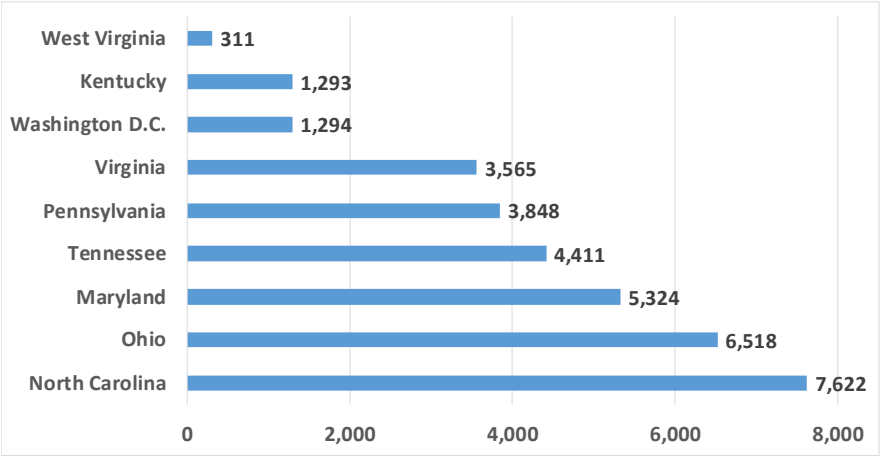
- 100 MW
- Owned by Dominion Renewables
- Built in 2017

Source: EIA (2017b). West Virginia data from Christensen (2018). No photo is available for the 100-MW North Carolina Innovative Solar 37 array, owned by Dominion Renewables and built in 2017.

## SOLAR CAN CREATE JOBS, ATTRACT NEW EMPLOYERS AND INCREASE LOCAL REVENUES

Across the country, the solar industry supported more than 242,000 jobs in 2018 (The Solar Foundation, 2018), and solar installation is the fastest-growing employment sector in the United States (SEIA, 2017). While thousands of solar-related jobs are found in all nearby states and Washington D.C., only about 300 solar-related jobs are found in West Virginia (Figure 8). In general, solar jobs can be broken into five sectors: installation, project development, manufacturing, sales and distribution, and "other."

**FIGURE 8: SOLAR JOBS IN 2017**




Source: The Solar Foundation (2018).

### Installation and project development

The project development sector is distinguished from the installation sector because it includes firms that work mostly on large-scale systems that supply electricity directly to the grid. Most workers at solar installation and project development companies are electricians and construction laborers. These companies, however, also employ a wide range of project support staff, including permitting, engineering, design, sales, marketing, administration, accounting and management (The Solar Foundation, 2018).

### Manufacturing

Solar manufacturers produce the solar panels and associated components, such as inverters and mounting structure hardware (The Solar Foundation, 2018).

### Solar jobs in West Virginia

West Virginia solar jobs are found at:

- solar installers such as Mountain View Solar and Solar Holler (Mountain View Solar, 2018; Solar Holler, 2018)
- companies such as Wheeling-Nisshin that manufacture steel coatings for solar racking systems (Wheeling-Nisshin, 2018)

### Sales and distribution

Wholesale and retail-trade establishments make up the sales and distribution sector of the solar industry. These firms sell, but do not install, solar and ancillary services to customers and/or warehouse and distribute solar goods to installers (The Solar Foundation, 2018).

ACROSS THE COUNTRY, THE SOLAR INDUSTRY SUPPORTED MORE THAN 242,000 JOBS IN 2018.

### Other jobs

Other jobs not included in the previously mentioned sectors are found in academic research, government oversight, research and development, nonprofit advocacy, finance, architecture, consulting, law and communications (The Solar Foundation, 2018).

## NEW EMPLOYERS

Worldwide, businesses are making vigorous commitments to sustainability. The hallmark of many of these commitments is decreasing the carbon-intensity of daily operations, often through the implementation of energy efficiency measures and installation of renewable energy sources. Sought-after employers like Google and Amazon have integrated renewable energy as part of their business models.

WORLDWIDE, BUSINESSES ARE MAKING VIGOROUS COMMITMENTS TO SUSTAINABILITY.

Google, a technology company that employs nearly 90,000 people but has no existing facilities in West Virginia, powers 100% of its operations, including many data centers, with renewable energy through power-purchase agreements (Google, 2018).

Amazon, a multinational e-commerce, cloud computing and artificial intelligence firm that employs over 600,000 people, including several hundred in West Virginia, is committed to achieving 100% renewable energy usage across its global infrastructure. The company is currently constructing new wind and solar farms in nearby Ohio, Virginia, Indiana and North Carolina. When completed, these installations will deliver more than 1.6 million megawatt-hours of renewable energy into the electric grids that power Amazon Web Services' cloud data centers (Amazon, 2018).

Indeed, many companies already doing business in West Virginia have made corporate sustainability commitments that involve replacing grid-supplied electricity with solar power, either through renewable energy credits or on-site solar installations. These renewable energy investments, however, are not being made in West Virginia.

MANY COMPANIES ALREADY DOING BUSINESS IN WEST VIRGINIA HAVE MADE CORPORATE SUSTAINABILITY COMMITMENTS THAT INVOLVE REPLACING GRID-SUPPLIED ELECTRICITY WITH SOLAR POWER.

Toyota has challenged itself to eliminate carbon dioxide emissions, not only from the vehicles it manufactures but also from the manufacturing process itself (Toyota, 2018a). Symbolic of this self-imposed challenge, Toyota North America installed 8.79 MW of solar at its Plano, TX headquarters (Toyota, 2018b). Toyota is the 31st largest employer in West Virginia (WorkForce West Virginia, 2018).

The Target Corporation has been recognized as the Number 1 Corporate Solar Installer by the Solar Energy Industries Association for two consecutive years (Target, 2018). Target has 204 MW of installed solar capacity at 436 sites across the country (*PV magazine*, 2018a). Target is the 89th largest employer in the state (WorkForce West Virginia, 2018).

Walmart is on track to get 50% of its electricity from renewable energy sources by 2025. Today, the company has 500 solar installations across the country (*pv magazine*, 2018b). Walmart operates 44 locations in West Virginia (Walmart, 2018) and is the state's second largest employer (WorkForce West Virginia, 2018).

## LOCAL REVENUES

Solar development increases the tax value of land upon which the array is sited, thereby increasing real property taxes that provide revenues to local governments.

SOLAR DEVELOPMENT INCREASES THE TAX VALUE OF LAND UPON WHICH THE ARRAY IS SITED.

Business property taxes, based on the value of the solar equipment itself, can bring in additional revenues. However, because solar investments are capital intensive upfront because there is no ongoing fuel cost —and to promote the development of renewable energy—38 states offer property tax exemptions for renewable energy (SEIA, 2018b). For example, North Carolina exempts 80% of the appraised value of a solar PV system from property tax (DSIRE, 2018).

One way that local communities benefit from solar projects is through PILOT agreements, which are frequently negotiated between the solar developer and the local community.

ONE WAY THAT LOCAL COMMUNITIES BENEFIT FROM SOLAR PROJECTS IS THROUGH PILOT AGREEMENTS.

Massachusetts, a state that has witnessed significant growth in the solar industry, is home to many local government entities that have successfully executed PILOT agreements (SEIA, 2018c). In 2012, for example, the Town of Rochester entered into a PILOT agreement with Consolidated Edison Development. As part of the agreement, the developer agreed to pay $9,524 per MW per year on a 4.2-MWproject for 20 years—$800,000 over the lifetime of the agreement for a 30-acre solar facility on the edge of town (Rochester, 2012).

Closer to West Virginia, two PILOT agreements were approved in Maryland's Washington County. According to one PILOT approved in November 2016, the developer of an 18.3-MW solar array would pay $110,000 per year over 20 years, for a total of $2.2 million, to the county. According to the second PILOT approved the following month, the developer of a 7-MW solar array would pay $42,000 per year over 30 years, for a total of $1.26 million, to the county (Greene, 2016; Board of County Commissioners of Washington County, Maryland, 2016).

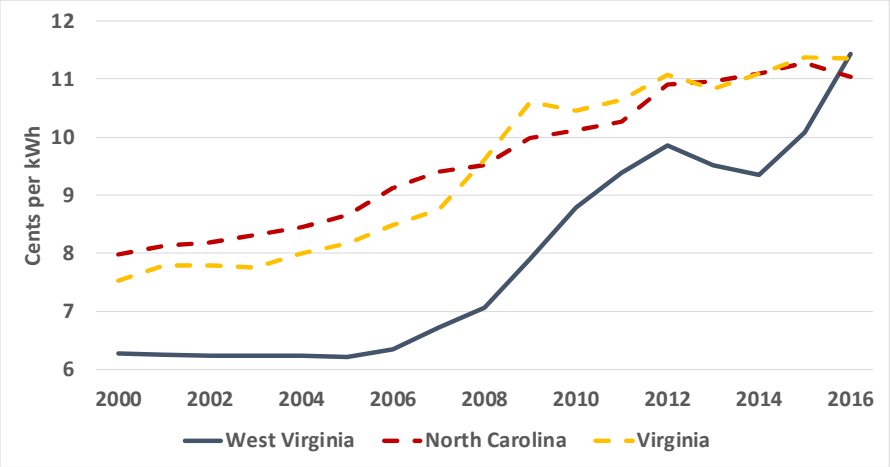
## SOLAR CAN HELP ADDRESS WEST VIRGINIA'S INCREASING ELECTRICITY RATES

West Virginia has experienced a rapid rise in electricity prices over the past decade. As recently as 2008, West Virginia had low electricity prices relative to the national average, but that price gap has narrowed considerably. Between 2008 and 2017, electricity prices in West Virginia increased by about six percent annually—the fastest growth rate in the nation over this period (Bowen and Christiadi, 2017). As illustrated in Figure 9, West Virginia now has higher average residential electricity rates than North Carolina and Virginia. In West Virginia, residential electricity rates are substantially higher than commercial and industrial rates (Figure 10).

SOLAR CAN PLAY A ROLE IN STABILIZING AND POTENTIALLY REDUCING WEST VIRGINIA'S RISING ELECTRICITY RATES.

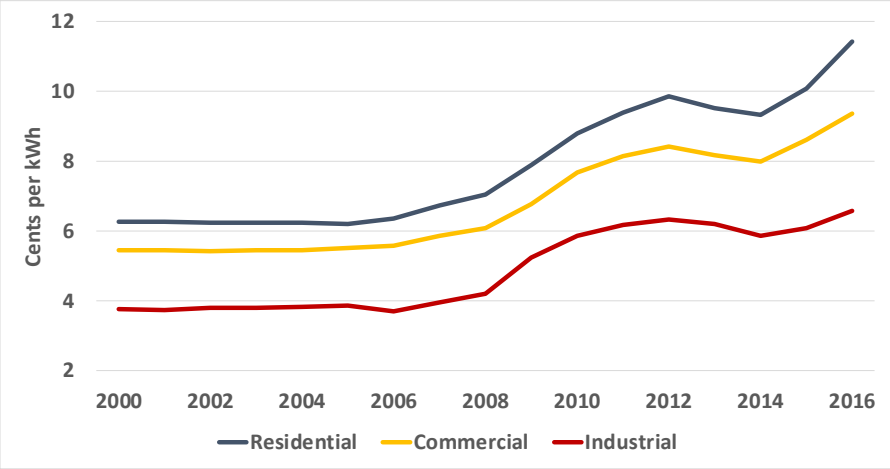
These trends likely can be explained by multiple factors, including reduction in electricity demand that led to loss of economies of scale, increased federal environmental safeguards that contributed to rising costs of electricity generation using coal and rising operations and maintenance costs from an aging plant fleet (West Virginia Forward, 2018). Over the past five years, the Public Service Commission approved the transfer of three aging coal plants from unregulated merchant subsidiaries of FirstEnergy and AEP into the regulated utility rate base in West Virginia. As a result, ratepayers are bearing the full costs of operation of plants that are too inefficient to succeed in the competitive wholesale power markets, which has resulted in large annual rate increases through power cost adjustment mechanisms when the predicted revenues from wholesale sales failed to materialize. While coal-based electricity prices in West Virginia have risen, the cost of solar electricity has fallen. As illustrated in Figure 11, the cost per watt in 2017 is less than one-quarter of the cost per watt in 2010.

**FIGURE 9: RESIDENTIAL ELECTRICITY RATES (2000-2016)**



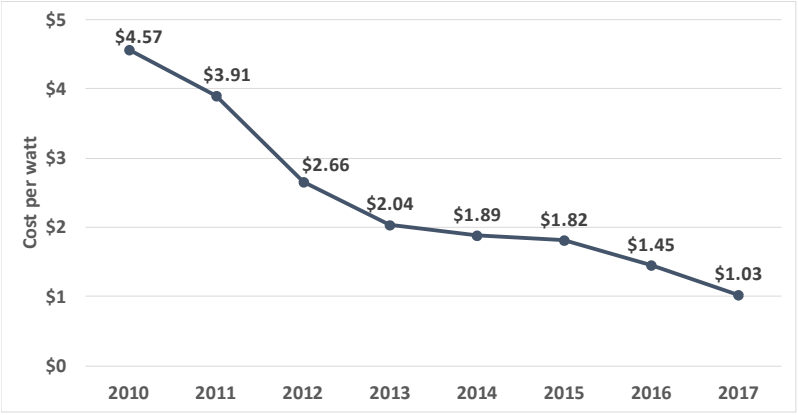

Source: EIA (2018b).

**FIGURE 10: WEST VIRGINIA RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL ELECTRICITY RATES (1990-2016)**




Source: EIA (2018b).

**FIGURE 11: UTILITY-SCALE SOLAR COST (2010-2017)**




Source: Fu et al. (2017).

### Regulated versus deregulated electricity markets

***Regulated markets***

- Utilities have monopolies to sell electricity in specific regions
- Utilities are regulated by state public utility commissions or public service commissions

***Deregulated markets***

- Electricity generators compete for customers across the state
- Solar producers can sell into the market and are guaranteed grid access

## SOLAR CAN THRIVE IN REGULATED OR DEREGULATED ELECTRICITY MARKETS

Solar development has proceeded at very different paces in different states. The most important driver is not necessarily the amount of sunlight—it is state policies.

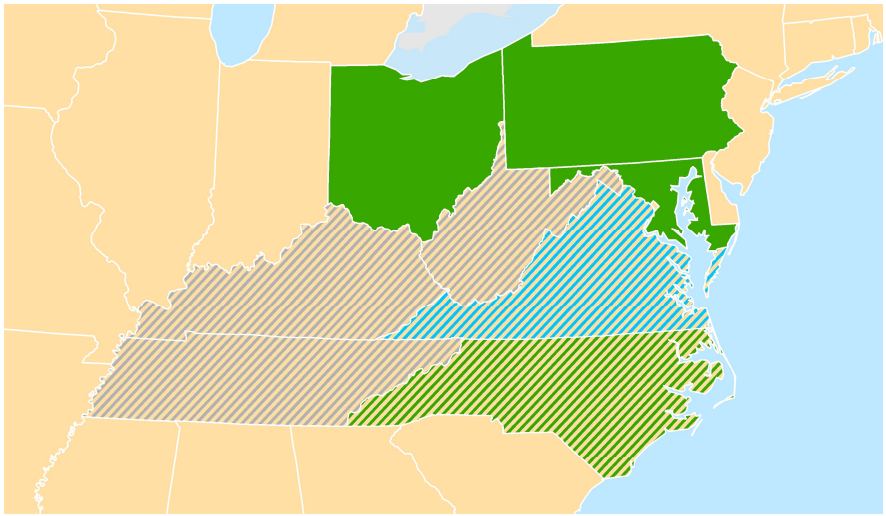
In the United States, several states have restructured their electricity markets to permit retail competition. In contrast to the traditional vertically integrated states—where utilities own or control the power plants that generate electricity, as well as all transmission and distribution equipment used to distribute electricity to homes and businesses, thereby giving customers only one option for their electricity supply—in the deregulated states, customers have a choice of energy suppliers, as multiple and competitive retail electric suppliers sell electricity to the businesses and residences that use it. In these states, the local utility will still deliver your power, but the "supply" portion of an electric bill is paid to the alternative suppliers.

Solar can thrive in both regulated or deregulated electricity markets; the driver is not the structure of the retail market in each state, but rather the extent to which state policies support solar.

SOLAR CAN THRIVE UNDER EITHER REGULATED OR DEREGULATED ELECTRICITY MARKETS.

North Carolina, a regulated electricity market, has the most installed solar capacity in our study area. Maryland and Virginia, with deregulated markets, have the second- and third-most installed solar capacity. West Virginia has a regulated market (Figure 12).

**FIGURE 12: REGULATED AND DEREGULATED ELECTRICITY MARKETS**




## REGULATED OR DEREGULATED MARKETS

Irrespective of whether a state's retail markets are regulated or deregulated, several state-level policies are effective in stimulating growth in solar development.

### Renewable portfolio standard (RPS)

An RPS requires utilities to achieve a certain percentage of electricity generation from renewables by certain dates. The imposition of a procurement obligation on utilities in and of itself increases the demand for renewable energy. In addition, because most RPSs allow renewable energy credits (RECs) to be used by utilities to fulfill their compliance obligations, a separate market is created for RECs, which is a product distinct from the energy commodity (in MWh) and provides an additional source of revenue to improve the economic feasibility of renewable projects.

### Solar carve-out

An RPS can be designed to require that a portion of the renewable energy procurement obligation be dedicated to solar resources, thereby increasing the demand for solar in particular and creating a solar REC (SREC) market with prices that typically are higher than for "generic" RECs. Unlike the market for some renewable resources, such as wind, states are increasingly closing their SREC market to projects located outside the state's boundaries. In other words, the electrons must be generated by solar projects located within the state to be eligible to be compensated as an SREC. Thus, for a state without an RPS, like West Virginia, there is no additional revenue stream for RECs or SRECs attributed to a solar project within such state.

### Net metering

Net metering offers West Virginia electricity customers the opportunity to generate their own electricity by requiring utilities to credit the output of eligible distributed energy resources (DERs) at retail rates. State laws can vary by the level of maximum capacity for DERs in the various customer classes (e.g., 25 kW for residential customers in West Virginia), the existence of a statewide cap on energy procured through net metering (e.g., 3% of a utility's retail load in West Virginia) and whether or not virtual net metering is allowed, either for an individual customer (e.g., a customer having two or more meters can apply DER generation across meters, regardless of distance between meters) or across a group of customers. Some states are revisiting net metering and adjusting the purchase rate downward from the retail rate to reflect the improving economics for solar PV resources and to minimize upward rate pressures and perceived cross-subsidization of DER resources. West Virginia's Net Metering Task Force recently studied this issue and found the retail rate of electricity is still used to credit customer-generators.

### Interconnection standards

Streamlining the interconnection standards can reduce the administrative burdens of integrating DERs into the utility network. Most states, including West Virginia, have developed interconnection standards.

### Third-party ownership of electric-generating equipment

If ownership of electric-generating equipment is limited to regulated utilities, then customers seeking to install solar PV must bear the upfront capital costs and are precluded from the flexibility of leasing solar panels or entering into PPAs. West Virginia currently prohibits third-party ownership of DERs, while North Carolina's recently enacted legislation expressly authorizes third-party ownership.

## REGULATED MARKETS

In regulated markets, utilities continue to be subject to close oversight by the state public utility commission (PUC), and therefore the policy decisions made by PUCs determine to a large extent whether the regulatory environment is favorable to solar development. Many policies can promote solar development in regulated markets.

### Rigorous integrated resource planning (IRP) requirements

PUCs can adopt policies that require utilities to engage in meaningful long-term resource planning, which would include a resource acquisition process that places solar electricity on an equal footing with other generating resources and generally produces a diversified portfolio of resources. Given the increasing cost-competitiveness of solar, as well as its zero fuel costs, solar PV can be expected to fare well under a rigorous IRP analysis. Its prospects are even better if the IRP process takes environmental externalities into account, which would burden fossil fuel resources with the pollution and climate change impacts of their technology.

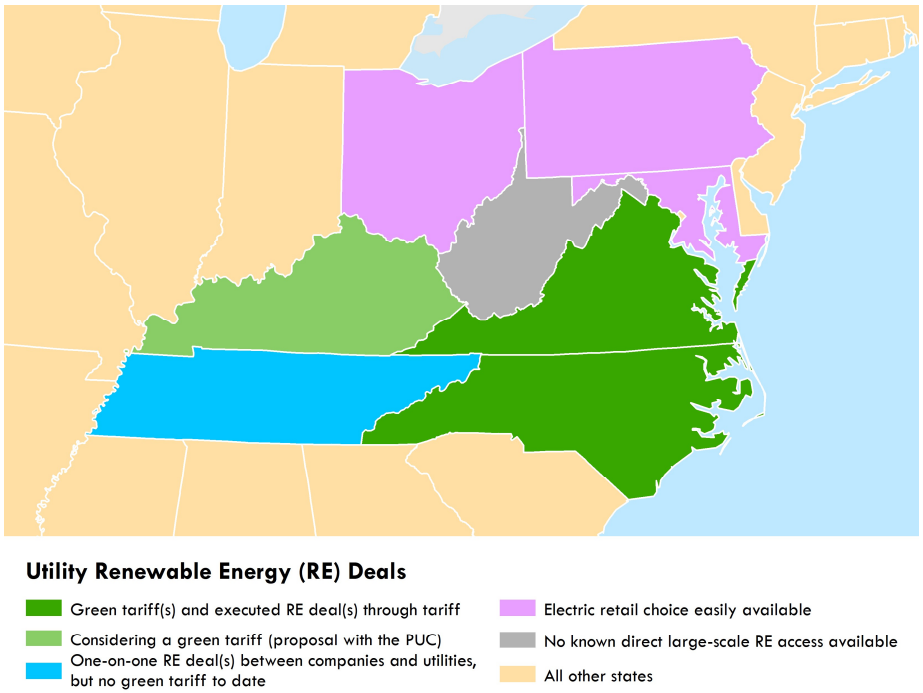
### Streamlined standard offer programs for distributed energy

In addition to net metering requirements, PUCs can require utilities to engage in a competitive bidding process to acquire new resources, or to offer standardized rates, terms and conditions for DERs. Requiring small projects to negotiate individually with utilities can make projects infeasible.

### Green tariffs

PUCs, under their existing statutory authority, can require utilities to provide customers with the option of purchasing all or a portion of their electricity supply from renewable resources. Such programs enable large customers with corporate sustainability objectives to satisfy renewable energy requirements through purchases of "green" electrons from the utility. The utility, in turn, is obligated to procure sufficient renewable resources to ensure that there are enough "green" electrons to satisfy the demand under green tariffs. As illustrated in Figure 13, nearby states make use of a variety of mechanisms to implement green tariff programs. West Virginia, in contrast, does not.

**FIGURE 13: STATES WITH GREEN TARIFF PROGRAMS**




Source: Barua and Bonugli (2018)

### Rigorous competitive procurements

Competitive procurements are one method for regulated utilities to use to obtain electricity supply for their retail customers. However, certain criteria need to be met for competitive procurements to provide the "best" fit to customers' needs at the "best" possible terms. Best practices include:

- The procurement process should be fair and objective.
- The procurement should be designed to encourage robust competitive offerings and creative proposals from market participants.
- The procurement should select winning offers based on appropriate evaluation of all relevant price and non-price factors.
- The procurement should be conducted in an efficient and timely manner.
- Regulators should align their own procedures and actions to support the development of a competitive response (Tierney and Schatzki, 2008).

## DEREGULATED MARKETS

For deregulated markets, the actions of PUCs are less critical, as the availability of choice for customers facilitates market development that reflects customer desires.

### Open access to wholesale markets & PPAs

Because the utility ceases to own generation in deregulated markets, customers are free to procure their electricity supply from other suppliers. Customers can thus choose to purchase all their electricity from a supplier that offers 100% renewable energy. In deregulated states, customers can directly enter into PPAs, or build their own solar projects, at locations that are remote from the customer facilities, with the power "wheeled" over the grid. These customers would, of course, pay a wheeling charge to the transmitting utility for delivering the electrons.

### Ability to meet corporate sustainability goals

In deregulated states, corporations with renewable or solar electricity targets can contract directly with renewable energy providers to secure the necessary "green" electrons to satisfy their renewable energy requirements without having to depend upon the availability of a green tariff.

# CONCLUSION

While solar generation has increased rapidly across the United States and in neighboring states, the solar industry in West Virginia is still very small.

A drastic increase in solar development will bring jobs, new employers and increased local revenues. While thousands of solar-related jobs are found in all nearby states and Washington D.C., only about 300 solar-related jobs are found in West Virginia.

Greater access to solar in West Virginia can also play a role in stabilizing and potentially reducing West Virginia's electricity rates, which experienced the fastest growth rate in the nation over the last decade despite being powered almost exclusively by coal.

Solar can thrive in regulated electricity markets like West Virginia, and many tried-and-true policies are already in place in nearby states that have diversified state electricity generation, created jobs and local benefits and reduced emissions.

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Downstream Strategies is an environmental and economic development consulting firm with West Virginia locations in Morgantown, Davis and Alderson. We are considered *the* go-to source for objective, data-based analyses, plans, and actions that strengthen economies, sustain healthy environments and build resilient communities.

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Since 1951, The Nature Conservancy has worked to protect the lands and waters on which all life depends. From our historic work in land acquisition to cutting-edge research that influences global policy, The Nature Conservancy is constantly adapting to take on our planet's biggest, most important challenges. Our vision is a world where the diversity of life thrives, and people act to conserve nature for its own sake and its ability to fulfill our needs and enrich our lives. To that end, The Nature Conservancy is working in West Virginia to invest with new partners in new ways to contribute to economic diversification as the world transitions to a low carbon future.

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The energy industry in West Virginia is the cornerstone of the state's economy, and the Center is committed to playing a prominent role in shaping the energy and environmental policies of the future. The Center conducts objective, unbiased research and policy analyses providing a forum for issues to be explored by various stakeholders, and it promotes policies that balance the demand for energy resources alongside the need to reduce environmental impacts.

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