LARGE-SCALE SOLAR DEVELOPMENT

A PLAYBOOK FOR SOUTHWEST VIRGINIA

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LARGE-SCALE SOLAR DEVELOPMENT: A PLAYBOOK FOR SOUTHWEST VIRGINIA

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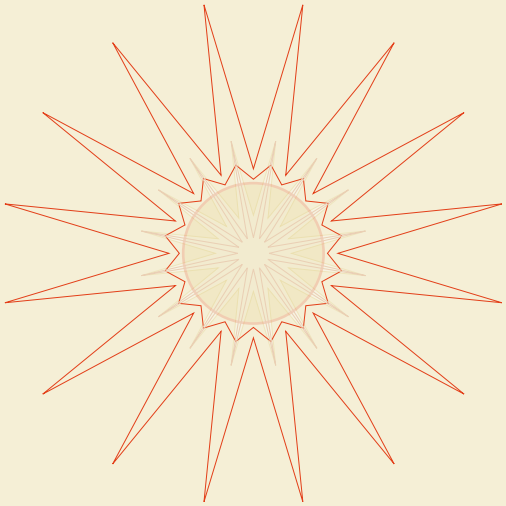


LARGE-SCALE SOLAR DEVELOPMENT

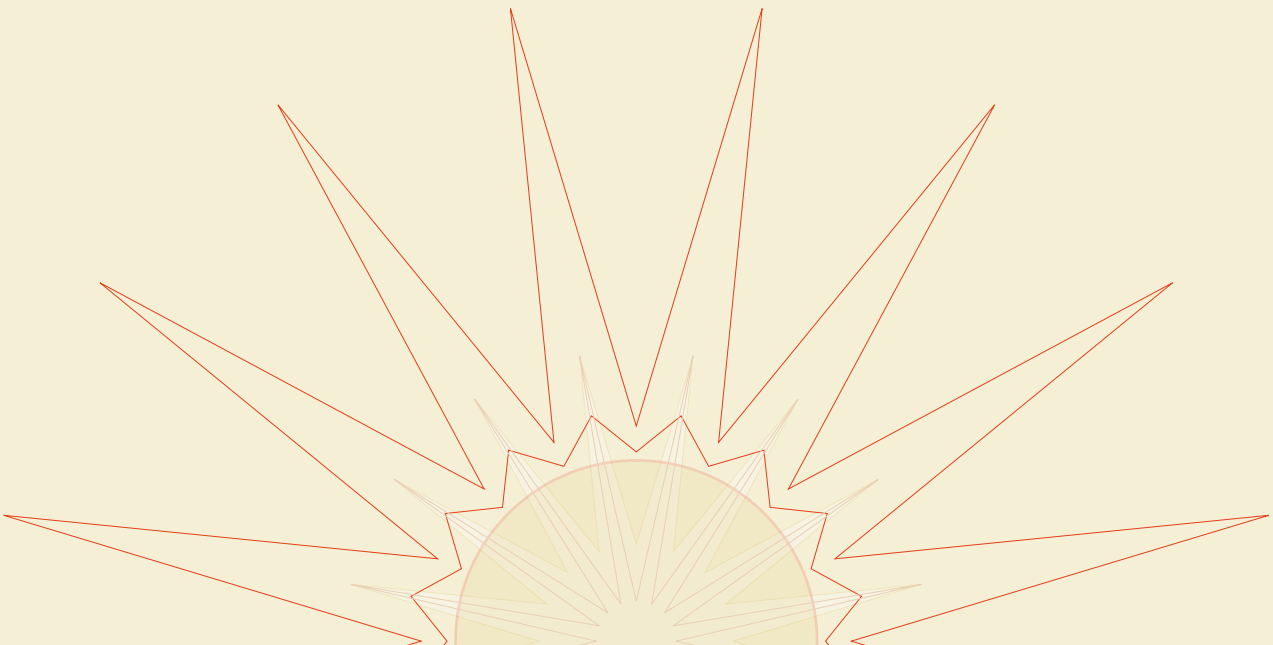
A PLAYBOOK FOR SOUTHWEST VIRGINIA

INTRODUCTION

This playbook is an introductory guide for local governments to facilitate large-scale solar projects in Southwest Virginia. In a region that has a long history of energy production, solar technologies offer enormous potential for economic development and job growth. Large-scale solar can take many forms, including rooftop or ground-mounted installations at local corporate offices, nonprofit organizations, or schools. It can also encompass utility-scale projects over many acres on former agricultural or timberlands, mined lands, or industrial sites. Regardless of the type of project, solar is a widely popular, cost-competitive energy choice that helps create sustainable and prosperous communities.

This playbook is directed to municipal and county governments that have an essential role to play in encouraging large-scale solar projects. The first section provides an overview of state and national trends, including recent state legislation that will impact local oversight of solar development. This is followed by an overview of the solar project approval process from a developer's perspective. The next section is an overview of the state and local permitting process for solar projects, followed by other development considerations such as local tax revenue options, financing incentives, and considerations for solar on brownfields and previously mined lands. The playbook concludes with a step-by-step guide for local governments to facilitate large-scale solar development.

This playbook is part of the Solar Workgroup of Southwest Virginia's effort to bring solar energy and associated jobs to the region. Over the past few years, the workgroup has met with stakeholder groups and crafted a strategy for local solar energy development. The workgroup has collaborated with cities and counties to bring SolSmart designation to eight counties and cities, implemented group purchase campaigns for commercial solar, and led research efforts.



THE SOLAR DEVELOPMENT OPPORTUNITY

National Trends: Solar Energy on the Rise

Southwest Virginia is ready for solar. Considered a niche product as recently as a decade ago, solar energy is now a mainstream, affordable energy source, which communities across the nation have made a top choice for meeting their electricity needs. With an average annual growth rate of 49% since 2010, U.S. solar installations in 2020 total more than 81 gigawatts (GW), enough to power 15.7 million homes at peak output. In 2019, 40% of all new electric capacity in the United States came from solar.[1]

The most important reason for this growth has been the rapidly declining costs of solar energy technologies. Installation costs have declined 70% since 2010, driven by the reduced cost of panels and other hardware.[2] Today, it is often cheaper to build new solar projects than maintain existing fossil fuel plants.[3]

This thriving and mature industry presents an economic opportunity for communities in all parts of the United States, from large cities to rural areas. The Solar Foundation's *National Solar Jobs Census* found the solar industry directly employs 250,000 Americans as of 2019.[4] Solar energy helps reduce utility bills for residents, businesses, and local governments. It creates new business opportunities with companies that value clean energy use, and it helps communities reduce greenhouse gas emissions while improving local air quality and health outcomes.

Southwest Virginia is well positioned to take advantage of these opportunities. The region has an abundant solar resource and many suitable locations for solar energy projects. Unlike much of the Commonwealth, this includes previously mined land, which in many cases may be appropriate for large-scale solar development.*

Virginia: The Next Solar Energy Leader

In Virginia, solar only provided 1% of the state's energy needs at the time of publication. However, even the state's modest investment in solar energy to date has made a significant economic impact. As of 2019, the Commonwealth had 893 MW of solar energy, 255 solar companies, and nearly 4,500 solar jobs.[5] Moreover, the year 2020 saw the passage of sweeping legislation that positions Virginia

* This playbook refers to previously mined land. However, another term, coal impacted land, includes the previously mined land and related industrial land used for processing, burning, waste, etc., for the mined coal. This coal impacted land is also available for solar development.

OPPORTUNITIES FOR SOLAR DEVELOPMENT THROUGH SOLSMART

Eight communities in Southwest Virginia achieved SolSmart designation in 2019. Led by The Solar Foundation and the International City/County Management Association, and funded by the U.S. Department of Energy Solar Energy Technologies Office, SolSmart has provided no-cost technical assistance to help over 380 municipalities and counties reduce barriers to solar energy growth. Communities that meet national criteria are designated SolSmart Gold, Silver, or Bronze, a signal that the community is "open for solar business."

Virginia communities now have the opportunity to receive technical assistance from the Virginia Department of Mines, Minerals and Energy (DMME) and the University of Virginia's Weldon Cooper Center for Public Service, which are serving as local community SolSmart Advisors. Interested communities can visit the DMME website to learn more. Go to this link to learn more about the national SolSmart program.

WHAT IS LARGE-SCALE SOLAR?

This playbook is designed to help local governments in Southwest Virginia facilitate large-scale solar projects. For the purposes of this guide, "large-scale" solar can fall into two main categories: utility-scale and nonresidential distributed solar.

Utility-scale solar refers to large solar installations, usually 1 MW or above, that feed directly into the grid. The systems are often referred to as front-of-the-meter, due to their location relative to a customer's electric meter. They are normally ground-mounted (as opposed to mounted on rooftops) and tend to cover large areas, such as former agricultural land or timberlands, previously mined lands, or former industrial sites. Utility-scale solar projects can take several years to complete and require significant input and approval from local and state governments.

Nonresidential or *commercial solar* refers to solar installations, either rooftop or ground-mounted, that feed energy directly into corporate, government, or nonprofit facilities. Examples could include 100 - 300 kW of solar energy at a school, a city hall, or an industrial park; or a 3 MW system at a commercial data center. They are often referred to as behind-the-meter, since a meter separates them from the main electric grid. These projects are often financed through power purchase agreements (PPAs) or third-party leases and can provide excess electricity into the grid through net metering (see page 17).

Residential solar (mounted on the rooftops of homes, or on smaller ground or pole-mounted systems) also has enormous potential in Southwest Virginia, but the residential sector is not covered in this playbook. The Solar Workgroup of Southwest Virginia has information about residential solar available on their website: www.swvasolar.org.

to be one of the nation's leading solar markets in the next decade. A series of new laws have set out goals, mandates, and incentives to encourage solar development throughout the state. This represents a major opportunity for local governments, including in Southwest Virginia, to host new large-scale solar projects and reap the associated economic benefits.

In April 2020, Governor Ralph Northam signed the **Virginia Clean Economy Act** (VCEA) (SB 851/ HB 1526).* The new law requires the state's two largest utilities to steadily increase the percentage of renewable energy use year by year and eventually become 100% carbon free. Dominion Energy (Dominion) is required to procure 41% carbon-free electricity by 2030 and 100% by 2045. For Appalachian Power (APCo), the requirement is 30% carbon-free electricity by 2030 and 100% by 2050.

To achieve this mandate, Dominion is required to develop or procure 16,100 MW of solar photovoltaic energy (solar PV) or onshore wind by 2035. Of that amount, 200 MW is required to be on previously developed project sites, such as mined lands, quarries, brownfields, or parking lots. Dominion must also derive at least 1% of its energy from distributed generation from in-state solar, wind, and anaerobic digestion, of which at least 25% is from qualified low-income systems. APCo is required to procure 600 MW of solar or onshore wind by 2030.

Additional legislation adopted in 2020 provides a number of other potential benefits for Virginia communities seeking to go solar. Further details are discussed in the Local and State Context section of this report (see page 11).

* Prior to these acts, there was Senate Bill 966, also known as the Grid Transformation and Security Act (GTSA), and Executive Order 43. GTSA (enacted in 2018) among other things requires utilities to submit a grid modernization plan to the SCC and allows utilities to spend excess profits for grid modernization to accommodate renewable energy and energy efficiency. Governor Northam issued Executive Order 43 in September 2019. It paved the way for the VCEA by setting a goal of 30% electricity powered by carbon-free resources by 2030 and 100% by 2050.

Southwest Virginia's Opportunity

The seven-county coalfield region of Southwest Virginia is primed for economic development opportunities through solar. Southwest Virginia is already an energy-producing region, and solar energy offers new opportunities for growth, investment, and jobs. A 2017 economic impact analysis conducted by the Appalachian Institute for Renewable Energy showed that developing just 26 megawatts (MW) of solar in Southwest Virginia could:

- Create more than 300 construction jobs and 127 maintenance job-years;
- Generate over $40 million in local economic activity and pay living wages;
- Represent almost $50 million in private sector investment; and,
- Generate over $80 million of valuable renewable energy.[6]

The region's history of coal production has led to an opportunity for utility-scale solar projects on previously mined lands, which is further bolstered by the new legislation requiring solar development on land that was previously developed. Brownfields, industrial parks, and unproductive agricultural land can all be opportunities for utility-scale solar projects. Meanwhile, a growing number of corporations, nonprofit organizations, and local governments have demonstrated interest in nonresidential solar to meet their energy needs. A groundbreaking new partnership between the Solar Workgroup of Southwest Virginia and the solar company Secure Futures will open the door to many such projects (see box, page 7).

The many benefits of solar energy for Southwest Virginia include:

- *Job growth*. A utility-scale installation can create hundreds of local jobs during construction. Once concluded, these jobs can often be transferred to other solar projects or construction sites. Solar companies also create permanent jobs in installation, sales and marketing, project management, and many other fields.
- *Expanding local economies*. Solar projects attract new businesses with an interest in renewable energy use, such as data centers that want to power their facilities with solar.
- *Local tax revenue and incentives*. Local governments can obtain revenue from solar development through tax revenue or an annual per-MW fee, with little added cost in government services. A report prepared for MDV-SEIA found that large-scale solar projects in several parts of Virginia "provide a greater net fiscal benefit to counties than several other land uses."[7] One reason is that solar projects yield significant tax revenue while imposing a low burden on local services. In nearby North Carolina, a study found that 50 counties with solar development received more than $10 million in property tax revenues the year after solar was installed, compared to only $513,000 the previous year.[8]
- *Sustainability*. Solar energy production emits no greenhouse gases and contributes to improved air quality and health outcomes.
- *Grid resilience*. Solar installations diversify the electricity grid and reduce dependence on any single power source. When paired with energy storage, solar can provide electricity for critical services, such as health clinics and community centers, even when the power grid goes down.

THE SOLAR DEVELOPMENT PROCESS

Before turning to the role of local governments in encouraging solar energy projects, it is useful to consider the process from a developer's perspective. The following is a brief outline of the solar development process, including the key actions, requirements, and decisions that come with a typical nonresidential or utility-scale solar project. The Local and State Context for Solar Development section (page 11) includes a more in-depth discussion on the regulatory approval process.

Broadly, there are nine steps to the solar development process.

1. Market screening
2. Site selection
3. Project studies and design
4. Regulatory approval
5. Interconnection approval
6. Off-taker identification
7. Financing
8. Construction
9. Operations and maintenance

The first seven steps comprise the predevelopment process, which culminates in agreements among parties committing to move forward with construction. This is the part of the process when public officials are the most involved. The steps do not necessarily occur in sequence, and a developer could be working on several of them at any given time. As a developer invests more time into the process, the cost of discontinuing the project goes up. Therefore, it is important for the developer to identify any fatal flaws that would eliminate unsuitable sites and projects early in the process. Once construction is complete, there is ongoing system operations and maintenance. Finally, decommissioning occurs when the system is replaced or removed after 30 to 40 years or longer.

Market Screening

In this stage, the developer will consider the broader policy and market context in the state. States with aggressive renewable portfolio standards (RPS) will be appealing to solar developers. In particular, utility-scale developers will find these states attractive because their projects will be needed to meet the RPS targets. Virginia adopted an RPS as part of its clean energy legislation adopted in 2020 (page 3). Meanwhile, developers will review local and state regulations to determine the likely amount of time and effort that will be needed for regulatory approval. They will consider permitting requirements and regulations on transmission, labor, and power sales.

For distributed generation solar, developers will also review electricity rates and state and local regulations, including those concerning third-party ownership and net energy metering. Virginia now provides more support for these policies as a result of the new clean energy legislation.

Off-Taker Identification

An important factor in making a project successful is finding an entity that will purchase the electricity (the "off-taker"). Most of Virginia is part of a wholesale market (the PJM Interconnection market), which gives developers the option to sell directly into the wholesale market as opposed to a specific customer. Developers may also sell the power or the facility to a utility that is responsible for delivering electricity to customers within their service territory. The 2020 Virginia Clean Economy Act requires utilities to source a certain amount of their power from third parties such as solar developers. For example, Dominion must source 35% of its renewable energy (solar or onshore wind) from third-party-owned systems and 65% of its

renewable energy from company-owned sources, which may either be developed or acquired by the company. Another option for developers, in Virginia and elsewhere, is to respond to an RFP to supply electricity to a corporate off-taker, such as a data center, to generate energy either onsite or offsite.

Site Selection

A developer will screen for suitable project sites and may reach out to property owners to assess their interests. As part of the screening process, developers will conduct preliminary analyses of the feasibility and regulatory context. For example, for utility-scale projects, they will evaluate the slope of the land, access to the electric grid, environmental considerations, and the local zoning regulations. For nonresidential rooftop projects, they will consider the condition of the roof, shading, and the host facility's electricity use (load), and for ground-mount nonresidential projects, they will consider the slope of the land and the host facility's electricity use. Local governments can help identify land use characteristics in their region that may be suitable for solar projects. These considerations can be covered in the locality's comprehensive plan (see page 24).

The state Department of Mines, Minerals, and Energy (DMME) and Department of Environmental Quality (DEQ) can help identify brownfields and previously mined lands.

Project Studies

The developer will follow up with more extensive analysis into a proposed solar project, including detailed site studies and financial modeling. They typically have discussions with local and state officials to identify barriers that may preclude development.

The site assessment will include an evaluation of the site orientation, available space, and amount of shading during peak solar hours. For utility-scale projects, the site analysis will identify environmental factors such as wetlands, soils, and drainage that may complicate site development. The developer will also assess the likely costs and timeline for interconnection to the electric grid.

A SOLAR PARTNERSHIP IN SOUTHWEST VIRGINIA

In September 2020, following a competitive selection process, the Solar Workgroup of Southwest Virginia announced a partnership with the Virginia-based solar company Secure Futures, representing a breakthrough for nonresidential solar development in the region. Secure Futures aims to install 12 MW of solar at five commercial buildings, five multifamily housing units, and 10 schools by 2023. This partnership is the product of many years of engagement between Southwest Virginia businesses, local and state governments, educational institutions, and nonprofit organizations. To support local workforce development, the partnership includes a grant to Mountain Empire Community College for training and apprenticeships. It will also direct startup funds to a local installation company, Lonesome Pine Solar. The new solar projects are expected to create a significant number of new full-time jobs including solar installers, sales representatives, and entrepreneurs.*

* Elizabeth McGowan, "Appalachian solar effort a reality after backers powered through setbacks," *Energy News Network*, Sept. 2, 2020, https://energynews.us/2020/09/02/southeast/appalachian-solar-effort-a-reality-after-backers-powered-through-setbacks/.

For smaller, nonresidential, net-metered projects, developers will assess the existing structures and determine the optimal configuration of the solar system. They may consider rooftops, shade structures above parking lots, or open space available for ground-mounted systems. If they plan to install on a rooftop, they will determine the roof condition and age and whether the structure can support the load associated with the solar installation. They will also review the roof warranty. Developers will also work with the staff at the facility to estimate current and projected energy use and costs. This review will provide a baseline to estimate potential cost savings from a solar energy system.

Regardless of the type of project, developers will compare the likely revenue to expected costs to project the return on investment. They will also consider the local tax structure and the impact of taxes on the project. Here, the developer may include potential revenue from the sale of renewable energy certificates (RECs), which usually exist in states where an RPS is in place. A REC represents the environmental attributes associated with one megawatt-hour (MWh) of renewable energy, which, for Virginia, includes energy from solar, wind, and anaerobic digesters. The owner of the REC has the right to claim they are using renewable energy.*

Regulatory Approval

Regulatory approval primarily takes place at the local and state levels. In addition, federal agencies may be involved in wetland permitting, wildlife issues, or aviation interference. Obtaining regulatory approval for utility-scale projects can take months and even a year or more, and this process drives up the "soft" costs of going solar (the non-hardware costs associated with business processes). Taken together, these soft costs accounted for 56% of the total cost of nonresidential installed solar and 36%-40% of utility-scale solar costs in the U.S. in 2019.[10] For local governments, streamlining the regulatory approval process and reducing unnecessary barriers can reduce these costs and make solar development more attractive.

Local approval varies by jurisdiction but will typically include a review of the project for conformance with the local comprehensive plan. For communities with zoning, there may be specific language in the zoning ordinance that addresses solar, specifying the review requirements for a given size of project. Alternatively, there may be a separate ordinance that addresses solar development. For larger projects where solar is the primary use, the ordinance usually requires a conditional or special use permit. This requires the developer to submit a site plan for zoning and building staff to evaluate against the land use considerations in the zoning and building codes.

The state approval process varies by project size and location. In Virginia, a comprehensive state approval process is required by the Department of Environmental Quality (DEQ) or State Corporation Commission (SCC) for projects over 5 MW. See the Local and State Context for Solar Development section (page 11) for a complete discussion of the local and state approval process in Virginia, including a discussion of local planning and zoning considerations.

Interconnection Approval

Interconnection is defined as the technical and administrative linking of an electric generator (a solar or other electric system) to the utility grid. The interconnection process varies by project size. For utility-scale projects that will supply electricity directly to the transmission grid, the interconnection process is usually managed by the regional transmission organization (RTO). An RTO is responsible for "administering the buying and selling of electricity through wholesale electricity markets, and assessing and planning for the future needs of the electric grid."† Most of Southwest Virginia is covered by PJM Interconnection, an RTO that coordinates the wholesale electricity market for part or all of 13 states. However, the most Southwestern corner of the region is not covered by any RTO (see page 12). In this region, the interconnection process for utility-scale projects is managed directly by the Tennessee Valley Authority (TVA).

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* To meet RPS mandates, utilities either develop renewable energy or acquire RECs from others such as third-party developers or households who install rooftop solar. REC markets may be further delineated through carve-outs. In a solar carve-out, a certain percentage of the RECs must come from solar and are referred to as SRECs, or solar renewable energy credits. A Virginia SREC market is not yet established but may be in the future, depending on the yet-to-be-approved utility RPS compliance plans. The 2020 Virginia Clean Economy Act stipulates requirements for the use of RECs.

† PJM Learning Center, https://learn.pjm.com/three-priorities.aspx.

Even where the RTO manages interconnection, the utility, which owns the grid, has to evaluate the project to ensure the interconnection is done safely, is compatible with the grid infrastructure, and that there is existing capacity on the line where the project would be connected.[11] Consequently, PJM or TVA may determine that the developer must cover the costs of equipment upgrades, which may make some projects financially infeasible based on the total interconnection costs.

The interconnection process for utility-scale projects can be very time-consuming, lasting from 2-3 years. Therefore, local permits should provide a flexible window for the start of construction. The interconnection process requires the developer to provide increasingly granular analyses as the development process proceeds. The more information that the developer can find about the grid early on, the less likely they are to sink money into a solar project that later proves too costly to complete. Therefore, it is important for the utility and RTO to be forthcoming with information about the grid.

The interconnection process for smaller nonresidential projects that connect to the local distribution lines is managed by the utility according to state regulations. The process is typically much shorter than for utility-scale projects — typically a matter of weeks or months.

Financing and Tax Credits

Developers will often finance a series of projects in a similar manner based on their business model and market opportunities. Financing is also subject to the preferences of the property owner and any requirements in the RFP, if applicable. Property owners who wish to own their solar systems may seek debt financing such as through a bank loan. Alternatively, developers that maintain solar energy system ownership will often secure equity and debt financing.

The system owner can benefit from tax incentives such as the federal solar Investment Tax Credit (ITC), which provides a tax incentive for residential, commercial, and utility-scale solar. For commercial and industrial projects, the tax credit is claimed by the business that owns the solar energy system. The ITC is currently ramping down from 30% in 2019 to 26% percent in 2020. In 2021, it will step down to 22%. In 2022, the residential credit is scheduled to be eliminated, and the commercial and utility-scale tax credit will drop to 10%.*

A second federal incentive is the Modified Accelerated Cost Recovery System, which is a common way to address depreciation for equipment. Taking a depreciation expense reduces the income subject to federal income taxes. Under Section 168 of the tax code, solar energy equipment qualifies for a five-year accelerated depreciation schedule.

Design and Construction

Once the project is approved and financed, the developer will complete final design and begin construction. While some of the larger developers have in-house staff to install the system, many will contract such services to an engineering, procurement, and construction firm (EPC). The EPC will provide the staff, procure the equipment, and complete the installation. For larger systems, the EPC will hire much of the labor, often locally. Local governments can work with the EPC, local trade associations, and community colleges to help ensure that a significant amount of the crew is hired within the community.

Even if a contractor oversees the installation, the developer will remain involved in project oversight that includes regular inspections of the system to ensure proper performance. The developer will ensure that regulatory compliance is properly documented and that the systems are performing correctly prior to contract closeout. Following construction, the system will undergo final testing and commissioning. The system can begin operations after passing local building code inspection and receiving the utility letter for permission to operate.

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* The ITC credit for a given project is based on the time that a project starts, so a project starting in 2020 and finishing in 2022 would be eligible for a 26% credit.

Operations & Maintenance

After the system is built and goes into operation, monitoring and maintenance becomes necessary. The developer will typically enter into an operations and maintenance (O&M) agreement with the EPC or another third party. The O&M agreement will typically delineate a schedule to monitor, inspect, and clean the equipment and help enforce the warranty. For ground-mounted systems, the agreement covers maintenance of the grounds, including landscape maintenance — typically mowing, but grazing sheep are an emerging component in some projects — and any environmental commitments such as reforestation of disturbed areas and/or the preservation or planting of pollinator-friendly vegetation (see box, page 16). The operations phase of a utility-scale solar facility does not generate nuisances such as traffic or noise, and does not require heavy equipment except for an occasional equipment upgrade. Most large-scale facilities have no on-site personnel, with maintenance visits occurring at most several times a week.

THE LOCAL AND STATE CONTEXT FOR SOLAR DEVELOPMENT

Local governments are indispensable to the process for developing large-scale solar projects. County and municipal governments review proposals to ensure they are consistent with local requirements and provide maximum benefit to the community. Even before any solar projects are on the table, however, local and state governments can and should take an active role in encouraging solar energy development. This includes reviewing local development goals and planning documents to consider how solar might fit into the community's vision. A clear and open process will help facilitate successful projects for all stakeholders.

Below is an overview of the local and state role in encouraging solar energy growth. A step-by-step guide for communities to facilitate solar energy development follows on page 21.

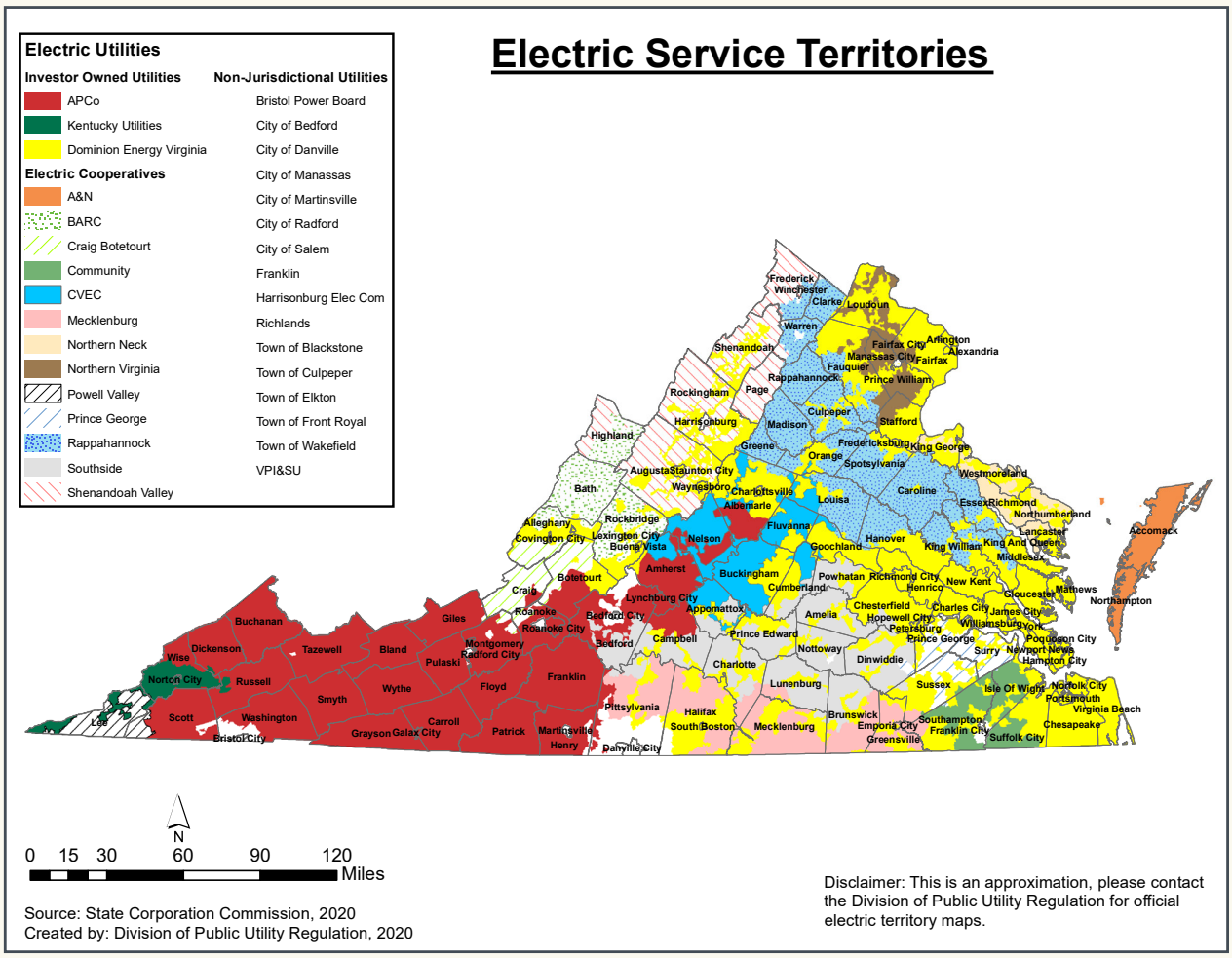
The Key Players

A diverse group of constituents influence the development of solar projects. A brief list of the most important stakeholders follows below.

Internal staff and elected officials. Depending on the community, this may include the building and inspections department, planning department, representatives from the Planning District Commission, and sustainability staff, among others. While these individuals may work closely together, they may have divergent goals and priorities. This makes it important to collaborate early in the process to establish a shared vision for solar energy development. Meanwhile, staff can brief elected officials and planning commissioners on solar development plans and how the community could benefit.

State agencies. The Virginia Department of Mines, Minerals, and Energy (DMME) oversees the development of energy and mineral resources in the Commonwealth. DMME is an Advisor organization under the SolSmart program, providing no-cost technical assistance to help local governments encourage solar development (see box, page 3). DMME can also provide technical assistance with site evaluation, particularly on previously mined lands.

The Virginia Department of Environmental Quality (DEQ) oversees environmental protection in Virginia and can approve utility-scale solar projects that are 5 MW up to or equal to 150 MW through the Permit by Rule process (page 15). The State Corporation Commission (SCC) can also approve such projects. Any project larger than 150 MW must receive approval through the SCC in the form of a Certificate of Public Convenience and Necessity (CPCN). Also, projects owned by a public utility will require a CPCN, regardless of the size of the project. The DEQ also provides the environmental assessments required through the CPCN process.



Electric utilities. In any community, engagement with electric utilities is critical for developing solar projects. There are several utilities serving Southwest Virginia:

- *Appalachian Power (APCo)*, an investor-owned utility that is a subsidiary of American Electric Power (AEP). APCo covers all or part of six counties in the region: Tazewell, Buchanan, Russell, Dickenson, Wise, and Scott. APCo is required to steadily increase its renewable energy portfolio under the Virginia Clean Economy Act (VCEA), and must procure 600 MW of solar or onshore wind by 2030 (see page 4).
- *Old Dominion Power (ODP)*, a unit of Kentucky Utilities Company, covers Norton City and portions of Lee, Wise, Russell, Scott, and Dickenson counties. ODP does not have renewable energy purchasing requirements, but is required to develop a new shared solar program for multifamily residents.
- *Powell Valley Electric Cooperative (Powell Valley)*, a nonprofit co-op that is part of the Tennessee Valley Authority. Powell Valley covers portions of Lee, Scott, and Wise counties. Powell Valley also has no requirements for renewable energy purchases.
- *The Bristol Virginia Power Board* serves portions of Scott County and the city of Bristol.
- *Richlands Electrical Department*, a municipal utility serving the town of Richlands in Tazewell County.

Finally, although Dominion's service territory is not located in Southwest Virginia, the utility is interested in investing in solar projects located in the region. It currently operates the Virginia City Hybrid Energy Center in St. Paul.

Regional Transmission Organizations (RTOs). Most of the Southwest Virginia region is covered by PJM Interconnection (PJM), which oversees the regional electricity market that spans much of the Mid-Atlantic and parts of the Midwest. The service areas for Powell Valley are not covered by an RTO.

Local businesses and nonprofit organizations. Local businesses and nonprofit organizations will provide important perspectives on the impacts of solar development. They can also benefit directly if there are opportunities for solar installations at their facilities. A key organization to contact is the Solar Workgroup of Southwest Virginia, an umbrella group that unites state and local government officials, businesses, and educational institutions. The Solar Workgroup can assist communities with many questions and follow-up needs as they pursue solar development plans.

Corporate off-takers. In recent years, corporations have shown increased interest in financing and developing solar and wind projects to meet their own energy needs. In fact, corporate buyers purchased a record 7 GW of renewable energy projects in 2019.[12] One prominent example is a 500 MW project under development in Spotsylvania County, Virginia, which will be the largest solar farm in the Eastern U.S. upon completion. This project includes Microsoft, Apple, and the University of Richmond as off-takers.[13] In Southwest Virginia, a promising area of opportunity is data centers: A 3 MW project on a previously mined land next to the Mineral Gap Data Center in Wise County is now under development.[14]

Educational institutions and workforce development boards. Community colleges and other educational institutions may offer courses on solar installation or related topics, or they could see opportunities to do so in the future. A solar training course at a local institution can be the foundation for a skilled workforce based in the community. Local workforce development boards and American Job Centers can also help publicize job opportunities in the solar industry and help recruit local talent.

In Virginia, resources include the Solar Hands-On Instructional Network of Excellence (SHINE), a public-private partnership that offers an immersive, two-week introductory course in solar installation. The Virginia Energy Workforce Consortium builds partnerships in support of a diverse and skilled workforce in solar and other energy sectors. As mentioned previously, the Solar Workgroup of Southwest Virginia has arranged for Secure Futures to provide a grant to Mountain Empire Community College for training and apprenticeships (see page 7).

On the national level, the North American Board of Certified Energy Practitioners (NABCEP) offers widely recognized certifications and credentials in solar energy. A directory of workforce development boards, American Job Centers, and other resources can be found at CareerOneStop, a U.S. Department of Labor website. Additional workforce development resources are available through the Interstate Renewable Energy Council.

Solar companies. Local solar companies will have a direct interest in the community's development plans. For example, under the new partnership, Secure Futures plans to install 12 MW of nonresidential solar in the region. Local governments can survey companies that are either active in Southwest Virginia, or ones that are located in other parts of the state (or nearby states) and may be interested in entering the market. A good starting point is to contact the Maryland-DC-Delaware-Virginia Solar Energy Industries Association (MDV-SEIA) for more information on local solar providers. Communities can also contact the Solar Energy Industries Association (SEIA), which maintains an online map of solar companies in each state.

Property owners. Key property owners include those interested in hosting solar projects, as well as their neighbors. The prospective hosts will want to ensure that local policies support their interests in solar development. Neighboring property owners may be concerned about the impact of development on their property.

General public. Through public meetings, surveys, and comment opportunities, local governments obtain public input on solar projects and any concerns that may arise. Solar projects may also require notices for

public comment at various stages of the permitting process. The input received during these comment periods is a key part of the project approval.

Local Planning and Zoning Considerations

Local planning documents, county ordinances, and zoning codes provide the vision and framework for community development and how solar energy fits into these plans. For any community interested in encouraging solar development, it is useful to review these documents and if necessary, amend them to ensure they facilitate solar energy growth while balancing other development and conservation priorities.

Below is a brief overview of the local planning and zoning process. For more information on amending the comprehensive plan and zoning codes to incorporate solar energy, including sample language, see page 24.

The **comprehensive plan** is a long-term overview of the community's growth and development goals, usually for the next 20-25 years. It includes a discussion of how these goals relate to other priorities, such as agriculture, industrial development, the environment, and cultural resources. Comprehensive plans are typically updated every five years, providing an opportunity for local governments to amend their plans to give consideration to solar energy. Even when the plan is not yet due for an update, local governments can still articulate how solar energy fits into their long-term development goals.

Virginia law requires that solar development proposals be reviewed to ensure they comply with the comprehensive plan. However, new legislation (HB 657) allows local governments to waive this requirement (see Virginia code 15.2-2232). Furthermore, solar projects that meet certain criteria will be deemed to comply with the comprehensive plan. These include projects in zoning districts that are permitted by right or projects that are intended to serve the host facility's load.

Zoning codes provide specific information on what type of development is allowed in each zoning district. Where zoning codes do not exist, a solar ordinance, building codes, or other development regulations may establish performance standards and requirements for solar projects. If the zoning codes and ordinances are silent on solar energy, communities are likely to consider solar proposals on a case-by-case basis.

Including solar energy in a zoning code or ordinance can help reduce uncertainty for developers who may be interested in doing business in the area. On the other hand, communities should take care that they do not impose unique restrictions on solar that are not applied to other forms of development with similar impact.

Local Permits and Approvals

Utility-scale and large nonresidential solar projects usually require a series of approvals at the municipal and/or county level to obtain a use permit. The exact process will vary by jurisdiction, but typically requires planning department review, planning commission approval, a public hearing, and approval by the political leadership.

Prior to approval, the project undergoes a **site plan review**. This is an opportunity for local governments to determine if the site is suitable for a solar project, if there will be any major adverse impacts, and how the developer will mitigate those impacts. The requirements for the site plan review are guided by the local zoning code and development regulations. The review typically addresses items such as vegetation buffers, height restrictions, stormwater mitigation, wetlands, and ecological considerations such as native plant use and wildlife impact mitigation.

Following the site plan review, large-scale solar projects are typically issued a **conditional use permit** or **special use permit**. The permit can also include special conditions including compensation for the local government (see page 26).

As noted below, large-scale solar projects above 5 MW must also undergo comprehensive state approval. Therefore, it is often efficient for local governments to avoid duplicating the state permitting process. They

can focus on criteria that are important at the local level, such as the specific location, local tax structures, and other unique aspects of the site.

Special Permit Conditions and Opportunity Zones

State legislation adopted in 2020 provides new options for local governments to include provisions in conditional use permits that provide community benefits and financial support. One of these laws (HB 655/SB 870) allows zoning ordinances to include conditions including 1) the dedication of real property of substantial value; or 2) cash payments for public improvements, so long as they are reasonably related to the project. For example, a solar project with impacts on wildlife, open space, or critical natural habitat could include payments to support mitigation projects that can offset these impacts.[15]

Another new law (HB 1675) applies to any locality with a proposed solar project in any census tract that meets the eligibility requirements for designation as a qualified opportunity zone by the U.S. Department of the Treasury. It requires a developer to contact the locality with notice that the developer intends to locate a solar project in that locality, and to request a meeting to discuss and negotiate a siting agreement. Localities are required to meet with the developers, but they don't have to ultimately approve the project. However, a locality cannot deny a solar project solely because the locality and solar developer are not able to reach consensus on the business terms of a siting agreement.

For projects that are eligible under HB 1675, a community can negotiate a siting agreement that includes financial compensation even if it is not directly related to the project, including mitigation of project impacts, addressing capital needs, and assistance with broadband deployment.* A public hearing is required before the siting agreement is approved. Once finalized, developers must still receive any applicable zoning approvals and the conditional use permit. Approval of a siting agreement, however, does constitute a determination that the solar project is in accord with the locality's comprehensive plan. The siting agreement will take priority if there are any inconsistencies with the zoning code or comprehensive plan.[16]

This new law does not replace the process for approving conditional use permits. Instead, it creates a legal structure to enable meaningful discussions between the locality and the solar developer about the community and economic benefits the solar project can bring to that community.

The State Approval Process

Developers of projects between 5 MW and up to or equal 150 MW may submit an application to the Virginia Department of Environmental Quality (DEQ) for review and approval under DEQ's Permit by Rule (PBR). Alternatively, the project is submitted to the State Corporation Commission (SCC) for approval. Projects owned by a public utility or any project greater than 150 MW must follow the CPCN process with the Virginia SCC. (Although DEQ refers to PBR-eligible projects as small solar projects, the industry refers to grid-tied projects over 5 MW as utility-scale projects.)

For projects that are submitted under PBR, there is more certainty to the process for developing utility-scale solar. The advantage of PBR is that it identifies all the requirements for an application in one place, rather than settling them on a case by case basis. No additional conditions may be added or removed, and the department must make a determination within 90 days of receipt of the application.

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* Several resources are available from the state of Virginia for communities interested in investing in broadband. Communities are encouraged to consult the website for Commonwealth Connect, Virginia's comprehensive program for ensuring universal broadband access, at https://www.commonwealthconnect.virginia.gov/. Commonwealth Connect also published *Bringing Broadband to your Community: A Complete Guide for Virginia's Local Leaders*, January 2020, https://www.commonwealthconnect.virginia.gov/sites/default/files/Toolkit%20Documents/Bringing%20Broadband%20to%20Your%20Community%20Version%202.1_Final%20Final.pdf. A third resource is the grant program from the Virginia Telecommunication Initiative (VATI), https://www.dhcd.virginia.gov/vati.

POLLINATOR-FRIENDLY DEVELOPMENT

In 2019, Virginia joined approximately a dozen other states and established a "Pollinator Smart" program to encourage the development of solar project sites using native vegetation to benefit pollinator species, birds, and other wildlife. This program certifies solar facilities as "Pollinator Smart" based on performance standards outlined in a Pollinator Smart scorecard.

A pollinator-smart approach can offer a host of benefits for communities and project developers. In addition to the aesthetic benefits of wildflowers and ecological benefits for bee and bird habitats, native or naturalized vegetation can be three times less costly to maintain than turf grass because less mowing is required. Native meadows provide cooling effects that increase panel efficiency while reducing stormwater runoff. Pollinator-friendly vegetation also benefits nearby pollinator-dependent crops, which in Virginia can include soybeans, pumpkins, peanuts, apples, and cotton.

Pollinator-friendly vegetation can be used at a variety of project sites, including brownfields, previously mined land sites, former agricultural land, and schools. Aside from the other benefits, it can enhance the brand for corporations or local governments involved in solar projects, demonstrating how responsible land use can be a part of any renewable energy development.

One of the requirements of the PBR is a notice of intent (NOI) that is submitted to DEQ and published in the Virginia Register. The developer must also obtain local government approval; however, the developer can file the NOI and simultaneously address state and local requirements. Additional components of the PBR require the applicant to address an assessment of environmental, wildlife, archaeological, and historic impacts, and a mitigation plan if specific resources have the potential to be significantly impacted by the project.

Applicants must provide interconnection studies, the final interconnection agreement, the site plan, and the operating plan. For local government approval, the applicant must have local government certification that the project complies with all applicable land use ordinances (Code of Virginia, 10.1-1197.6 B2). The applicant must also conduct a public meeting and a 30-day public review and comment period and prepare a report summarizing the issues identified during that period (Code of Virginia, 10.1-1197.6 B13&14).

In Virginia, projects below 500 kW (or a disturbance zone of less than two acres) do not require state approval. For projects between 500 kW and 5 MW (or a disturbance zone greater than 2 acres and less than or equal to 10 acres), developers do not have to undergo the full permit by rule process. They simply submit a local government certification that the project complies with all applicable land use ordinances.*

Projects larger than 150 MW go through a more rigorous review process and must be approved by the SCC. A pending regulation would also require energy storage facilities 100 kW or greater to be approved by the SCC.† Further details on the permit by rule process can be found on the state DEQ website. In particular, communities are encouraged to consult *Solar PBR Guidance Section 2: Methodology* for more details on the requirements in a permit by rule.

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* Other criteria may also allow exemptions from state review. For more details, see Section 130 of the Department of Environmental Quality *Solar PBR Guidance Section II: Methodology*.

† For more details on the proposed regulation on energy storage, see Williams Mullen, "Virginia Issues Proposed Energy Storage Regulations for Comment," Sept. 21, 2020, https://www.jdsupra.com/legalnews/virginia-scc-issues-proposed-energy-77033/.

OTHER DEVELOPMENT CONSIDERATIONS

The following section outlines key items to consider relating to power purchase agreements and net metering; tax revenue options and incentives; community or shared solar; and solar on brownfields and previously mined land.

Power Purchase Agreements and Net Metering

Non-residential solar projects are often financed by power purchase agreements (PPAs). Under this arrangement, a third party (such as the solar developer or an investor) owns the project and sells electricity to the user at a price determined by the contract. This allows the consumer, such as a corporation, nonprofit, or local government, to benefit from the project without paying upfront costs.

Until recently, state law imposed stringent limitations on PPAs in Virginia. This was a major roadblock to the nonresidential solar market. However, the VCEA (SB 851/HB 1526) and the Solar Freedom Act (SB 710/HB 572) expand the facility size limit for PPAs from 1 MW to 3 MW. The legislation also specifies the aggregate capacity of these PPAs for Dominion, APCo, and ODP. Dominion must offer PPAs for projects up to 500 MW, with an additional 500 MW for public authorities also known as non-jurisdictional entities (such as local governments). APCo must offer PPAs for up to 40 MW and ODP must offer PPAs for up to 12.5 MW.

The legislation also expands the ability to offer net metering programs, which allow facilities to be credited for power sent back to the grid. Nonresidential solar facilities up to 3 MW can now participate in net metering, and the aggregate of all net metering may cover up to 6% of the peak load forecast for each investor-owned utility (1% is reserved for only low-income customers).

In Virginia, local governments and schools (known in the law as "non-jurisdictional customers" and sometimes referred to as public authorities) negotiate contracts with investor-owned utilities on electricity rates, net metering, and PPAs. As such, the contracts may be different than those under the comparable laws for homes and businesses (known in the law as "jurisdictional customers"). Up until June 2020, a more restrictive contract existed between APCo and public authorities than what exists by law for homes and businesses. It was also more restrictive than the contract between Dominion Power and the public authorities in their service area.[17] That contract has expired and a new one is being negotiated.

It is also uncertain whether Powell Valley is required to offer either PPAs or net metering. BVU and Richlands do not currently offer net metering, and PPA legality is also uncertain in these utility territories. Communities are encouraged to reach out to the Solar Workgroup of Southwest Virginia for the latest information.

PACE Financing

In Property Assessed Clean Energy (PACE) financing, a property owner voluntarily places a special assessment or lien on their property to provide upfront financing for property improvements that are paid back through a line item on their property tax bill. Most states that allow PACE financing, including Virginia, allow improvements for clean energy such as solar PV and energy efficiency to be financed. A few also include water efficiency or improvements that protect from disasters, such as as hurricanes and earthquakes.

Unlike traditional debt service, which typically relies on a customer's credit or other security interest, the PACE assessment remains with the property rather than the property owner. One of the key benefits of PACE is that projects are financed with long-term loan terms, so the payments on that debt are much lower than that of traditional financing. PACE financing debt maturity typically lasts up to 20 years or more compared to under 10 years for most traditional financing. PACE financing can cover 100% of project costs, including design, permitting, and construction costs. Since projected energy savings (or the value of energy production, in the case of solar systems) typically exceed the debt service, PACE projects can be cash-flow positive from day one with no out-of-pocket expenses.[18]

Virginia has enabling legislation for Commercial Property Assessed Clean Energy (CPACE) financing, but residential properties with fewer than five dwelling units and condominiums are not eligible. Local jurisdictions must pass an ordinance to enable CPACE special assessments. Programs are typically run by a third-party program administrator competitively selected by the locality. For example, the nonprofit Virginia PACE Authority (VPA) is now administering programs and is available to set up programs on behalf of localities. VPA will work with localities to design and market a program; train contractors, lenders, and building owners; and manage day-to-day operation of the program.[19] Since the process of establishing a C-PACE program can be time-consuming and costly at the local level, Virginia's General Assembly passed a law in 2020 (HB 654) to authorize DMME to sponsor a statewide program and retain a third party to administer it. Localities will be able to opt in to the standardized statewide program and reduce time and cost associated with making C-PACE financing available to building owners.

To date, most of the solar PV systems financed and installed using C-PACE are building-mounted, often in conjunction with energy efficiency measures, but more and more are solar-only projects. C-PACE allows the owner to purchase the system and take the ITC associated with the system. C-PACE has been used to finance large (up to 1 MW) building-mounted systems; however, use of C-PACE for financing larger-scale ground-mounted systems could be a viable option going forward.

Resources on PACE Financing

- Virginia PACE Authority
- Sustainable Real Estate Solutions
- The Mid-Atlantic PACE Alliance and their MAPA Regional CPACE Toolkit
- A national nonprofit focused on PACE, PACE Nation
- For use of PACE with nonprofit organization facilities, visit The Solar Foundation's website on CivicPACE

Shared (Community) Solar

There will soon be two new opportunities for shared solar projects in Virginia, including one in Southwest Virginia. Also known as community solar, these projects allow customers to enjoy the benefits of solar energy without installing it on their own rooftops. The energy is produced at an off-site facility (such as a ground-mounted array or an installation on a multi-family rooftop). Customers then subscribe or purchase a share of the installation and receive a credit on their utility bills, sometimes referred to as virtual net metering.

Both programs were in the rulemaking stage as of late 2020. One new program will be in Dominion territory. It will initially total 150 MW, with 30% of the subscribers reserved for low-to-moderate income consumers. Separately, there is a program focused on multifamily residential customers in the Dominion Energy and ODP territories. Information on the proposed rulemakings for these programs can be found here. Final rules are expected by January 1, 2021.

Tax Revenue Options and Incentives

Another benefit for local governments is the potential tax revenue from utility-scale solar projects. Revenue share law (SB 762/HB 1131 - § 58.1-2636)) allows local governments to assess an electricity generating capacity tax of up to $1,400/MW (alternating current, or AC). If they choose this option, the locality would need to pass by ordinance an amendment to its tax code, and the developer would receive a 100% exemption from the machinery and tools (M&T) tax. One community that is considering this approach is Bedford County, where a proposed solar project could bring $105,000 per year based on 75 MW generation.[20] A larger 150 MW project would generate $210,000 per year in revenue to a locality, with very little costs in additional services.

Alternatively, local governments can forego the revenue share option and take advantage of another new law (HB 1434/SB 763) which adjusts the rate schedule for local governments to obtain revenue from the M&T tax over time. This law changes the tax exemption from an 80% lifetime exemption to 80% over the first five years, 70% for the second five years, and 60% for the remaining years.

The University of Virginia and DMME have developed a tool called "SolTax" to help localities determine the optimal choice for increasing revenue. The beta version is now available at https://solar-tax-webapp.herokuapp.com.

Solar on Brownfields and Previously Mined Lands

Contaminated or formally contaminated land, such as industrial sites and landfills or previously mined areas, can be well suited for solar development. Even after cleanup has reduced the impact of their contamination, these sites still may have few other viable uses. Furthermore, the former industrial sites typically have access to the electric grid and nearby roads and highways. State and federal incentives for brownfields reuse can help make these challenging projects profitable for developers.* In addition, local governments gain tax revenue from properties that otherwise might remain dormant.

Solar development can take place at any phase during the cleanup process, especially if the solar system is being located away from the cleanup. Once a site is assessed, it is common to find only parts of the site need remediation, leaving other parts available for development. It is not uncommon to find sites suspected of contamination, such as former mined lands, are clean and available for use.

The typical land cleanup process consists of five steps:[21]

- Site identification, including potential contamination
- Environmental assessment
- Cleanup plan
- Cleanup
- Post-cleanup and ongoing monitoring

Solar development on brownfields is not unlike other development, except that it can be complicated by factors related to the cleanup and monitoring. Such factors typically include the need for developers to:

- Work with the appropriate state environmental agency (in Virginia, the state DEQ) to ensure the solar energy system is compatible with the cleanup. For Superfund sites that are more severely contaminated than brownfields, the U.S. EPA will be involved.
- Address liability, which is a concern even if the property owner accepts liability. As such, the EPA has worked with states to develop tools to reduce liability. For example, in Virginia, properties remediated in accordance with the state-approved cleanup plan are provided a "certificate on completion." A memo between the DEQ and the EPA provides "federal concurrence with DEQ's decisions on site requirements."[22] In addition, the certification "provides assurance that the remediated site will not later become the subject of a DEQ enforcement action unless new issues are discovered."[23] Liability can be further reduced through private insurance.
- Consider the compatibility of solar development with remediation activities. Capped brownfield sites can create wetlands and trigger ecological concerns. The capped sites may also cover unstable soils, causing uneven settlement.[24]

* The EPA defines a brownfield as a "property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." U.S. EPA, "Brownfields Overview," accessed Sept. 24, 2020, https://www.epa.gov/brownfields/overview-epas-brownfields-program.

- Consider the compatibility of the solar system with environmental controls, such as groundwater monitoring wells or physical barriers designed to prevent exposure to contamination. This may require, for example, that systems avoid pilings but instead install a ballast system to prevent the disruption of soil.
- Consider institutional controls such as easements and covenants established to minimize exposure to contaminants. For example, a covenant may prevent the land from ever being used for residential use.

If solar development takes place during cleanup, the developer will need to incorporate solar design with cleanup design and coordinate development and cleanup actions.

Local governments can work with the Virginia DMME and DEQ to inventory contaminated sites for redevelopment, including which sites are previous mined lands, brownfields, or Superfund sites.* Once identified, these sites should be considered by the community for preferred reuse and those findings incorporated into the comprehensive plan. When a solar project is desired for the site, communities can work with interested property owners, the DMME, and the DEQ to obtain information about the site to provide to developers. Key topics should include:

- Property owners and their interest in solar
- Access to the electricity grid and the likely need for utility upgrades
- Other property characteristics: size, topography, etc.
- Status of cleanup and state certificates on completion
- Nature of any incentives for brownfields development
- Nature of environmental and institutional controls

Brownfields and previously mined lands may be eligible for both state and federal brownfields funding. To help spur redevelopment, the Virginia Brownfields Assistance Fund (VBAF) provides opportunities for assessment and planning as well as remediation grants. In addition, the U.S. EPA provides numerous brownfields grant opportunities that can help advance brownfields redevelopment. These funds can be helpful in clearing environmental concerns or liabilities, planning for development, or cleaning up sites when needed. This can make the site even more attractive for developers if done in advance.

Additional Resources on Brownfields

- The U.S. EPA website has considerable information on brownfields redevelopment, as well as information on federal incentives.
- The EPA also has a special website specifically for brownfields and renewable energy.
- The EPA and the National Renewable Energy Laboratory (NREL) developed a map of brownfields sites that can be screened for solar.

* A third possibility is Resource Conservation and Recovery Act (RCRA) sites, where the owners and operators are currently using, managing, or disposing of hazardous wastes. However, most candidate sites will be brownfields.

STEPS TO FACILITATE LARGE-SCALE SOLAR DEVELOPMENT

Below is a step-by-step guide for municipalities and counties to encourage and guide large-scale solar development. These steps should be taken as a starting point rather than a comprehensive guide. Naturally, each community will want to consider its unique local circumstances and processes.

For individual, no-cost technical assistance on solar energy, communities are encouraged to contact the Virginia Advisors to the SolSmart program (see page 3).

Setting a Vision and Priorities

Local governments will fare best if they take a proactive approach well before any specific project is on the table. However, even if a solar project is under consideration, it's useful to take a step back and consider the community's goals and perceived opportunities for solar development. This visioning exercise helps clarify a community's core values and aspirations for economic growth and development and where solar energy might fit into the plan.

A community can start by answering a few basic questions:

- Are there currently any large-scale solar projects in the community?
- What are the main goals and benefits the community hopes to derive from solar (for example, supporting landowners and their ownership rights, supporting small businesses, adding tax revenue, creating jobs, achieving environmental goals)?
- Has the community identified any general locations that would be suitable for solar development?
- Are there any brownfields, or previously disturbed lands such as mines, landfills, or former industrial sites that might support solar development?
- Is the community most interested in pursuing nonresidential and commercial solar, utility-scale, or both? (Residential solar, while not covered in this playbook, is a third option to consider.)
- Are there any landowners (including farmers), or local businesses (or prospective businesses) interested in hosting solar projects at their facilities?
- At a high level, what do communities expect will be the main barriers to overcome? (For example, financing, finding a suitable site, attracting developers, finding an energy purchaser, utility engagement, public opposition, etc.)

At this stage of the process, even if there are no solar projects yet on the table, communities can begin by laying out an overall vision for solar development. For example, they can identify potential sites or types of sites (e.g. former coalfields, other brownfields, unproductive agricultural land, corporate office buildings, government facilities, schools, etc.). Communities can also set goals, such as the overall amount of solar development they would like to see in a certain year or a percentage of their energy that could come from solar.

Engaging Stakeholders

Generally speaking, solar energy is very popular across the United States.* Any new solar development project, however, could face opposition or concern for a variety of reasons, ranging from the suitability of the project site to impacts on agriculture, tourism, viewshed, or competing development priorities. Local governments can anticipate and resolve such conflicts by engaging with a broad range of constituents throughout the development process. The National Renewable Energy Laboratory has prepared a useful

* A recent poll found 92% of Americans favored expanding solar power, a finding that is consistent with other surveys. Pew Research Center, "U.S. Public Views on Climate and Energy," November 25, 2019, https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/.

resource listing the top five myths about large-scale solar projects and why some potential concerns may be unwarranted.[25]

Important stakeholders for local governments are listed in the "key players" section of this guidebook (see page 11). They include internal local government staff, state agencies, electric utilities, local businesses and nonprofit organizations, corporate off-takers, solar companies, and the general public, among others.

Stakeholder engagement will be most effective if it continues on an ongoing basis. Below is an outline of how stakeholders could be engaged at each step in the solar development process:

Long-term plans and visioning. Before a specific project is on the table, local officials can begin by identifying the most important individuals from the stakeholder groups listed above and holding one-on-one meetings to gain their perspectives. Hosting one or more workshops with invited stakeholders can help build common ground. Distributing a public survey can be a useful way to obtain broad input from the community.

Planning and zoning discussions. To encourage solar development, it may be beneficial to revise the comprehensive plan and/or adopt a new zoning ordinance (see below, page 24). In addition to continued engagement with key stakeholders, these processes will likely require public comment and one or more public meetings. Such public forums also help a community explain its overall vision for solar energy to the public and obtain feedback.

Solar project reviews. A third opportunity for engagement comes when the community is reviewing specific projects. The review process will be different depending on whether the project is a nonresidential project serving the electricity load of the host (behind the meter), or a larger utility-scale project providing power directly to the grid (front of the meter). In all cases, however, public engagement will offer opportunities to hear concerns and identify solutions that can be incorporated into the project permits.

Identify and Resolve Barriers

Following internal discussions and engagement with stakeholders, a useful next step is to list the key barriers to solar development and possible avenues for overcoming them. Some common barriers can include:

Public opposition or uncertainty. Key stakeholders and the general public may be generally unfamiliar with solar projects and uncertain about how they can impact the community. Alternatively, some members of the public may actively oppose a particular project based on its location, site attributes, or perceived site attributes. Public meetings and workshops can help resolve misconceptions and discuss how to reach agreement with developers to resolve concerns.*

Competing land use priorities. Stakeholders may object that solar projects will take up valuable land intended for agriculture or new residences or businesses. They may also be concerned about the impacts on natural resources, cultural sites, aesthetic views, or construction-related traffic, among other factors. A review of the planning and zoning process (see below) will help communities set guidelines for solar projects that balance other development priorities. If a specific project is under consideration, the public meeting and comment period will provide an opportunity to discuss and resolve concerns.

Lack of suitable sites. Local officials may believe the topography and natural resources in their area do not provide sufficient opportunity for large-scale solar projects. For example, hilly terrain can make large solar projects more difficult. While some of these factors may be impossible to change, communities should keep an open mind about opportunities in their area. The Virginia Clean Economy Act is expected to lead

* For another list of common misconceptions about solar projects, see Megan Day, "Are You Solar Ready?", in *Planning Magazine*, March 2020, https://www.planning.org/planning/2020/mar/are-you-solar-ready/.

to extensive solar development (see page 4) that could extend to all parts of the Commonwealth including previously mined land.

Unclear local processes. The community may lack a clearly defined process for proposing and approving solar projects. In addition, solar energy may not be addressed in the comprehensive plan or zoning ordinances. If not addressed, the public might be more inclined to reject a developer's proposal before carefully weighing the pros and cons. To resolve such issues, governments can adjust their planning documents and codes to include solar development, as detailed below. They can also identify any policy barriers or uncertainties (for example, with regard to development on contaminated land) or potential conflicts with the electric utility. Local resources such as the Solar Workgroup of Southwest Virginia can also help to resolve such issues.

Difficulty finding locally trained workers. Utility-scale solar projects can require hundreds of workers during construction. Companies also hire for permanent positions in design, engineering, installation, land acquisition, sales, project management, government relations, and much more. With these hiring demands, the solar industry has found it can be very difficult to hire qualified workers.[26] While the primary responsibility for hiring rests with the developer, communities can partner with other stakeholders to encourage local hiring and develop a skilled workforce. They can promote training courses at local community colleges; partner with workforce development boards to develop a hiring pipeline; and collaborate with solar companies on career fairs and work-based training programs. See page 13 for more specific information about educational institutions and workforce development.

Identifying Sites

In some cases, developers will have already identified specific project sites. However, communities can help lay the groundwork by identifying locations where solar projects are most suitable. This could include general recommendations (e.g., previously mined lands) and sometimes individual sites. Local officials should be aware, however, that it can be difficult to predict which locations developers will find most attractive. Flexibility and continued dialogue with property owners and potential developers will always be helpful.

Some key considerations when identifying sites include:

Proximity to transmission. Ideally, utility-scale solar sites should be within one mile of the transmission grid. Sites farther from transmission lines are certainly possible but will incur larger interconnection costs. Many developers look for sites adjacent to or near a substation to simplify interconnection to the grid. Smaller nonresidential sites do not need to be located near transmission lines.

Topography. Hilly areas may represent a barrier to large-scale solar projects. Up to a 6% grade is ideal for solar development, and communities may want to prioritize these relatively flat areas. However, communities should not assume they should take areas with steeper hills off the table, as solar companies can and do develop projects on more difficult terrain.

Agricultural and Forested Land. Communities may want to keep highly valued agricultural land and forested areas in production. High-value agricultural and forested lands may not be suitable for solar development. However, a community can identify areas with lesser agricultural value or lower quality forests where solar development could be more suitable and explore opportunities to co-locate solar and agricultural activities.

Environmental and Cultural Resources. There may be parts of the community that are important for ecology, wildlife conservation, scenery, outdoor recreation, and/or cultural preservation and may not be suitable for solar projects. However, in some cases it may be possible that developers can mitigate these impacts as a condition in their permit. For example, developers could be required to replant trees in an offsite location

to mitigate for any forest loss caused by a solar project. Communities can flag such locations for additional investigation without closing them off to solar development outright.

Former Industrial Sites. As noted, there can be excellent opportunities for solar projects on formerly developed land, such as mine lands, brownfields, and industrial sites (see page 19). Communities are encouraged to contact the Virginia Department of Mines, Minerals, and Energy (DMME) for more information on finding suitable sites on formerly mined land, or the state Department of Environmental Quality (DEQ) for information on brownfields sites.*

Commercial, Municipal, and Nonprofit Sites. As part of the stakeholder engagement process, local governments may find businesses or nonprofit organizations that are interested in including solar energy on their properties. Examples could be data centers, industrial parks, and big-box retail stores. In addition, local governments can host solar at their own facilities, such as city halls, community centers, and schools. In Southwest Virginia, a recent partnership with Secure Futures is an excellent example of how local governments can work on a regional basis to encourage a portfolio of solar projects (see box, page 7).

Address Local Regulatory Issues

One of the most important tools that local governments have to facilitate solar development is their planning and zoning procedures: namely, the comprehensive plan and zoning ordinances. Communities will benefit if they consider opportunities to include solar as part of their long-term planning goals and objectives. This will help ensure solar projects are consistent with a community's broader goals for development, economic growth, and environmental protection.

Comprehensive Plans

Comprehensive plans are the foundation for local communities' development preferences. They define and quantify natural and economic resources within the community and set development goals and land use objectives for those resources. Therefore, a comprehensive plan should also define and set priorities related to the community's solar resource and future development opportunities.

As a first step, localities can identify and define the generation potential for large-scale PV within their jurisdiction from the State and Local Planning for Energy (SLOPE) platform from the Department of Energy and the National Renewable Energy Laboratory (NREL), by contacting the DMME, or by issuing a Request for Information (RFI) to developers.

Having quantified the resource and development potential, communities can then set development goals and land use objectives. As part of this process, they should acknowledge the benefits and co-benefits of solar development and identify any solar development opportunities and conflicts.

Examples of comprehensive plan language addressing or related to large-scale solar include the following:[27]

1. **Goal** – Encourage the development of local renewable energy resources, including appropriate applications for wind, solar, and biomass energy.
    a. **Objective** – Encourage co-location or integration of solar with other land uses such as agricultural uses.
    b. **Objective** – Encourage solar development that conserves local habitat and water quality.

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* Contacts at DEQ include Vince Maiden, Brownfields Program Coordinator (vincent.maiden@deq.virginia.gov), and at DMME include: Daniel Kestner, GIS Specialist in DMME's Division of Mined Land Reclamation (Daniel.Kestner@dmme.virginia.gov) and Nick Polier, Energy Marketing Specialist, DMME Division of Energy (Nick.Polier@dmme.virginia.gov). The web page for the Virginia Division of mine land reclamation is here: https://dmme.virginia.gov/dmlr/dmlrlandingpage.shtml.

2. **Goal** – Encourage local economic development and job creation through renewable energy development.
    a. **Objective** – Enable development of new opportunities for local contractors and support industries.
    b. **Objective** –Facilitate growth in the tax base.
3 **Goal** – Encourage the redevelopment of brownfields and mining reclamation through renewable energy development.
    a. **Objective** – Remove barriers in codes and standards to ease renewable energy redevelopment on difficult to develop sites.
4. **Goal** – Support resilient and modernized infrastructure.

In one example, Stearns County, Minnesota recognized the value of renewable energy development as an economic opportunity in its 2008 comprehensive plan update. In 2010, the county adopted a solar ordinance. By 2020, the county had more than 90 MW of large-scale and community solar development, which will generate an estimated $3 million in local energy production and property tax revenues over the useful life of the projects.[28]

Meanwhile, the Fort Collins, Colorado 2011 city plan set the long-term goal to "develop a community solar garden that provides an opportunity for electric utility customers to individually benefit from collectively sharing a larger-scale remote solar energy resource." The city's first community solar facility was built in 2015 and was sold out with approximately 200 subscribers.[29]

Comprehensive plans are typically revised every five years. If the plan is not currently due for an update, it is still beneficial for a community to consider how solar fits in with its broader development goals. Many communities also publish related plans such as area plans, energy plans, or economic development plans which also may have goals that can be met through appropriate large-scale solar development. To lead by example and further encourage solar development, many communities commit to offset a portion or all of the electricity use from municipal or county operations with renewable energy. They prioritize local renewable energy generation to capture the associated economic benefits, including job growth, land lease payments, a new tax base, and land use synergies.

Zoning Ordinances

A zoning code can include specific information on land use requirements for residential, commercial, and utility-scale solar projects. While it's possible to develop solar in a community without addressing it in zoning documents, this can lead to uncertainty among developers and require local officials to make ad hoc decisions for each project. Incorporating solar into the code can help ensure these projects are developed in a manner that is consistent with a community's land use goals.

If the complete zoning code is not up for review, a community can adopt a solar ordinance. A third option is to make minor text amendments to the zoning code to address solar development (for example, adding a definition of solar energy systems or a use table).

Some of the elements to include in the zoning code include:

- A comprehensive definition of a solar energy system differentiated by type and size. A best practice is to distinguish solar projects based on type (rooftop, as an accessory use; or ground-mounted, typically a primary use) and size (based on acreage). Rooftop residential solar projects are typically allowed by-right, meaning they can be approved administratively. Larger projects typically

require a conditional use or special use permit. Below is an example of a use table that specifies these distinctions.

Example Use Table

	Zone			
Type of Energy System	**Residential**	**Commercial**	**Industrial, Agricultural, Rural**	**Special, Conservation, Historic**
Rooftop	Allowed	Allowed	Allowed	Allowed, subject to special reviews
Ground-mounted:				
Small, < 2 acres disturbance	Allowed, depending on zone density	Allowed	Allowed	Special/ conditional use permit
Median, 2- 10 acres disturbance	Special/ conditional use permit	Allowed	Allowed	Special/ conditional use permit
Large, 10+ acres disturbance	Not allowed	Special/ conditional use permit	Special/ conditional use permit	Special/ conditional use permit, depending on zone

- Minimum development standards for solar projects. More specific considerations can be included in the special use permits for each project. However, basic development standards can include minimum setbacks from the property line; vegetation screening requirements; height and fencing requirements; ground cover requirements, which could include native or naturalized vegetation; and site maintenance requirements.
- Site plan review requirements for a special/conditional use permit for large-scale solar projects.
- Decommissioning requirements.

Review Solar Development Proposals

Having set the framework in the comprehensive plan, zoning code, and tax ordinances, the next step is to consider individual proposals for large-scale solar projects. This allows local governments to review the potential benefits and impacts of each project. They can reach agreement with the developer to mitigate any negative impacts, if necessary, and decide on any conditions to include in the project permit.

An overview of the local review process can be found on page 21. The main steps a local government will follow when reviewing a large-scale solar project include:

Conduct a site plan review. At a high level, this review will help determine if the project is consistent with a community's development priorities. The site plan review is guided by local development regulations and any requirements in the comprehensive plan or zoning code.

Consider a siting agreement. Some localities have the option to negotiate a siting agreement with the developer. This is available to projects in any census tract that meets the eligibility requirements for a federal Qualified Opportunity Zone (see page 15). The advantage is that it allows for financial compensation to the local government even for uses that are not directly related to the project, such as broadband development. A siting agreement requires a public hearing before it is approved.

Review project permits. Whether or not a siting agreement is negotiated, the project will require a conditional use or special use permit. This permit will include any mitigation strategies that are necessary to offset the impacts of the project; for example, pollinator plant requirements or minimums, off-site reforestation requirements if applicable, height restrictions, and buffers to protect viewsheds. To address these impacts, additional permits may be necessary. For example, solar projects may require grading for stormwater management and therefore require construction general use and stormwater permits.

Include any compensation requirements. Solar projects can include compensation for local governments to address any impacts of the project. As noted above, one option may be to negotiate a siting agreement for projects located in areas that meet the eligibility requirements to be considered a federal opportunity zone. Otherwise, a new Virginia law (HB 655/SB 870) allows zoning ordinances to allow conditions including 1) the dedication of real property of substantial value; or 2) cash payments for public improvements so long as they are reasonably related to the project.

Consider tax revenue options. Local governments have different options to consider when it comes to tax revenue from solar projects above 5 MW. They can either collect up to $1,400 per MW_{AC}, or obtain revenue based on a machinery and tools (M&T) tax or property tax rate schedule that changes over time due to depreciation. Please see page 18 for a discussion of these options.

Promote the Opportunity

Communities can increase their prospects for solar energy growth by promoting the opportunity to potential developers. While communities may lack the time and resources for an extensive promotion campaign, there are a number of low-cost, relatively simple activities that local governments can employ.

A solar landing page on the website. A dedicated solar energy landing page on the local government website can be very effective. This page can include information for residents, businesses, and solar developers; links to key application and permitting information; and basic facts about how solar can benefit the community. James City County, Virginia; Blacksburg, Virginia; and Pulaski County, Virginia, are examples of useful solar landing pages. Note that these landing pages can focus on large-scale solar, residential solar, or both, depending on what the community wishes to emphasize.

Attending industry conferences or webinars. Local officials can attend regional conferences (virtual or in-person) hosted by the Solar Energy Industries Association (SEIA) or MDV-SEIA to network with developers. In addition, the Virginia Renewable Energy Alliance (VA-REA) hosts an annual Virginia Clean Energy Summit. An alternative with a shorter time-commitment is to attend webinars hosted by these and other industry associations.

Community Engagement. As a follow-up to the stakeholder engagement process, local governments can work with key community organizations to spread the word about solar development opportunities in the area. In this region, an important resource is the Solar Workgroup of Southwest Virginia.

Engaging with SolSmart. The SolSmart program, funded by the U.S. Department of Energy, provides national designation and technical assistance to municipalities and counties that encourage solar development (see box, page 3). One of the principal benefits is that designated communities receive recognition and publicity for being "open for solar business." SolSmart also provides no-cost technical assistance to help communities carry out many of the steps covered in this playbook, supported by Advisors from DMME and the University of Virginia.

Issue an RFI/RFP. As a more intensive promotional effort, the community can work with willing landowners to identify prospective sites for solar, gather information on those sites, and package that information into a document as a request for information or proposals. Then, disseminate the RFI or RFP to the developer community. Assuming viable responses, the community could negotiate a group discount for one (or several) of the developers to provide solar to the interested property owners (see box, page 7).

STEPS FOR LOCAL GOVERNMENTS TO FACILITATE LARGE-SCALE SOLAR DEVELOPMENT

ADDITIONAL RESOURCES

The following additional resources may be useful for local governments seeking to facilitate large-scale solar projects.

SolSmart, *Solar Energy: SolSmart's Toolkit for Local Governments*

A roadmap to help local governments and community stakeholders encourage the use of solar energy and related technologies like energy storage. It includes sections on the federal and state context; planning, zoning, and development; codes, permitting, and inspection; utility engagement; solar on public facilities and under-utilized land; and more.

https://solsmart.org/solar-energy-a-toolkit-for-local-governments/

Virginia-Specific Information on SolSmart at DMME

https://dmme.virginia.gov/de/SolSmart.shtml

Williams Mullen, "Recent Virginia Land Use Laws Provide New Tools for Solar Developers," September 15, 2020

An overview of new Virginia laws adopted in 2020 with implications for solar developers.

https://www.williamsmullen.com/news/new-virginia-land-use-laws-provide-new-tools-solar-developers

Megan Day, "Are You Solar Ready?" *Planning Magazine*, March 2020

This article is authored by a senior energy planner at the National Renewable Energy Laboratory. It offers seven steps to help local planners successfully manage solar development.

https://www.planning.org/planning/2020/mar/are-you-solar-ready/.

Megan Day, "Local Solar," *Planning Magazine*, December 2015

This article describes characteristics of leading solar communities and stories of how they came to lead their states in solar capacity.

https://www.planning.org/planning/2015/dec/localsolar.htm

Megan Day, "Top Five Large-Scale Solar Myths," National Renewable Energy Laboratory, February 3, 2016

This article is a useful overview of common myths about the possible impacts of large-scale solar energy.

https://www.nrel.gov/state-local-tribal/blog/posts/top-five-large-scale-solar-myths.html

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