



SOLAR ROADMAP

FOR SOUTHWEST VIRGINIA



Solar Workgroup of Southwest Virginia





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SOLAR WORKGROUP

of Southwest Virginia

Solar Workgroup Goals

Goal 1:

Identify and develop sites that are ideal for solar development, especially solar “ambassador” projects.

Goal 2:

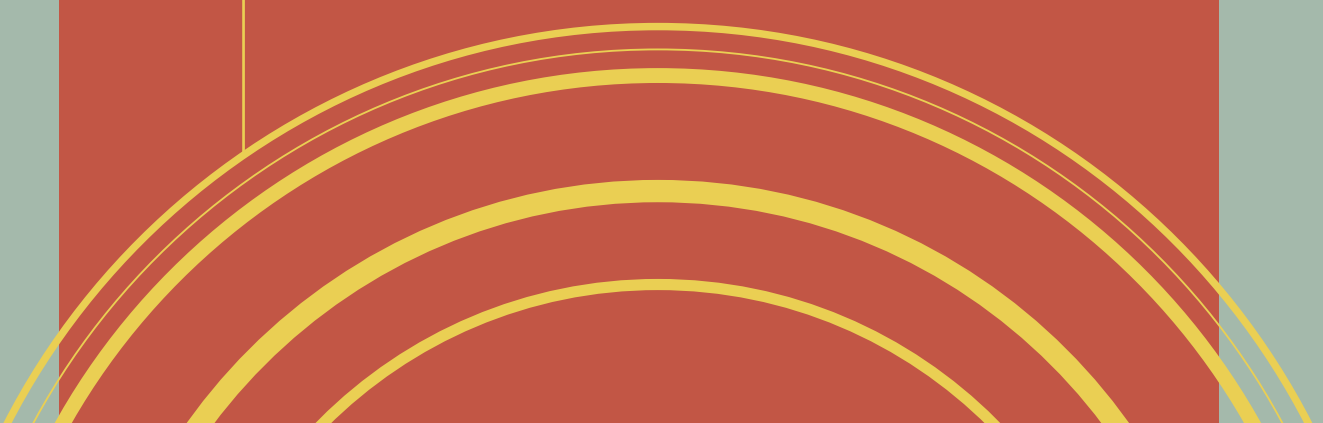
Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits.

Goal 3:

Expand education and outreach in communities and with local leaders around solar benefits and opportunities.

Goal 4:

Promote policy changes that will help grow the solar industry in Southwest Virginia.



Introduction

Accelerating the solar industry in far Southwest Virginia will require multi-faceted strategies to create new solar installations and facilities, including accessing capital and financing options, promoting policies that support the solar industry, building workforce development and solar value chain opportunities, and maximizing community outreach and education around renewables and energy efficiency in the region's seven coalfield counties (Figure 1). These strategies are outlined in this roadmap to accelerate the solar industry in far Southwest Virginia, which has been developed with the ideas and strategy suggestions of members of the Solar Workgroup of Southwest Virginia. The Solar Workgroup is co-convened by the University of Virginia's College at Wise Office of Economic Development & Engagement, People Inc., and Appalachian Voices, with facilitation assistance from Dialogue + Design Associates.

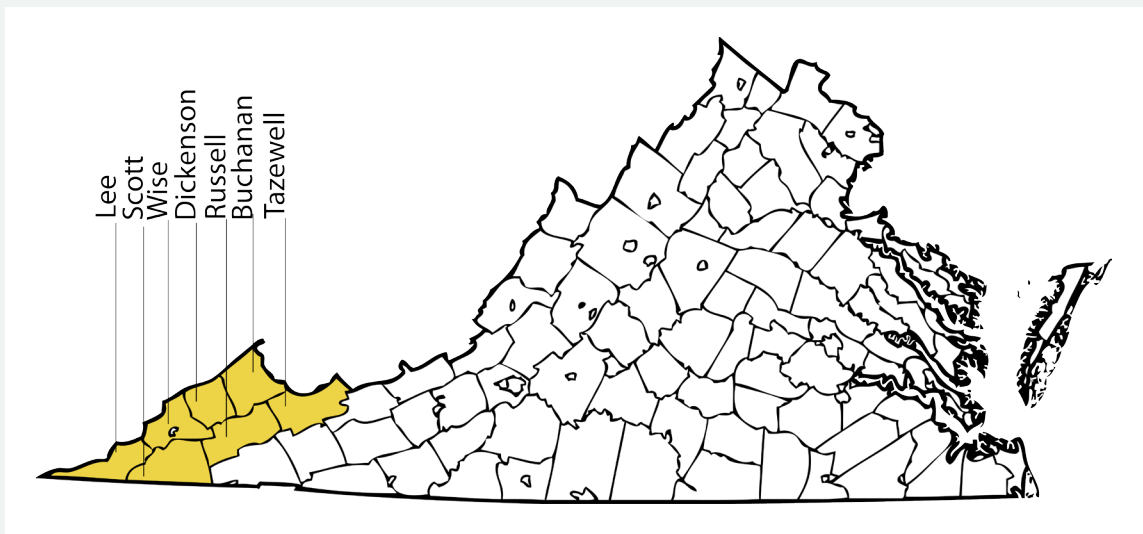


Figure 1: Southwest Virginia coalfield counties.

The Roadmap highlights the four goals of the Solar Workgroup and prioritizes projects that offer the greatest benefit to local economies or that will be highly visible and serve as solar industry “ambassadors” in the region. In addition, the Roadmap illustrates the local economic impact of solar projects and encourages “in-sourced” supply chains. This means proposing specific workforce development initiatives, local business opportunities in solar development, and policy recommendations, as well as addressing other questions and research needs raised by the Solar Workgroup.

Solar Workgroup Overview and Background

The Solar Workgroup of Southwest Virginia formed as a result of the 2016 SWVA Economic Forum hosted by UVa-Wise. The mission of the Solar Workgroup is to utilize the development of solar energy as an economic catalyst in the seven-county region of far Southwest Virginia. In early 2017, the Appalachian Regional Commission awarded a POWER Initiative Technical Assistance federal grant to fund the development of the Roadmap. The U.S. Department of Energy’s SunShot Initiative has also provided support for the effort.

The Solar Workgroup holds monthly conference calls or in-person meetings in locations rotating throughout far Southwest Virginia. The meetings are open to the public, and the Workgroup is comprised of local governments, nonprofit and community action agencies, colleges, state agencies, planning district commissions, and other interested citizens and businesses. Additional information about the Workgroup is available at www.swvasolar.org.

In addition, several smaller committees focus on specific areas of action discussed in the Roadmap, including developing policy recommendations, building a residential solar program called Solarize Wise, creating innovative financing models and mechanisms to build solar, and developing priority sites to serve as “ambassador” solar projects throughout Southwest Virginia. Committee participants are drawn from the Workgroup, co-conveners, and other partners throughout the region. Consistent communication is maintained through an email listserv, with the Workgroup and co-conveners holding regular planning team calls to guide the overall development of the Workgroup. Finally, as noted above, several community meetings have been held across the region focusing on the Solarize Wise program and building the community’s awareness of solar.

Four Key Goals of the Solar Workgroup



These goals were developed over the course of several Workgroup meetings in 2016 and 2017. At the onset of the process, participants shared hopes, goals, challenges, and opportunities for solar development in Southwest Virginia during an October 4, 2016 initial scoping meeting. Workgroup meetings continued to build on the ideas shared at the scoping meeting. Summaries of Workgroup meetings may be found at www.swvasolar.org.

The highlights of each of the four Workgroup goal areas and recent progress are included in the Roadmap, which includes an economic analysis and site assessments conducted by Downstream Strategies and additional partners. Early in the process, the Solar Workgroup prioritized having an independent economic analysis, which may be found in Chapter 3 and in Appendix A and B.

Economic Analysis Highlights

The economic analysis demonstrates that solar development in Southwest Virginia could bring significant economic benefits to the area — and to Virginia as a whole. The residential and commercial solar development scenario modeled in this report would generate approximately 43 steady, full-time jobs, including project development jobs, on-site jobs, module and supply chain jobs, and induced jobs. The utility solar development scenario would generate an additional 212 jobs per year, on



Figure 2: Projected jobs per year.

average, over the next decade (Figure 2). Earnings would total approximately \$68,000 per year per worker, or \$17.4 million total, including residential, commercial, and utility-scale solar installations.

The Commonwealth of Virginia and local governments can institute new policies that would incentivize additional investments in solar projects. For example, replacing Virginia’s voluntary Renewable Portfolio Standard (RPS) with a binding RPS and

Year	Residential		Commercial		Utility	
	Capacity (MW)	No. systems	Capacity (MW)	No. systems	Capacity (MW)	No. systems
2018	0.9	183	2.0	7	0	0
2019	1.8	366	4.3	15	25	1
2020	2.7	549	6.3	23	25	1
2021	3.7	732	8.3	31	60	2
2022	4.6	915	10.3	39	60	2
2023	5.5	1,098	12.3	47	105	3
2024	6.4	1,281	14.3	55	105	3
2025	7.3	1,464	16.3	63	160	4
2026	8.2	1,647	18.3	71	160	4
2027	9.2	1,830	20.3	79	230	5

Note: MW=megawatt.

Table 1: Cumulative solar capacity and number of installations, 2018-2027.



specific goals for solar would provide additional momentum for utilities to build or help support solar projects. At the local level, establishing PACE financing programs (see Appendix A for description) would make it easier for commercial property owners to borrow money to install solar. These and other similar policies — together with local efforts like those spearheaded by the Solar Workgroup — would help make the aspirational scenario modeled in this report a reality (Table 1).

Acknowledgments

The Roadmap development would not have been possible without the members of the Solar Workgroup of Southwest Virginia or its co-conveners, including Shannon Blevins and Becki Joyce of UVa-Wise and Bryan Phipps of People Inc. Roadmap co-authors and content developers include the following Solar Workgroup members: Blake Sutherland of EcoLogical Energy Systems in Bristol, Tennessee; Evan Hansen, Joey James, and Alan Collins of Downstream Strategies in Morgantown, West Virginia; Matt Wasson, Kate Boyle, Adam Wells, and Lydia Graves of Appalachian Voices; and Christine Gyovai and Emily Carlson of Dialogue + Design Associates, who were all instrumental in developing the Roadmap. In addition, funding from the POWER Initiative, sponsored by the Appalachian Regional Commission, provided the resources for the Roadmap development.

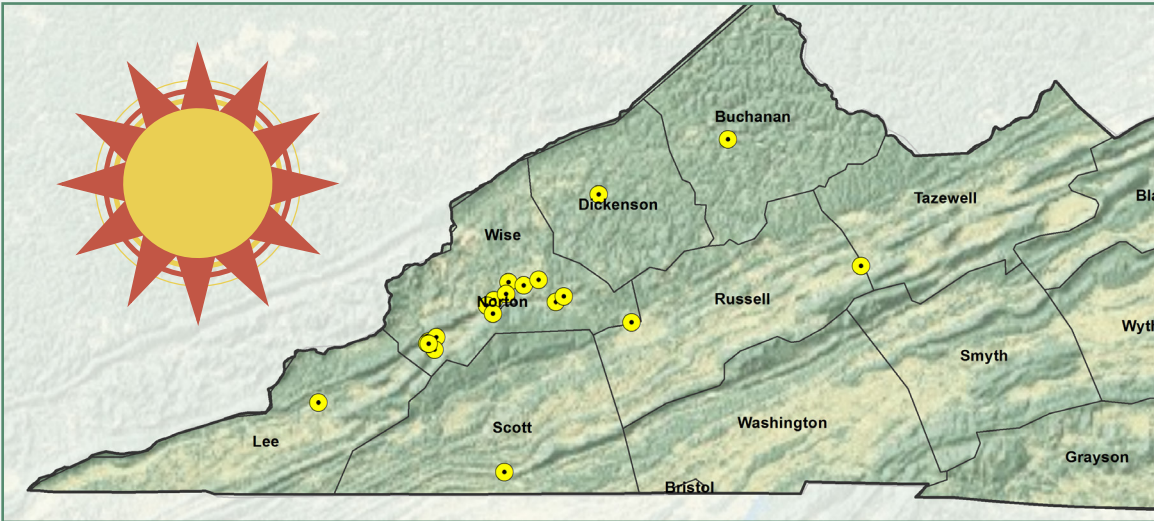


Figure 3: Top sites for solar development in Southwest Virginia.

Workgroup Priorities + Roadmap Goals

Goal 1: Identify and develop sites that are ideal for solar development, especially solar “ambassador” projects.

Top sites for solar development in Southwest Virginia (Figure 3) include:

For-profit entities:

- Food City Grocery Stores – Southwest Virginia
- Norton Green Apartments – Norton, VA
- Jonesville Manor – Jonesville, VA
- Deskins Apartment Complex – Vansant, VA
- Powell Valley National Bank – Norton, VA

Nonprofit entities:

- Ridgeview High School – Clintwood, VA
- Mutual Drugstore – Big Stone Gap, VA
- Lonesome Pine Regional Technology and Business Park – Wise, VA
- Eastside High School and Coeburn Primary – Coeburn, VA
- Mountain View Regional Medical Center – Norton, VA

- Lonesome Pine Hospital – Big Stone Gap, VA
- UVa-Wise – Wise, VA
- Southwest Virginia Community College – Cedar Bluff, VA
- Mountain Empire Community College – Big Stone Gap, VA
- Central High School – Wise, VA

Goal 1 - Action strategies:

- A. Develop ambassador sites** such as residential, commercial, and community-scale solar projects, later focusing on developing industrial-scale sites.
- B. Develop ambassador projects** that have strong marketing and public relations components to assist with community outreach and education.
- C. Identify financing options** for solar project development and clear mechanisms to access capital and project financing.
- D. Create an inventory** of possible sites for solar development in the seven coalfield counties of Southwest Virginia.

Goal 2: Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits.

The current solar workforce situation in Southwest Virginia is characterized by a “chicken and egg” challenge, where the lack of a trained workforce prevents local hiring, and a lack of local employers suppresses interest in job training. The strategies outlined the Solar Roadmap attempt to resolve this challenge through an “all at once” approach to spurring both labor supply and employment demand concurrently. Through facilitating and supporting partnership between educational institutions and solar installers, the Workgroup hopes to address the local workforce needs of the solar industry as well as the local need to create higher paying jobs.

Southwest Virginia's robust system of higher education and training institutions, combined with a technically skilled labor force, creates infinite possibilities for solar workforce development and training. In Virginia, strong solar markets exist in both regulated and deregulated electricity markets; understanding Southwest Virginia's electric utilities' regulations will open avenues for solar financing and incentives. Virginia currently offers several business incentive programs through entities such as the Virginia Coalfield Economic Development Authority and the Virginia Tobacco Region Revitalization Commission, which could directly or indirectly support solar infrastructure and job development.

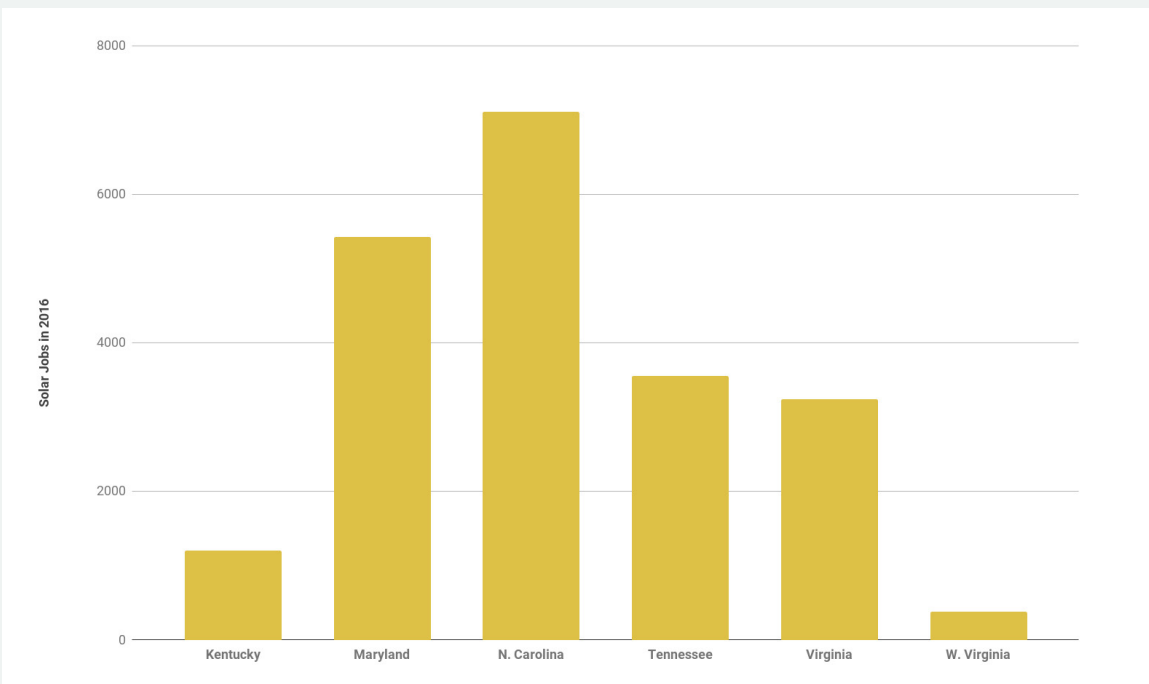


Figure 4: Solar industry jobs by state in 2016 (The Solar Foundation, 2017).

Goal 2 - Action strategies:

- A. **Address the local workforce needs** of the solar industry as well as the local need to create higher paying jobs through facilitating and supporting partnership between Southwest Virginia's educational institutions and solar installers.

- B. Coordinate training opportunities** developed between Mountain Empire Community College (MECC), solar installers, and the Solar Training Network,¹ such as a “learn and earn program,” to provide students with “boots on the roof” training in installation (initially through the 2017 - 2018 Solarize Wise program).
- C. Connect existing solar businesses** with the Solar Training Network to develop on-the-job training programs.
- D. Develop a feasibility study** of photovoltaic panel manufacturing in Southwest Virginia.

Goal 3: Expand education and outreach in communities and with local leaders around solar benefits and opportunities.

Members of the Solar Workgroup both recognize the heritage of coal mining in Southwest Virginia and are excited to grow opportunities for solar development with community members in the future. The Workgroup has engaged both the public and partners in learning about solar and developing opportunities for collaboration. An intentional effort has been made to involve community members including workers, students, homeowners, and other key stakeholders in both the Workgroup and Solarize Wise. Outreach and education around initiatives including Solarize Wise, the May 2017 Solar Fair, the SolSmart program, and community solar meetings are ongoing. The Solar Workgroup model can be adapted and shared with



others in the Appalachian region as it combines outreach, policy recommendations, implementation, and a focus on economic development while celebrating the region's strong heritage and bright future.

Goal 3 - Action strategies:

- A. Conduct community-wide solar education and outreach events** (such as the May 2017 Solar Fair at UVa-Wise, the residential Solarize Wise model, and the SolSmart program).
- B. Host tour events** of solar residential, community, and utility solar facilities in Southwest Virginia.
- C. Connect specific groups** such as homeowners, nonprofits, businesses, and farmers with the appropriate tools for understanding and financing solar opportunities particular to their needs.
- D. Collaborate with regional educational institutions** to identify hands-on learning opportunities and build key partnerships.

Goal 4: Promote policy changes that will help grow the solar industry in Southwest Virginia.

Improved state and local government policies would pave a much easier path toward a solar-based economy in Southwest Virginia. When policies reduce red tape and financial barriers to installing solar, more people are able to invest in solar energy. Chapter 5 describes a comprehensive list of existing state and federal policies and recommends reforms to increase the market for residential, commercial, and utility solar projects in Southwest Virginia.

Goal 4 - Action strategies / Policy recommendations:

- A. Remove restrictions on net metering**, which has been instrumental in making solar financially viable for residential and commercial customers in many states. Net metering allows customers to enter into an agreement with their utility to connect their solar array to the electricity grid.
- B. Expand community solar**, which is the development of solar energy projects for multiple customers. These arrangements allow customers to “go solar” even if they face barriers to installing solar on their property.
- C. Expand access to Power Purchase Agreements (PPAs)** for net metering, which have the potential to make solar accessible to many more people, but Virginia utilities have pushed to limit the number of PPAs allowable in the state.
- D. Fund the Virginia Solar Energy Development and Energy Storage Authority**, which was enacted in 2015 by the General Assembly. The purpose of this state entity is to facilitate, coordinate, and support the development of the solar industry and solar projects.
- E. Increase access to tax incentives at the state and local level** to provide investment-based incentives for solar in the form of loan assistance and tax deductions.
- F. Utilize pumped-storage hydroelectric facilities for increased solar in Southwest Virginia.** In 2017, the General Assembly passed legislation enabling the development of pump storage facilities in the coalfields of Virginia. By designing these facilities with on-site solar, there is a unique opportunity to advance solar in the region.



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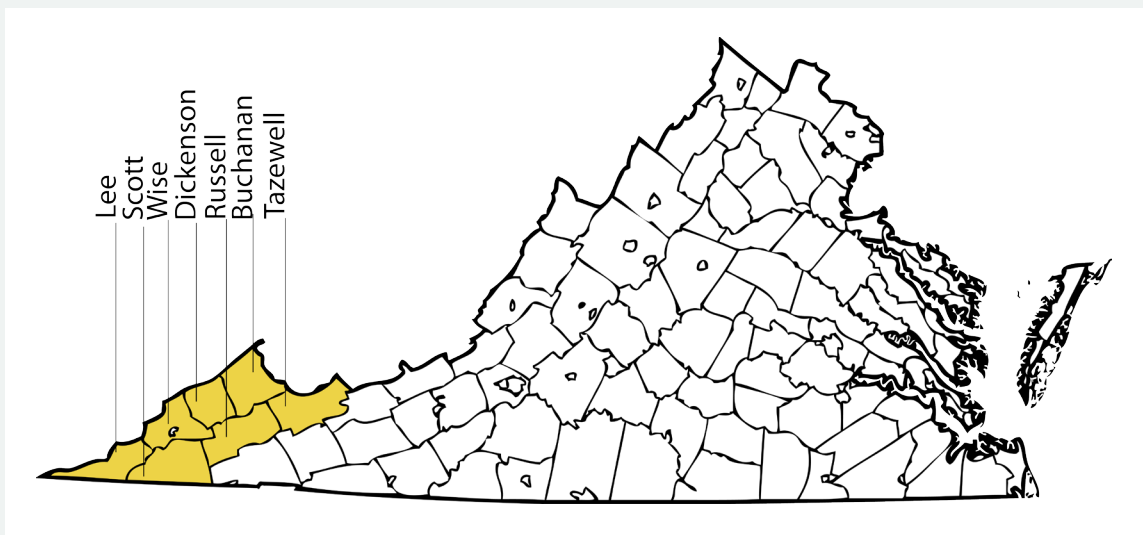
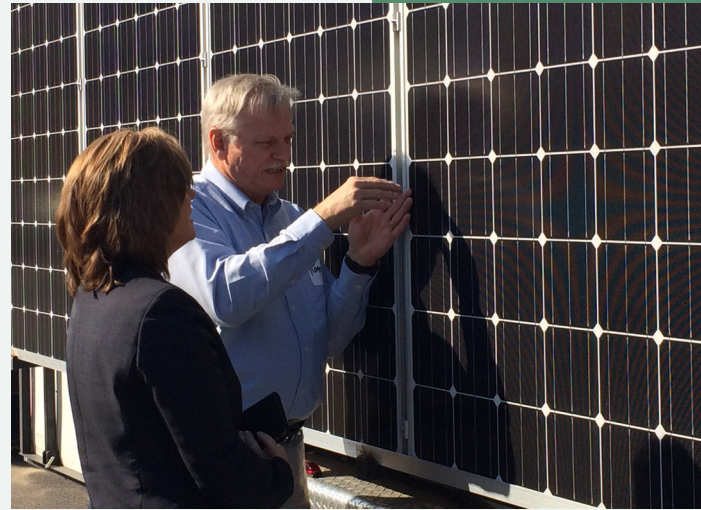


Figure 5: Southwest Virginia coalfield counties.

The Roadmap highlights the four goals of the Solar Workgroup and prioritizes projects that offer the greatest benefit to local economies or that will be highly visible and serve as solar industry “ambassadors” in the region. In addition, the Roadmap illustrates the local economic impact of solar projects and encourages “in-sourced” supply chains. This means proposing specific workforce development initiatives, local business opportunities in solar development, policy recommendations, and addressing other questions and research needs raised by the Solar Workgroup.

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Four key goals of the Solar Workgroup:



- 1 Identify and develop sites that are ideal for solar development, especially solar “ambassador” projects.
- 2 Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits.
- 3 Expand education and outreach in communities and with local leaders around solar benefits and opportunities.
- 4 Promote policy changes that will help grow the solar industry in Southwest Virginia.

Solar Workgroup Goals

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SOLAR WORKGROUP OF SWVA

The Solar Workgroup of Southwest Virginia was formed as a result of the 2016 SWVA Economic Forum hosted by UVa-Wise. The mission of the Solar Workgroup is to utilize the development of solar energy as an economic catalyst in the seven-county region of Far Southwest Virginia.

Goals	Done 2016-early 2017	Doing mid-2017	Will Do fall 2017
1 Identify and develop sites that are ideal for solar development, especially solar “ambassador” projects;	Develop a list of possible solar sites, and begin solar site assessments after prioritization;	Finalizing solar assessments and moving towards implementation;	Begin construction and implementation of ambassador sites;
2 Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits;	Collectively map out workforce and economic development opportunities, creating attainable goals;	Crafting strategies and partnerships to address identified opportunities which will be detailed in the Roadmap;	Finalize the Roadmap with strategies and recommendations for furthering solar development in SWVA;
3 Expand education and outreach in communities and with local leaders around solar benefits and opportunities;	Hold first annual Solar Fair and support Solarize Wise launch;	Expanding Solarize Wise outreach and Solar Workgroup membership;	Present a regional model for scaling solar development;
4 Promote policy changes that will help grow the solar industry in Southwest Virginia.	Listened to policy specialists’ recommendations, and discuss possibilities.	Developing policy recommendations based on current legislation and resource.	Present solar policy recommendations as a toolkit for expanding economic development.

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initial scoping meeting. Workgroup meetings continued to build on the ideas shared at the scoping meeting. Summaries of Workgroup meetings may be found at www.swvasolar.org.



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Economic Overview

In 2016, one out of every 50 new jobs added in the United States was created by the solar industry, adding \$84 billion to the Gross Domestic Product. Solar employment is growing 17 times faster than the U.S. economy overall and has increased by more than 20 percent per year for the past four years. By the end of 2017, the Solar Foundation projects that nearly 300,000 Americans will be employed by the solar industry (Figure 6).²

Also in 2016, this boom in solar jobs and economic activity finally reached Virginia, with 190 megawatts installed across the commonwealth — an enormous increase over the 10 megawatts installed the year before. In 2015, Governor Terry McAuliffe signed legislation declaring the construction of 500 megawatts of solar by 2020 to be in the

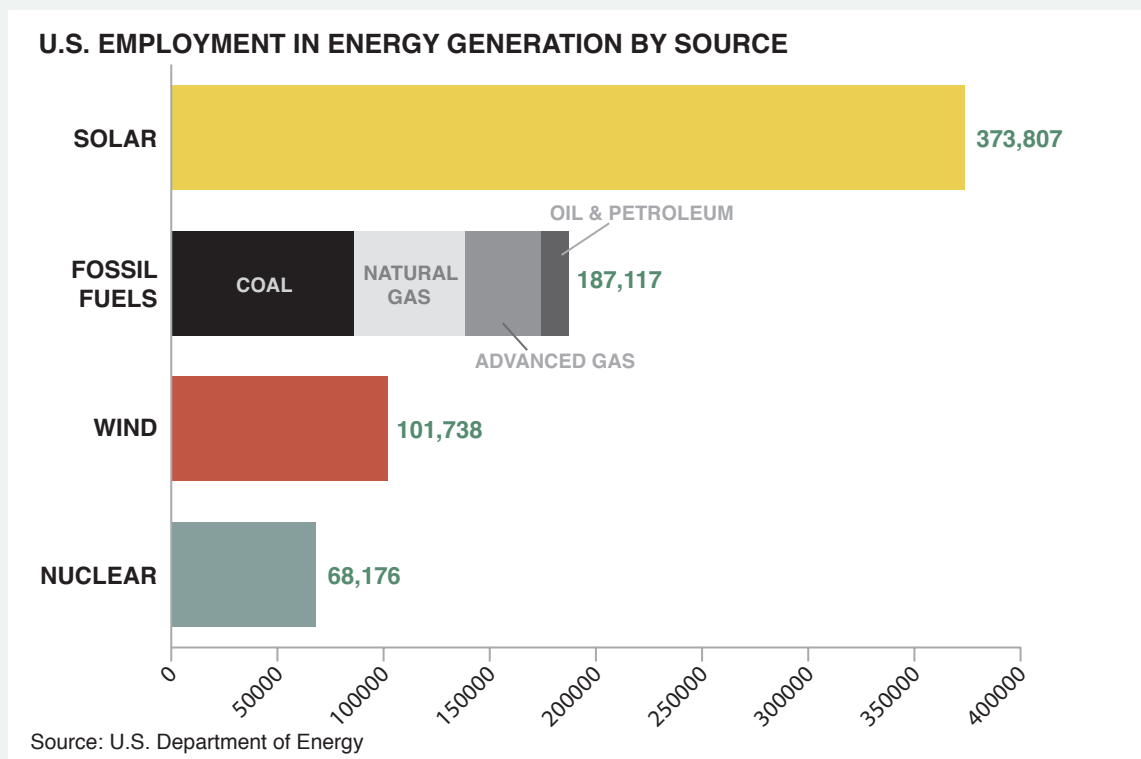


Figure 6: U.S. Employment in energy generation by source (Source: U.S. Department of Energy).

public interest. By the end of 2017, an additional 198 megawatts is expected to be installed in Virginia.

However, very few of these jobs and very little of the economic activity generated by solar have reached Southwest Virginia, a region facing many challenges as a result of the long-term decline of the coal industry. The ripple effect from mining job losses extends to locally owned service industries, including businesses that offer mechanical, electrical, and transportation services. At the same time, declining property and coal severance tax revenues have put stress on public services, including education and infrastructure.

Fortunately, renewable energy development relies on many of the same business enterprises and the technical, professional, and vocational skills that the coal mining industry has traditionally employed. Southwest Virginia also possesses many assets such as the availability of reclaimed mine lands near transmission lines and utility substations, local colleges that offer relevant training and degree programs, large vacant buildings that could be attractive to solar and wind manufacturers, and potential

sources of capital through the Virginia Coalfields Economic Development Authority and other state funds. Solar creates more jobs per unit of energy output than any other electricity-generating technology. As illustrated in Figure 7, the solar industry contributes a significant number of jobs to Virginia and neighboring states.³ In fact, there are now more jobs in solar in Virginia than there are in coal mining.⁴ References are available in the Downstream Strategies report (Appendix A).

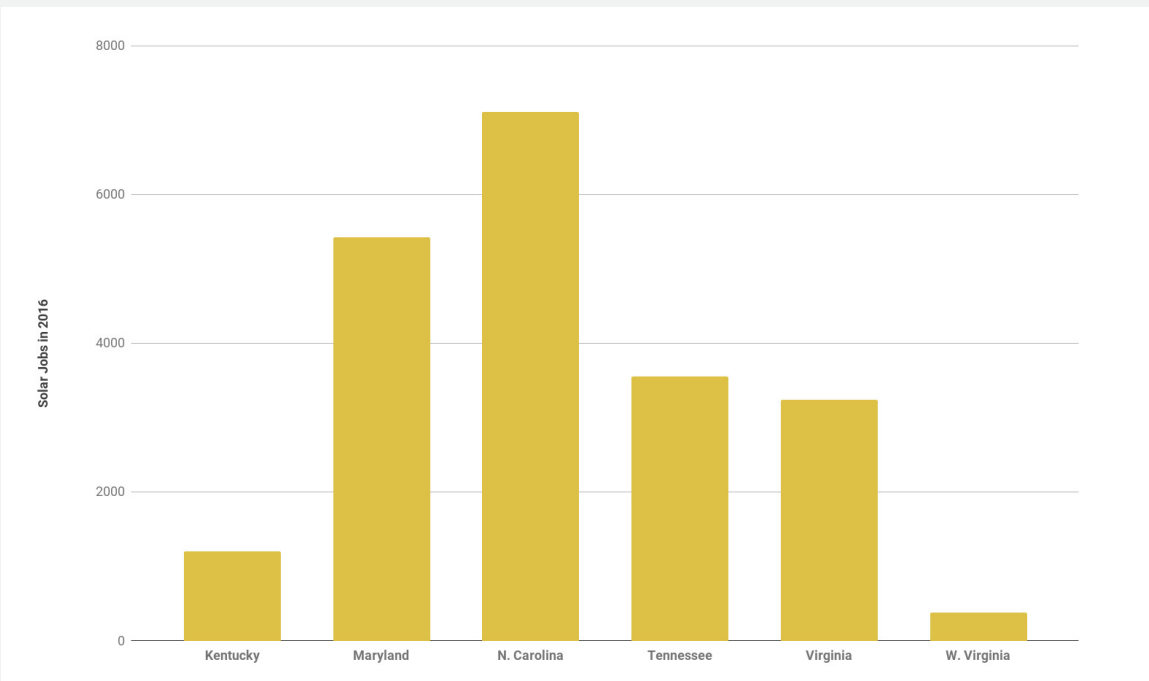


Figure 7: Solar industry jobs by state in 2016 (Source: The Solar Foundation, 2017).

Far Southwest Virginia is served by two major electric utilities, both of which are headquartered out of state, and the Powell Valley Electric Cooperative. Because of this, electricity demand currently represents dollars largely not circulated within the local economy. The Appalachian Institute for Renewable Energy estimates that current electric demand in the region encompassed by the LENOWISCO and Cumberland Plateau Planning District Commissions represents nearly \$300 million in retail electricity sales. Capturing a significant portion of that demand via local solar installations would provide an economic boon for local economies and a powerful leverage point for growing a solar industry sector. These statistics make renewable energy development an excellent candidate to replace some of the jobs that have

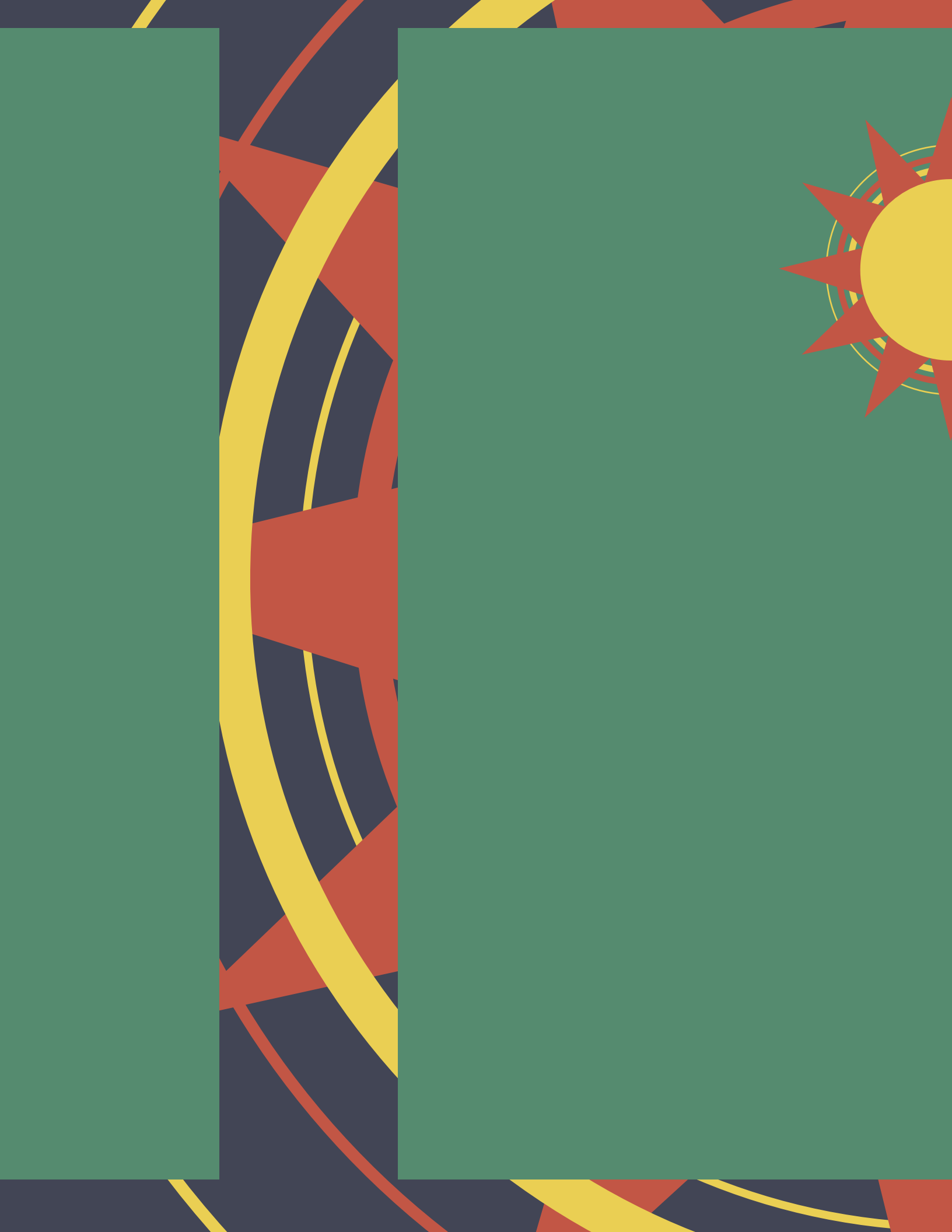


been lost in the coal industry and to position Southwest Virginia to continue in its traditional role as a leader in domestic energy production in the future.

The availability of local solar energy is also an increasingly important

asset for any region seeking to attract high-tech industries and manufacturing. For instance, the availability of affordable and reliable local sources of renewable energy has become an important factor for companies like Google, Apple, and Amazon in choosing where to locate new data centers. The emergence of Southwest Virginia as a solar energy leader would give it a competitive advantage in attracting high-tech industries, traditional manufacturers that have committed to reducing their carbon footprint, and manufacturers of renewable energy components, which have traditionally favored locating in states with large renewable energy markets and progressive renewable energy policies. Recent economic development strategy documents from the LENOWISCO and Cumberland Plateau Planning District Commissions and Appalachian Regional Commission recognize the potential for renewable energy to play a role in helping diversify the region's economy.

This Solar Roadmap details the four goals of the Solar Workgroup and the economic impacts of growing the solar industry in Southwest Virginia. Appendix A and B contain the full economic analysis and site assessments created by Downstream Strategies and EcoLogical Energy Systems.



CHAPTER 1: KICKSTARTING THE SOLAR INDUSTRY IN SOUTHWEST VIRGINIA



Goal 1: Identify and develop sites that are ideal for solar development, especially solar “ambassador” projects.

Goal 1 - Action strategies:

- A. Develop ambassador sites** such as residential, commercial, and community-scale solar projects, later focusing on developing industrial-scale sites.
- B. Develop ambassador projects** that have strong marketing and public relations components to assist with community outreach and education.
- C. Identify financing options** for solar project development and clear mechanisms to access capital and project financing.
- D. Create an inventory of possible sites** for solar development in the seven coalfield counties of Southwest Virginia.

During the fall of 2016 through the summer of 2017, Solar Workgroup members helped identify more than 40 potential sites far Southwest Virginia for solar development. The Workgroup and planning team members contacted site owners or representatives in the summer 2017 to obtain additional site and utility information. EcoLogical Energy Systems and Downstream Strategies are independent contractors that were selected after a request-for-proposal solicitation and independent review process conducted by members of the Workgroup members and co-conveners. Through partnership with Workgroup members, the contractors created site profiles for the priority sites

through digital and aerial analyses as well as physical site visits. In addition, Workgroup members developed the following potential criteria to be considered for ranking the possible sites:

1. Owner status
2. Fundability
3. Public accessibility
4. Economic development impact
5. Site development

Downstream Strategies and EcoLogical Energy Systems conducted analyses of the potential sites for solar development and created a broader economic analysis for solar industry development in Southwest Virginia. Sections of these reports are included in Chapters 2 and 3, and links to the full report and site profiles are included in Appendix A and B.

The site assessments include financial charting for a number of featured projects. Downstream Strategies charted one payback scenario for each for-profit entity and two payback scenarios for each nonprofit entity. See Appendix B for a link to detailed profiles for each site. Figures 8 and 9 show sample payback scenarios for Ridgeview High School, a priority site in Dickenson County. Figure 10 shows a sample site profile.

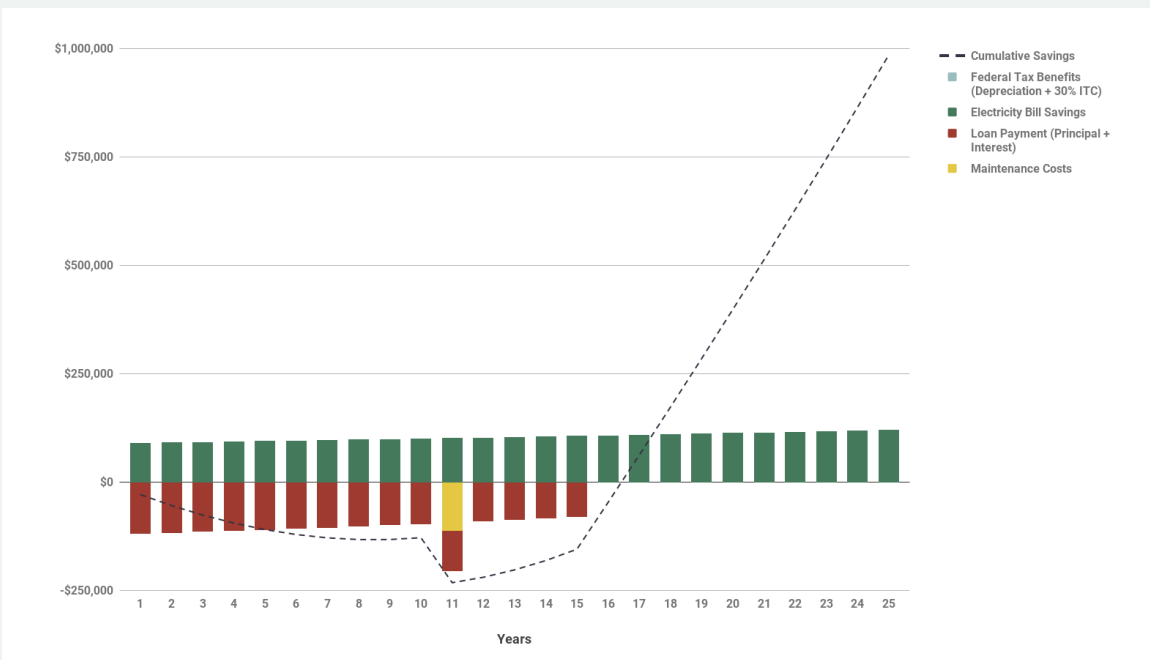


Figure 8: Payback schedule on a 15-year, 3.5 percent interest loan.

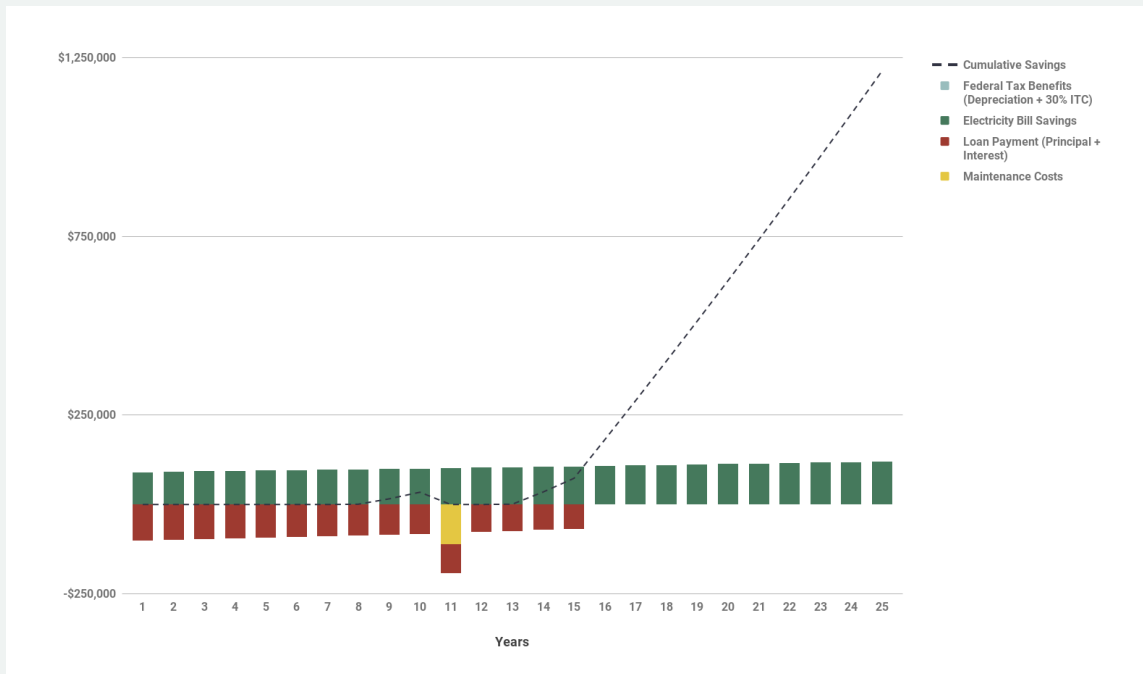


Figure 9: Payback schedule on a 15-year, 3.5 percent interest loan, 15 percent downpayment, and disbursement of \$20,932 over the first three years.

A total of 15 sites ranked high enough on each of the evaluation criteria to be included in the Roadmap. Five of these projects are sited on facilities owned by private businesses or investment groups, whereas 10 are on schools and other buildings owned by local government or nonprofit entities. This difference in ownership could have a significant impact on the financial viability of projects because tax-exempt entities like government and nonprofits are not eligible for some federal incentive programs like the Rural Energy for America Program⁵ (see Appendix A for additional information). Additionally, tax-exempt entities are unable to take advantage of tax benefits such as the Investment Tax Credit and asset depreciation that are key components of project finance for solar projects at private businesses.

Nevertheless, all 15 projects would save money for building owners over a 25-year period, even without tax benefits and other incentives. In fact, as a result of recent declines in the cost of solar panels and other components, the five projects at private businesses could be financed and installed without any cash investment, with loan payments more than offset by the energy savings and tax benefits accrued from the projects. This appears to be the case for any private business in the region that has a



building with sufficient sun exposure and appropriate roofing for a solar project.

The situation is more challenging for tax-exempt entities. However, several solar companies have developed financial devices that allow schools and nonprofits to partner with private investors to structure financing and ownership in a manner that would enable them to make use of federal tax incentives.

In summary, there are several opportunities to develop cost-effective solar projects throughout Southwest Virginia through innovative financing, incentives, and public-private partnerships and collaboration.

Ridgeview High School – Clintwood, Virginia



Opening its doors during the 2015-2016 school year, Ridgeview High School took more than two years to construct. The \$110 million project, the largest school project in the history of Dickenson County, consolidated the former Clintwood and Haysi High Schools. From January 16' to January 17', Ridgeview High School used nearly 3 million kilowatt hours of electricity, which it purchased from Appalachian Power. In January 17', the schools electricity bill was \$23,159.

Ridgeview High School has a flat rubber membrane roof. While the roof is scattered with air conditioning units and other appliances, there is a considerable amount of space that could be dedicated to a large solar photovoltaic system. The project team has determined a 700 kW fixed rack system would be appropriate for this situation. A system of this size would displace approximately 1/3 of the schools electricity purchases from Appalachian Power.

Financing

Installing solar at Ridgeview High School would cost nearly \$1.2 Million. The High School, owned and controlled by a unit of government, is not eligible for any grants or tax incentives that individuals or for-profit entities can take advantage of. This translates into larger upfront capital expenses and a longer loan payback period. This just won't cut it, our cash-strapped school districts can't be going into the red on any investment they are making. So we must be innovative. The system would generate 2.9 million in avoided costs over a 25 year period on a 1.2 million dollar investment. 1.7 million is a significant amount. So this means we need to rally for public or private investment from unconventional sources.

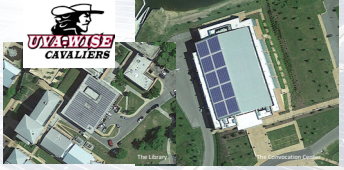
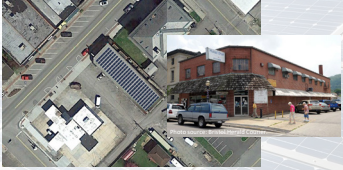
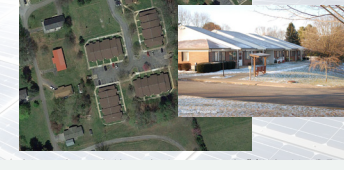
One option, private investment for use as down payment, could significantly increase the financial viability of the project. If the school district was able to secure private support in the amount of \$175,000—15% of the expected project cost—it would only need to strategically disburse \$21,000 to make this project cash positive almost immediately. In other words, with \$196,000 in strategic private support, the electricity cost savings from the solar installation will outpace loan payments.

Another option, Secure Futures out of Staunton, provides tax-exempt customers similar solar cost-reduction mechanisms that taxable entities have access to. By participating in Secure Futures' Solar Self-Generation Agreement program, the school district could install a photovoltaic system with no upfront capital costs, no maintenance responsibilities or costs, predictable payments, and guaranteed performance.

While these financing mechanisms aren't the only ones the school district may qualify for, they show that financing for a tax-exempt entity is possible.

Figure 10: Sample site profile from the Downstream Strategies report.

Site Assessments for Solar Development in Southwest Virginia

Ridgeview High School Clintwood, VA Ridgeview High School – Clintwood, Virginia 	Eastside High School and Coeburn Primary Eastside High School and Coeburn Primary – Coeburn, Virginia 	UVa-Wise Wise, VA UVA Wise – Wise, Virginia 
Southwest Virginia Community College Cedar Bluff, VA Southwest Virginia Community College – Cedar Bluff, Virginia 	Mountain Empire Community College Big Stone Gap, VA Mountain Empire Community College – Big Stone Gap, Virginia 	Central High School Norton, VA Central High School – Norton, Virginia 
Mutual Drugstore Big Stone Gap, VA Mutual Drugstore – Big Stone Gap, Virginia 	Lonesome Pine Regional Technology and Business Park Wise, VA Lonesome Pine Regional Technology and Business Park – Wise, Virginia 	Norton Green Apartments Norton, VA Norton Green Apartments – Norton, Virginia 
Food City Grocery Stores Southwest Virginia Food City Grocery Stores – Southwestern Virginia 	Mountain View Regional Medical Center Norton, VA Mountain View Regional Medical Center – Norton, Virginia 	Lonesome Pine Hospital Big Stone Gap, VA Lonesome Pine Hospital – Big Stone Gap, Virginia 
Deskens Apartment Complex Vansant, VA Deskens Apartment Complex – Vansant, Virginia 	Jonesville Manor Jonesville, VA Jonesville Manor – Jonesville, Virginia 	Powell Valley National Bank Norton, VA Powell Valley National Bank – Norton, Virginia 

CHAPTER 2: STRATEGIES TO MAXIMIZE LOCAL ECONOMIC IMPACT



Goal 2: Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits.

Goal 2 - Action strategies:

- A. Address the local workforce needs** of the solar industry as well as the local need to create higher paying jobs through facilitating and supporting partnership between Southwest Virginia’s educational institutions and solar installers.
- B. Coordinate training opportunities** developed between Mountain Empire Community College (MECC), solar installers, and the Solar Training Network, such as a “learn and earn program,” to provide students with “boots on the roof” training in installation (initially through the 2017 - 2018 Solarize Wise program).
- C. Connect existing solar businesses** with the Solar Training Network⁶ to develop on-the-job training programs.
- D. Develop a feasibility study** of photovoltaic panel manufacturing in Southwest Virginia.

Introduction

Far Southwest Virginia faces both direct and indirect challenges related to the downturn of the Central Appalachian coal industry. This region, which includes seven counties and one city, has historically led the state in coal production and employment; however, today, this reliance on the coal industry has reversed the region’s fortune. The combined

unemployment rate of the region, 6.1 percent, is much higher than Virginia's 3.6 percent unemployment rate.⁷ (See Appendix A for unemployment table and more background information.)

Fortunately, efforts are underway to overcome these challenges. There is no silver bullet to solve the economic challenges of Southwest Virginia and the greater Appalachian region. However, a combination of economic and educational initiatives in the region are cause for optimism. One particular opportunity, the development and promotion of the region's solar energy industry, has received support from a broad range of stakeholders that wish to diversify and strengthen Southwest Virginia's economy.

At the same time, the current solar workforce situation in Southwest Virginia is characterized by a "chicken and egg" challenge, where a lack of trained workforce prevents local hiring and a lack of local employers suppresses interest in job training. The strategies outlined in this Solar Roadmap attempt to resolve this challenge through an "all at once" approach to concurrently spur labor supply and employment demand. Through facilitating and supporting partnership between educational institutions and solar installers, the Workgroup hopes to address the local workforce needs of the solar industry as well as the local need to create higher paying jobs.

Southwest Virginia's robust system of higher education and training institutions, combined with a technically skilled labor force, creates infinite possibilities for solar workforce development and training. In Virginia, strong solar markets exist in both regulated and deregulated electricity markets; understanding Southwest Virginia's electric utilities' regulations will create open avenues for solar financing and incentives. Virginia currently offers several business incentive programs that could directly or indirectly support solar infrastructure and job development such as the Virginia Coalfield Economic Development Authority and the Virginia Tobacco Region Revitalization Commission.

Local Workforce Development

The Solar Workgroup has identified workforce development as a high priority goal and identified the action items above as priority strategies for implementation. Workgroup

partners will continue coordinating training opportunities developed between Mountain Empire Community College, solar installers, and the Solar Training Network. The college has established a “learn and earn” program with Sigora Solar, a privately owned installer based in Virginia, to provide students with “boots on the roof” training in installation. This program is currently being implemented in concert with the Solarize Wise residential program, but can be scaled to include the commercial projects outlined in Chapter 1 of the Roadmap. In addition, the Workgroup hopes to connect existing solar businesses with the Solar Training Network to develop on-the-job training programs. Another potential avenue for the Workgroup is to develop a feasibility study of photovoltaic panel manufacturing in Southwest Virginia.

Help Wanted, Jobs in Solar

Solar development bolsters economic wealth in several ways as noted in Chapter 1. The solar industry provides jobs and affiliated jobs based in construction, technology, and the sciences. Solar development also spurs wealth retention and creation through energy savings, which can lead to increased profit margins for businesses and institutions, allowing for further job creation and other resource development.

From the beginning, the Solar Workgroup recognized that in order for solar development to thrive in Southwest Virginia, it would need to identify opportunities for solar jobs to offer steady wages and career advancement. This has been a key strategy to address the drastic income loss experienced by displaced coal miners and entice younger generations to stay in the region or move to the region.

Solar creates more jobs per unit of energy output than any other electricity-generating technology and, as illustrated in Figure 7 on page 18, it contributes a significant number of jobs to Virginia and neighboring states.⁸ In fact, there are now more jobs in solar in Virginia than there are in coal mining.⁹ Currently, 217 Virginia companies employ more than 3,000 people throughout the solar energy value chain.¹⁰ Generally, jobs in the solar industry can be broken into five sectors described in detail below: installation, manufacturing, sales and distribution, project development, and “other.”¹¹

Types of Solar Jobs

Installation

Those working in the installation sector assemble, install, and maintain solar systems. According to the Bureau of Labor Statistics, the average annual wage for solar installers is just over \$39,000.¹² More than 93,000 U.S. jobs were created in this sector between 2010 and 2016, accounting for approximately half of all job growth in the solar industry.¹³

Manufacturing

Solar manufacturers produce the upstream components of solar systems, including photovoltaic panels, inverters, racking and mounting systems, and module connectors. Wages in this sector vary depending on position and products manufactured, however, wages averaged just less than \$21 per hour in July 2017.¹⁴ While many manufacturing companies only derive a portion of their business from solar, it is estimated that over 38,000 people are employed in the manufacturing of upstream components in the United States.¹⁵

Sales and distribution

Wholesale- and retail-trade establishments make up the sales and distribution sector of the solar industry. Employment in this sector, currently more than 32,000 people in the U.S., is expected to grow faster than any other sector in industry.¹⁶ This sector is very diverse, thus, no sector-specific wage data is available.

Project development

This sector is comprised of utility companies and others that develop and work on commercial-scale and utility-scale projects. Workers in this sector engage in land acquisition, financing, permitting, and other aspects of large-scale solar projects. Just under 35,000 people work in this sector nationwide.¹⁷ Similar to the distribution sector, jobs in project development are very diverse and no sector-specific wage data is available.

Other jobs

Finally, the “other” sector comprises about seven percent of the total solar workforce, just over 18,000 workers. People working in this diverse sector include workers at research and development firms, law firms, nonprofits, universities, training centers, and in different government agencies.¹⁸

Solar Workforce Development in Region

More than 80 percent of firms in the solar industry report having difficulty finding qualified applicants for employment. Notably, the top reasons for this are a lack of experience in the applicant pool, insufficient qualifications of the applicant pool, and the small size of the applicant pool. Solar training programs provide valuable opportunities for those pursuing employment in the solar industry to move into living-wage careers in as little as 12 months.¹⁹ Two such programs in the region are Rewire Appalachia and the North Carolina Clean Energy Technology Center. (See Appendix A for more information.)

Southwest Virginia's Skilled Workforce and Educational Institutions

One of Southwest Virginia's most valuable assets is the existence of a sizable, middle-skill STEM (science, technology, engineering, and mathematics) workforce. Existing professionals and small business owners such as miners, plumbers, roofers, contractors, and electricians can increase or adapt their workload by specializing in solar installation components relative to their field. For example, in West Virginia, the company Solar Holler is helping set up a training center in a former factory that had been abandoned in Huntington in partnership with the Coalfield Development Corporation. In a public radio story about the project, writer Jason Margolis noted that, "Beyond solar jobs, Coalfield Development is teaching former coal workers skills like woodworking and farming. Apprentices with Coalfield Development work 33 hours, spend six hours a week at a community college, and three hours engaged in 'life-skills mentorship.' Nearly 90 people have entered the program."²⁰

With the number of high-quality educational and workforce development institutions and programs in the region, creating job placement and training programs in the solar industry is a golden opportunity.

Educational and Training Institutions

Both of the state community colleges in this region offer training programs that complement solar workforce development. Mountain Empire Community College offers two degree programs (electrical and HVAC) that integrate geothermal and solar

skills. In recent years, Southwest Virginia Community College has offered programs in advanced manufacturing, alternative energy technology, renewable energy and energy efficiency, HVAC, and electrical engineering. However, those programs are currently idle due to a lack of student interest, a situation the Solar Workgroup hopes is reversed in the near future.

Additionally, other opportunities for collaboration around training are available through a number of institutions such as UVa-Wise and the Southwest Virginia Higher Education Center. Regional K-12 school systems offer a number of vocational and technical programs through Career and Technical Centers in Wise, Grundy, Ben Hur, Clinchco, Lebanon, Tazewell, and Gate City.

Workforce and Training Resources

Southwest Virginia's Workforce Development Board offers free trainings in advanced manufacturing through the federal POWER Initiative through a partnership between Mountain Empire and Southwest Virginia community colleges and Southwest Virginia Alliance for Manufacturing Centers of Excellence, which offers training in welding and industrial maintenance.²¹ Area One's Virginia Workforce Centers are integrated in the statewide network and offer a variety of career services as well.

National Certifications and Accreditation

Several national organizations offer guidance, training, and certification within the solar industry. Solar Energy Industries Association's mission is to build advocacy and education as the national trade association in the U.S. for solar. The association represents all organizations that promote, manufacture, install, and support the development of solar energy.²² Four national organizations provide certification in the solar industry. The most widely known is NABCEP (North American Board of Certified Energy Practitioners), which offers a Photovoltaic Installer certification and a Solar Thermal Installer certification. The Underwriter's Laboratory (UL) offers many courses and certifications, including a new Photovoltaic Installer Certification. The Underwriter's Laboratory University also provides many courses on photovoltaics as well as courses on many other topics, including fire safety and electrical safety. The Roof Integrated Solar Energy program offers a Certified Solar Roofing Professional

Certification. Lastly, the Electronics Technicians Association provides three levels of certification — apprentice, specialist, and technician — in alternative energy technologies, including photovoltaic and solar thermal.

The Interstate Renewable Energy Council provides an accreditation program for courses and instructors of renewable energy courses and practitioner training. The Institute for Sustainable Power Quality framework of standards and metrics provides accreditation for courses and certification for trainers. The U.S. Department of Energy sponsors the Solar Instructor Training Network, administered by the Interstate Renewable Energy Council. The network is a group of nine regional resource and training providers that support the professional development of instructors conducting solar and solar thermal courses.

Career Advancement in Solar

Certifications and training programs undoubtedly create a more competitive and competent workforce. Identifying prerequisite training and on-the-job opportunities for career advancement are both needed to create a robust and accessible career track. According to the Solar Foundation, solar companies anticipate similar opportunities for rapid advancement and promotion to a Senior Installer position after only 6-12 months of work and training. An average employee at one of these companies could see a 45 percent wage increase after less than one year of experience and training at the company.

Employers correspondingly report that they look less to installation-specific training among job applicants, and place more value on those experiences that develop technical abilities, safety techniques, and soft skills that are common to all companies. Currently, the solar industry is almost evenly split on the importance of entry-level installers obtaining a solar certification with 48.1 percent considering it either important or somewhat important, and 51.9 percent considering certifications unimportant.²³

Enterprise Development: Opportunities and Resources for Virginia Businesses to Expand Solar

Creating and leveraging incentives to attract and promote solar development in Southwest Virginia requires a balance of policy development and developing programs

that activate those policies. The solar policy chapter addresses such recommendations.

Role of Non-Solar Businesses

Many corporations are making vigorous commitments to sustainability and renewable energy. While these commitments do support some jobs in solar, they also help these corporations reduce their bottom lines and continue to grow. (Appendix A contains more detailed information.)

Virginia's e-Region, marketed by the Virginia Coalfield Economic Development Authority (VCEDA), includes Lee, Wise, Scott, Buchanan, Russell, Tazewell, and Dickenson counties, and the City of Norton. VCEDA promotes e-business job creation and regional economic diversification. Businesses that have located significant facilities in the e-Region include Northrop Grumman, CGI, Tempur-Sealy, and Crutchfield Corporation. Recently, Frontier Communications announced it will locate a 500-employee customer care center in Wise County near the Lonesome Pine Airport. This is in addition to the already-planned 65,000-square-foot data center that DP Facilities, one the world's leaders in data center construction and design, is building near that site.²⁴

Amazon, one of Appalachia's largest employers, is committed to achieving 100 percent renewable energy usage across its global infrastructure and is currently constructing new wind and solar farms in Ohio, Virginia, Indiana, and North Carolina. When completed, these installations will deliver more than 1.6 million megawatt-hours (MWh) of renewable energy into the electric grids that power Amazon Web Services' cloud data centers.

Amazon is developing significant solar infrastructure in Virginia, within the Dominion Virginia service territory. Amazon Solar Farm U.S. East, located in Accomack County, generates approximately 170,000 MWh annually. An additional four solar farms in New Kent, Buckingham, Sussex, and Powhatan counties combined are expected to start generating more than 190,000 MWh annually by the end of 2017. And a solar farm in Southampton County is expected to start generating approximately 210,000 MWh of solar power annually by the end of 2017.²⁵

These ambitions are, perhaps, emblematic of the big data industry. However, ambitious sustainability goals and renewable energy development is not limited to data centers. Large businesses like Target and Walmart are also playing a role in driving renewable industry development.

Virginia currently offers several business incentive programs that could directly or indirectly support solar infrastructure and job development:

- The [Cumberland Plateau Revolving Loan Fund](#), funded by the U.S. Economic Development Administration, provides a source of economic development financing and enhances the ability of local governments to deal quickly with bona fide industrial prospects. This funding source may be used with other existing local, state, and federal programs to develop financial proposals for new and existing industries throughout the seven counties of far Southwest Virginia.
- The [Virginia Jobs Investment Program](#) is an incentive program offering customized recruiting and training assistance to companies that are creating new jobs or experiencing technological change. The program is designed to reduce human resource development cost by providing direct funding to qualifying new and expanding companies.
- The [Tobacco Region Opportunity Fund](#) makes grants to localities in Virginia's tobacco-producing regions to assist with specific projects that result in the creation of new jobs and investment. Grants are made to the community at the discretion of the Tobacco Region Revitalization Commission. The goal of the fund is to attract competitive projects expected to have a regional impact due to the magnitude of new employment and investment, and the possibility of follow-on industry.
- The [Virginia Economic Development Incentive Grant](#) is a discretionary performance incentive designed to assist and encourage companies to invest and create new employment opportunities by locating significant headquarters, administrative, or service sector operations in Virginia.

- The [Virginia Investment Partnership Grant](#) and the Major Eligible Employer Grant are discretionary performance incentives designed to encourage continued capital investment by Virginia companies, resulting in added capacity, modernization, increased productivity, or the creation, development, and utilization of advanced technology.
- The [Commonwealth's Opportunity Fund](#), formerly known as the Governor's Opportunity Fund, is a discretionary incentive available to the governor to secure a business location or expansion project for Virginia.
- The [Virginia Coalfield Economic Development Authority](#) serves the seven-county coal-producing region in Southwest Virginia. Grants and loans are available on an annual basis to serve as project capital to develop new or grow existing businesses.
- The [Virginia Enterprise Zone](#) program is a partnership between state and local government that encourages job creation and private investment by designating Enterprise Zones throughout the state and providing two grant-based incentives, the Job Creation Grant and the Real Property Investment Grant, to qualified investors and job creators within those zones, while the locality provides local incentives.
- The [Blue Green Alliance Clean Energy Policy Inventory](#) is a tool that was developed to provide local economic developers, policy makers, and community organizers with accessible information on both state and federal policies and programs that can support their businesses and communities as renewable energy sources continue to expand within each focus state's energy portfolio. The online inventory contains detailed information on each incentive, including a brief summary, a detailed description of the policy or program, the type of funding, who is eligible, the government agency that operates the incentive, the website for the program/policy, contact information, and the information source.

Additional Resources

- Blueprint for Attracting and Sustaining Advanced Manufacturing in Southwest Virginia, 2014
- Workforce Skills Analysis: Southwest Virginia Workforce Investment Board
- Southwest Virginia Workforce Investment Board Local Strategic Plan, 2016-2020
- Solar Training Network







One of the priorities expressed by the Solar Workgroup was to develop a clear and unbiased understanding of the economic potential of solar in Southwest Virginia. An economic analysis was conducted by Downstream Strategies and partners to address this priority. The consultant team completed an economic impact analysis of residential, commercial, and utility-scale solar development in Southwest Virginia over a 10-year period beginning in 2018. The team used the National Renewable Energy Laboratory’s Jobs and Economic Development Impact (JEDI) model. (Please refer to Appendix A for the full report.)

In total, the economic analysis indicates that residential, commercial, and utility-scale solar installations would generate 255 jobs. In comparison with the current employment in Southwest Virginia (see Table 2), this would represent an increase of approximately 0.5 percent.

County	People employed	Registered businesses
Buchanan	5,240	414
Dickenson	1,996	200
Lee	2,705	273
Norton City	5,337	242
Russell	5,822	447
Scott	3,616	283
Tazewell	13,101	1,042
Wise	8,716	751
Total	46,533	3,652
Source: U.S. Census (2017)		

Table 2: Current employment in Southwest Virginia.

Inputs for the Economic Analysis

Solar Development Scenarios

This analysis models an aggressive growth in solar installations over 10 years. In this sense it is an aspirational analysis, but it is grounded in reality based on the success in rapidly increasing solar capacity in other states.

The residential solar development scenario goal is 9.2 MW by 2028. This is based on approximately 2.5 percent of Southwest Virginia households installing 5 kilowatts (kW) of solar at their homes. As shown in Table 3, this is modeled as 183 solar installations per year over 10 years.

Year	Residential		Commercial		Utility	
	Capacity (MW)	No. systems	Capacity (MW)	No. systems	Capacity (MW)	No. systems
2018	0.9	183	2.0	7	0	0
2019	1.8	366	4.3	15	25	1
2020	2.7	549	6.3	23	25	1
2021	3.7	732	8.3	31	60	2
2022	4.6	915	10.3	39	60	2
2023	5.5	1,098	12.3	47	105	3
2024	6.4	1,281	14.3	55	105	3
2025	7.3	1,464	16.3	63	160	4
2026	8.2	1,647	18.3	71	160	4
2027	9.2	1,830	20.3	79	230	5

Note: MW=megawatt.

Table 3: Cumulative solar capacity and number of installations, 2018-2027.

The commercial solar development scenario starts with installing the 15 identified ambassador projects in 2018 and 2019 and continues by installing 2 MW per year for the next eight years. In total, 20.3 MW of commercial-scale solar would be installed in Southwest Virginia by 2027. (See Appendix B for more information on the ambassador sites.)

The commercial sector represents a large opportunity to deploy solar energy, but this sector has experienced relatively slow growth due to a wide range of complexities and

complications. Appendix B presents site profiles for 15 opportunities for commercial solar development in Southwest Virginia identified by the Solar Workgroup — more than 4 MW of potential capacity. These projects demonstrate the availability of numerous similarly sized projects in the region. As noted above, one goal of the Solar Workgroup is to facilitate project installation at these facilities over the next two years.

For the utility-scale scenario, the project team reviewed solar integration goals found in Integrated Resource Plans (IRPs) for two of the three utilities that serve Southwest Virginia: Tennessee Valley Authority/Powell Valley Electric Cooperative and Appalachian Power. For each IRP, the project team scaled the solar integration goals for Virginia based on the number of customers in Virginia compared with the total number of customers in the utility service area. For our utility-scale projections, the project team assumed that all new utility-scale solar capacity within these two utilities' service areas in Virginia will be built in Southwest Virginia. The utility-scale solar development scenario includes 230 MW over the next 10 years, with projects of 25 MW, 35 MW, 45 MW, 55 MW, and 70 MW built every other year starting in 2019.

Results

Residential and Commercial Solar Jobs

As shown in Figure 11, residential and commercial installations will create approximately 20 project development and on-site jobs and approximately 15 supply chain jobs. (These jobs are described above in Chapter 2, and are available for review in Appendix A.) Residential and commercial installations will also create approximately nine induced jobs. These jobs are created as money earned in direct and indirect jobs cycles through the local economy.

Approximately 90 percent of these jobs are filled with workers who build new installations, while the other 10 percent are filled with workers who maintain them. Because the residential and commercial solar development scenarios include a similar amount of installations each year, these 43 jobs will be steady, full-time jobs.

Earnings tied to residential and commercial installations are estimated to total



Figure 11: Average annual jobs created.

approximately \$2.9 million per year, on average, over the 10-year period. This averages approximately \$68,000 per year per job.

Utility-Scale Solar Jobs

Jobs created by increasing utility-scale solar will be much more significant; however, because the scenario includes one utility-scale solar installation every other year, these installation jobs may be less consistent. Steady maintenance jobs at these sites, however, will ramp up gradually over time. As shown in Figure 11, utility installations will create approximately 212 jobs on average over the 10-year period, including project development and on-site jobs, supply chain jobs, and induced jobs. Approximately 92 percent of these jobs are filled with workers who build new installations, while the other 8 percent are filled with workers who maintain them.

These utility-scale solar jobs are expected to be more sporadic than the residential or commercial jobs, because only five large utility-scale projects are included in the solar development scenario over 10 years. For this reason, it is likely that workers will be a part of the regional solar job market that services large utility-scale solar development not just in Virginia, but also in nearby states that are dramatically increasing utility-scale solar development. Earnings tied to utility-scale installations are estimated to total approximately \$14.4 million per year, on average, over the 10-year period. This averages approximately \$68,000 per year per job.

Residential installations would create approximately 23 total jobs per MW of installed capacity over the 10-year period, more than twice the eleven jobs per MW created at commercial installations and the nine created at utility installations (Figure 12). This suggests that pursuing residential installations would be the most effective strategy for increasing local employment per unit of solar installed.

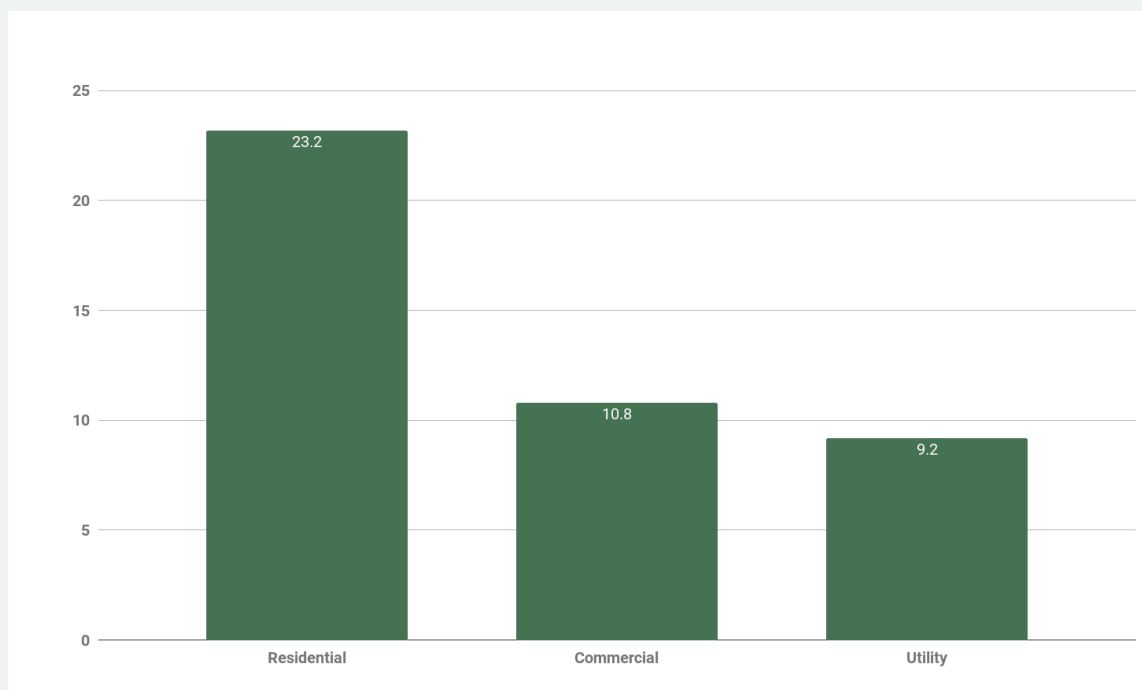


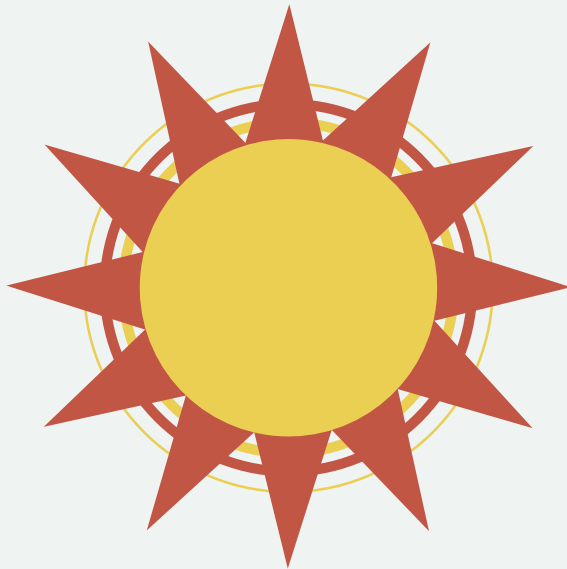
Figure 12: Jobs per megawatt.

Note: These total jobs per MW differ from the average annual jobs in Figure 11 in that they include the total of all annual jobs created over the 10-year time period.

Economic Analysis Conclusions and Recommendations

As demonstrated in the analysis, solar development in Southwest Virginia could bring significant economic benefits to the area and to Virginia as a whole. The residential and commercial solar development scenarios modeled in this report would generate approximately 43 steady, full-time jobs, including project development jobs, on-site jobs, module and supply chain jobs, and induced jobs. The utility solar development scenario would generate an additional 212 jobs per year, on average, over the decade. Earnings would total approximately \$68,000 per year per worker, or \$17.4 million total—including residential, commercial, and utility-scale solar installations.

The Commonwealth of Virginia and local governments can institute new policies that would incentivize additional investments in solar projects. For example, replacing Virginia’s voluntary Renewable Portfolio Standard (RPS) with a binding RPS with a solar carve-out would provide additional momentum for utilities to build or help support solar projects. At the local level, establishing PACE financing programs (see Appendix A for description) would make it easier for commercial property owners to borrow money to install solar. These and other similar policies, together with local efforts like those spearheaded by the Solar Workgroup, would help make the aspirational scenario modeled in this report a reality.



CHAPTER 4: GROWING SOLAR IN A REGION WITH A STRONG COAL HERITAGE



Goal 3: Expand education and outreach in communities and with local leaders around solar benefits and opportunities.

Goal 3 - Action strategies:

- A. Conduct community-wide solar education outreach events** such as the May 2017 Solar Fair at UVa-Wise, the residential Solarize Wise model, and the SolSmart program.
- B. Host tours** of residential, community, and utility-scale solar facilities in Southwest Virginia.
- C. Connect specific groups** such as homeowners, nonprofits, businesses, and farmers with the appropriate tools for understanding and financing solar opportunities particular to their needs.
- D. Collaborate with regional educational institutions** to identify hands-on learning opportunities and build key partnerships.

Workgroup Model and Background

The Solar Workgroup of Southwest Virginia, as noted in the introduction, is co-convened by the UVa-Wise Office of Economic Development & Engagement, People Inc., and Appalachian Voices, with facilitation assistance from Dialogue + Design Associates. The Workgroup uses an iterative, adaptive meeting process, creating an open forum for community partnership and focused collaboration.

SOLAR WORKGROUP OF SWVA

The Solar Workgroup of Southwest Virginia was formed as a result of the 2016 SWVA Economic Forum hosted by UVA-Wise. The mission of the Solar Workgroup is to utilize the development of solar energy as an economic catalyst in the seven-county region of Far Southwest Virginia.

Goals	Done 2016-early 2017	Doing mid-2017	Will Do fall 2017
1 Identify and develop sites that are ideal for solar development, especially solar "ambassador" projects;	Develop a list of possible solar sites, and begin solar site assessments after prioritization;	Finalizing solar assessments and moving towards implementation;	Begin construction and implementation of ambassador sites;
2 Grow workforce development and entrepreneurship opportunities to advance solar projects and maximize local benefits;	Collectively map out workforce and economic development opportunities, creating attainable goals;	Crafting strategies and partnerships to address identified opportunities which will be detailed in the Roadmap;	Finalize the Roadmap with strategies and recommendations for furthering solar development in SWVA;
3 Expand education and outreach in communities and with local leaders around solar benefits and opportunities;	Hold first annual Solar Fair and support Solarize Wise launch;	Expanding Solarize Wise outreach and Solar Workgroup membership;	Present a regional model for scaling solar development;
4 Promote policy changes that will help grow the solar industry in Southwest Virginia.	Listened to policy specialists' recommendations, and discuss possibilities.	Developing policy recommendations based on current legislation and resource.	Present solar policy recommendations as a toolkit for expanding economic development.

www.swvasolar.org

Workgroup participation is open at each meeting, and at the same time action ideas and goals build on one another over time through Workgroup member participation. Maintaining consistent planning team calls has enabled the co-conveners to address new opportunities and challenges as they arise, such as responding to new funding opportunities and maintaining progress for solar site development.

Workgroup Challenges

Given the wide-reaching goals, the Workgroup anticipated a few potential roadblocks along the way, which can occur with any collaborative process. Creating cohesion within the Workgroup and building partnerships before the project funding expired posed an initial challenge as the group needed to move toward implementation quickly. A combination of a short project timeline and a diverse set of goals made the flow of logistics and consistent communication and participation a core focus area early in the process.

successful May 2017 Solar Fair at UVa-Wise. Job creation and economic development have been a primary area of focus for the Workgroup in as many ways as possible, including creating direct jobs in solar, sharing information about monetary savings from energy efficiency, and installing solar for area businesses. Taking this community and economic development approach has enabled several individuals and institutions to support this effort, while still honoring and supporting the important role the coal industry has and continues to play in the region's economy and culture.



Best Practices and Lessons Learned

An intentional effort has been made to involve community members including workers, students, homeowners, and other key demographics in both the Workgroup and community outreach efforts. The Solar Workgroup model can be adapted and shared with others in the Appalachian region as it combines outreach, policy recommendations, implementation, and a focus on economic development while celebrating the region's strong heritage and bright future.

Keys to the Solar Workgroup's Success

1. The Workgroup began with broad-based regional support as it originated from the regional economic forum at UVa-Wise in 2016.
2. Establishing and fostering strong core partnerships with co-conveners, as well as regional and local planning and economic development organizations gave the Workgroup a grounded foundation from which to build.
3. The combination of skilled staff from member organizations and the professional facilitator hired by the Workgroup allowed for consistent follow-through and efficient communication.

4. Utilizing a transparent process, including posting all meeting notes online, having open participation at meetings, and inviting a variety of creative ideas and solutions.
5. Appalachian Voices and EcoLogical Energy Systems provided solar project development services free of charge, which provided critical momentum to early-stage efforts and encouraged a higher level of participation and enthusiasm.

Direct Outreach: Making Solar Accessible to Everyone

The residential Solarize model is a proven strategy for community education and residential solar development. Solarize programs have taken place in many other regions of Virginia with great success. After an initial meeting to gauge interest from the community about increasing residential solar options, the Workgroup determined a residential Solarize program was a good vehicle to aid in solar awareness and accessibility in Southwest Virginia.

The Solarize Wise program was the first residential solar program in far Southwest Virginia. Over 50 residents signed up for free site assessments during the course of the program. The success of this program is likely to inspire similar Solarize efforts in neighboring counties. Scaling up this initiative will nourish further enterprise and workforce capacity needed for broader economic development goals and increase the number of citizens in the region who are aware of and supportive of solar issues.

Solar Fair and Mini-Grants to Area Schools

In order to stimulate community involvement, the Workgroup hosted a Solar Fair as a free community event for education and recreation. The 2017 Southwest Virginia Solar Fair, held at UVa-Wise on May 9th, also served as the launch celebration for the Solarize Wise





program. The fair included workshops to provide information on residential solar and solar as an economic driver in Southwest Virginia. These ideas were particularly well received because the Solar Fair highlighted tangible evidence of existing solar capability in the region. Mountain Empire Community College's award-winning solar unit known as SPARC-E, built and designed by Mountain Empire Community

College students, powered the fair's main events. Attendees enjoyed performances by local musicians, demonstrations, information from solar homeowners, free food, and activities for children.

Two mini-grants of \$500 each were awarded to teams of high school students towards the development of school and community solar projects. The Eastside High School Ecology Club from Coeburn submitted a plan to build a solar phone charger and received approval for installation from the school board, and Ridgeview High School's robotics team from Clintwood plans to create a solar-powered robot to help educate their peers and community about solar energy. The winning teams presented overviews of their project proposals to attendees. Solar companies were also present to share information about their eagerness to do business in the region and nonprofit organizations attended as well. The success of the Solar Fair and positive response from the attendees were covered in local media including articles in the Coalfield Progress.

Ongoing direct outreach efforts to continue the momentum initiated by the Solar Fair have proven very fruitful. Regular tabling at area farmers markets and festivals, and demonstrations in schools and at children's camps have been a platform for education, exchange of ideas, and one-on-one discussion with community members and local leaders. The Solarize Wise program



has continued to grow since its launch. The Solarize planning team, comprised of a collaborative of community groups, selected Sigora Solar as the contractor to service the area and partner with local institutions of higher education to provide internships and apprenticeships after an RFP selection process. In addition, information sessions about Solarize Wise were well attended. The program was advertised in local media outlets, through mailing and phone banking efforts, and was promoted by partner organizations as additional means of community outreach.

The Solarize Wise initiative will significantly increase awareness and familiarity in the community about solar energy, but more economically impactful activity depends on continued efforts in other counties of Southwest Virginia and similar commercial development efforts as well.

Lessons Learned

The goal of the Workgroup's community engagement efforts has been to highlight the possibilities of solar as a viable opportunity for the region's economic future. Having community events such as the Solar Fair, where community members could enjoy themselves and see the possibilities for solar in Southwest Virginia, has inspired much optimism. Moving forward, planning team members will continue to highlight existing solar success stories and point to their positive impacts. On a more challenging note, having a variety of ways for Workgroup members to engage has been important, including individual committee meetings, in-person Workgroup meetings, and conference calls of both the Workgroup and individual committees, as people have expressed a high degree of interest in the Workgroup, but also multiple demands for their time.

Moving forward, maintaining project momentum will be important especially around ambassador site development and project opportunities. Community outreach and education efforts have been effective strategies to date, and have grown synergistically—for example, the Workgroup's Solar in Your School mini-grant challenge noted above. The winning project proposals developed by students and showcased at the Solar Fair will be displayed upon completion of the projects. Student teams have plans to demonstrate their projects at football games and community events

to share information about solar technology with their peers as well.

Telling the Story: Sharing the Successes and Possibilities

Until recently, the bulk of the Workgroup’s activity has centered around meeting, discussion, direct outreach activities, and creating the framework for a handful of innovative programs. The Solar Fair presented a unique opportunity to introduce the press to Solarize Wise and to the burgeoning work of the Solar Workgroup. Attendees of the fair were invited to receive updates about the Workgroup or receive more information about Solarize Wise. Now, as focus shifts to developing the ambassador sites, as Solarize Wise yields new residential installations, as new opportunities are explored between the solar installers and educational institutions, and as policy recommendations help frame the discussion around the development of Virginia’s solar industry, the Solar Workgroup will have more and more successes to celebrate. The story of the Solar Workgroup is just beginning.

Ambassador Solar Projects

The development of priority solar sites as ambassador projects is a key strategy to increase solar awareness and provide an opportunity to educate the community about the benefits of solar. A number of potential sites were identified as ambassador projects through interviews with community stakeholders and Workgroup meetings such as Ridgeview High School in Clintwood and the Mutual Drugstore in Big Stone Gap. These sites were then prioritized according to economic impact and visibility, with 15 in-depth site profiles and financial charts ultimately being developed for priority sites. (Refer to Chapter 1 and Appendix B for more information.)

The Future of the Solar Workgroup

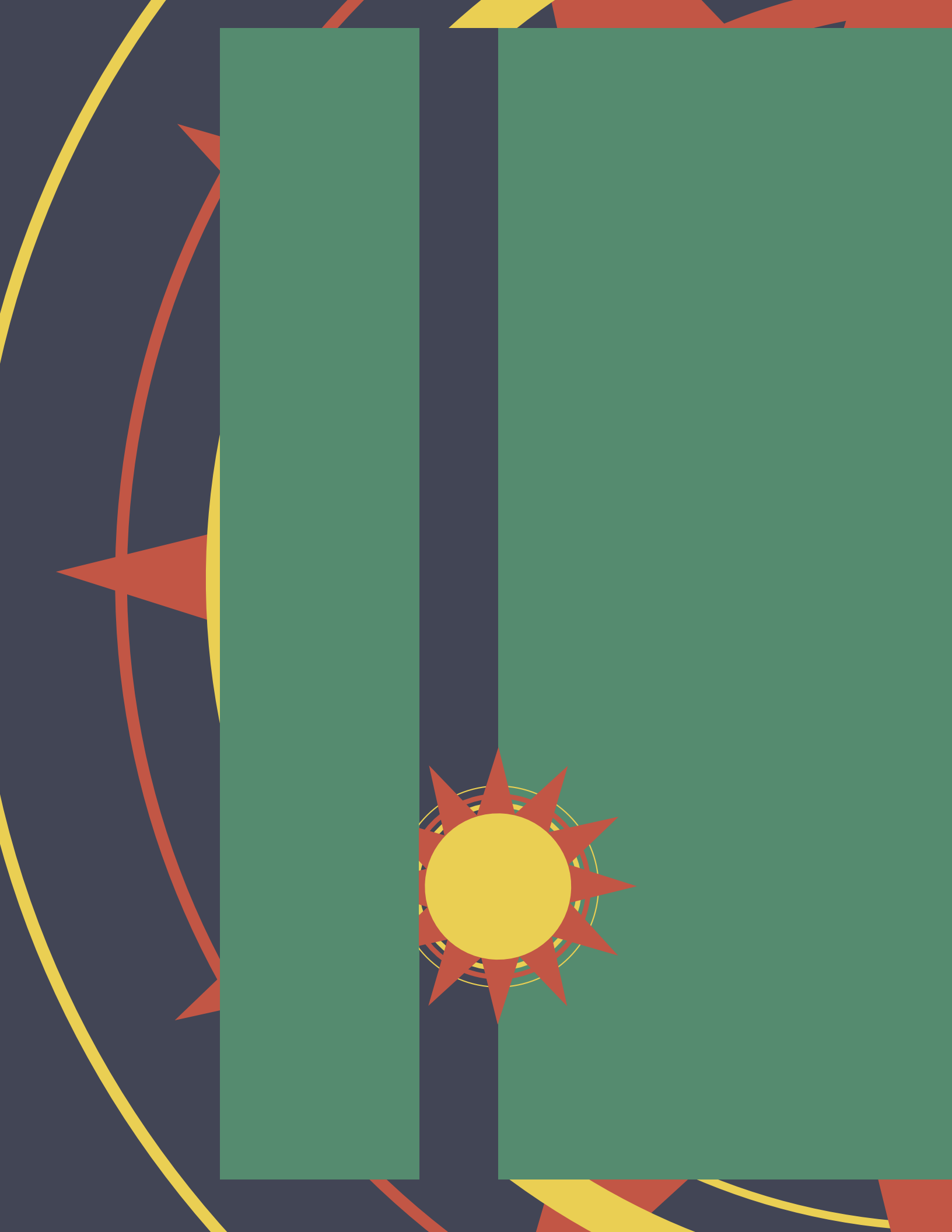
During the next few years, the momentum of the Solar Workgroup will continue through the development of the ambassador sites with a strong focus on job creation, new policies and legislation, and economic development as noted under “Action Strategies and Policy Recommendations” for each of the four Solar Workgroup goals. This Roadmap will continue to be adapted and refined with Workgroup activity and focus, with an iterative approach to implementation building on lessons learned.

Additional education and outreach activities for the Workgroup include:

- Obtain SolSmart “Solar Ready” designation in all seven counties of Southwest Virginia;
- Scale up the Solarize Wise program in other Southwest Virginia counties, which would have a tremendous impact on communities’ capacity to grow in self-sufficiency, sustainability, and wealth;
- Create a consistent and updated media clearinghouse for information on solar resources and news;
- Install solar on ambassador sites and capitalize on existing and upcoming solar successes such as the solar thermal installation on the Southwest Virginia Regional Jail in Duffield, and use the story of solar development at key sites to build community support and acceptance of solar; and
- Develop a toolkit for different types of sites concerning financing and solar installation management.

Scaling and Sharing the Model Within Appalachia

Replicating the Solar Workgroup model in other parts of the Appalachian region and identifying opportunities to connect and share with other alternative-energy initiatives in the region will help communities learn from each other and share successes.



CHAPTER 5: SOLAR POLICY CHALLENGES AND OPPORTUNITIES



Goal 4: Promote policy changes that will help grow the solar industry in Southwest Virginia.

Goal 4 - Action strategies / Policy recommendations:

- A. Remove restrictions on net metering**, which has been instrumental in making solar financially viable for residential and commercial customers in many states. Net metering allows customers to enter into an agreement with their utility to connect their solar array to the electricity grid.
- B. Expand community solar**, which is the development of solar energy projects for multiple customers. These arrangements allow customers to “go solar” even if they face barriers to installing solar on their property.
- C. Expand access to Power Purchase Agreements (PPAs)** for net metering, which have the potential to make solar accessible to many more people, but Virginia utilities have pushed to limit the number of PPAs allowable in the state.
- D. Fund the Virginia Solar Energy Development and Energy Storage Authority**, which was enacted in 2015 by the General Assembly. The purpose of this state entity is to facilitate, coordinate, and support the development of the solar industry and solar projects.
- E. Increase access to tax incentives** at the state and local level to provide investment-based incentives for solar in the form of loan assistance and tax deductions.

F. Utilize pumped-storage hydroelectric facilities for increased solar in Southwest Virginia. In 2017, the General Assembly passed legislation enabling the development of pump storage facilities in the coalfields of Virginia. By designing these facilities with on-site solar, there is a unique opportunity to advance solar in the region.

Introduction

Improved state and local government policies would pave a much easier path toward a solar-based economy in Southwest Virginia. When policies reduce red tape and financial barriers to installing solar, many more people are able to invest in solar energy. This section describes a comprehensive list of existing state and federal policies as well as recommendations that would increase the market for residential, commercial, and utility-scale solar projects in Southwest Virginia.

Background on Electricity Regulation in Virginia

Electric utilities are regulated in Virginia, which is divided into territories within which investor-owned utilities, electric cooperatives, or municipal utilities have exclusive rights to sell retail electricity. In order to protect “captive customers” from the high prices that can result from local monopolies, investor-owned utilities must receive approval from the State Corporation Commission (SCC) for any programs or proposals that

impact electricity rates. In addition, the SCC has authority over fuel purchase contracts, permits to build new electricity-generating facilities, and other programs administered under the Virginia Electric Utility Regulation Act.

In addition to these duties, the General Assembly passed legislation in 2013 directing the SCC to establish a 50 MW PPA pilot program in Dominion Virginia Power’s service

territory. This pilot was expanded in 2017 to include up to 7 MW in Appalachian Power Company’s service territory; however, participants are limited to nonprofit private institutions of higher education.



The approval and regulation of specific solar projects under the pilot program depends on a number of factors including system size, type of project (residential/commercial/utility), and location of project.

Overview of Electricity Providers in Southwest Virginia

The region analyzed in this Roadmap is serviced by two investor-owned utility companies and one electric cooperative. Appalachian Power Company (APCO) serves approximately one million customers, including those in Buchanan, Dickenson, Russell, Scott, Tazewell, and Wise counties.²⁶ Old Dominion Power (ODP), a subsidiary of Kentucky Utilities, serves nearly 30,000 customers in Wise, Lee, Russell, Scott, and Dickenson counties, in an area centered around the city of Norton.^{27, 28} Powell Valley Electric Cooperative is a public-private partnership with the Tennessee Valley Authority (TVA) that serves more than 25,700 members in Scott, Lee, and Wise counties, including businesses and residences.^{29, 30}

Dominion Energy is the largest investor-owned utility company in Virginia. Though it is not an electricity provider for the region covered by this report, it owns and operates a power station in the region and is highly influential in Virginia energy policy.

While Kentucky Utilities offers various solar and net metering options in Kentucky, ODP presently has no policies supporting solar power in Virginia beyond net metering, which all Virginia utilities are required to offer under state law.³¹

APCO currently offers few active solar programs in Virginia. In 2017, the General Assembly passed legislation to enable a PPA pilot program limited to nonprofit private higher educational institutions.³² APCO is also seeking to expand its solar capacity through the purchase of 25 MW of solar power.³³

Powell Valley Electric Co-op participates in TVA's Green Power Providers, a feed-in tariff program where participants can be compensated for the energy produced by renewable energy on their property, which is accepting applications until December 15, 2017.³⁴ Powell Valley also offers the Dispersed Power Program, which is a net metering program that has a maximum of 80 MW and purchases electricity at TVA's "avoided

costs” of \$0.03 per kWh. No customers have applied for this program to date.³⁵ Powell Valley has no plans to add utility-scale solar to its portfolio at this time.

Policies and Programs that Support Solar Energy

Incentives for solar fall into two major categories: investment-based incentives and performance-based incentives. Both types of incentives are essential for expanding the market for residential and commercial solar. Investment-based incentives lower the upfront costs of installing solar, a major obstacle for many. Performance-based incentives offer owners of solar installations money or energy credits based on the amount of kilowatt hours the solar panels produce. Performance-based incentives lower customer energy costs over time. They also promote optimal installation and maintenance practices, which maximize the public benefit of solar projects.

Existing Federal Policies and Programs

On the federal level, the Solar Investment Tax Credit (ITC) is currently a 30 percent federal tax credit claimed against the tax liability of residential, commercial, and utility investors in solar energy property. The credit steps down to 26 percent in 2020 and 22 percent in 2021. After 2023, the residential credit will drop to zero while the commercial and utility credit will drop permanently to 10 percent.³⁶

The U.S. Department of Agriculture’s Rural Energy for America Program Renewable Energy Systems and Energy Efficiency Improvement Loans and Grants provide guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems and energy efficiency improvements.³⁷ The Rural Energy for America Program also offers Energy Audit and Renewable Energy Development Assistance grants to local and state governments, tribes, institutions of higher education, public power entities, and rural electric cooperatives.³⁸ The grantees assist rural small businesses and agricultural producers by conducting and promoting energy audits, and providing renewable energy development assistance.

Existing Virginia State Policies and Programs

Virginia ranks 21st in the nation in total installed solar capacity and employs 3,236 people in solar jobs.³⁹ Yet the state has significant untapped potential, especially in

rooftop solar, ranking 11th in technical potential (not actualized potential) of rooftops suitable for solar installations.⁴⁰ Virginia ranks behind neighboring states such as North Carolina and Maryland that receive similar intensity of sunlight yet have much greater installed capacity.⁴¹ The difference can be largely attributed to state policies.

Unlike many states, Virginia does not have a mandatory Renewable Portfolio Standard. Instead, the state has a voluntary goal that uses incentives to encourage utilities to meet renewable goals rather than mandating them. And while the state has a net metering law, allowing residential and commercial customers to install renewable energy to offset their energy needs, it includes caps that limit system size and fees that increase costs to customers. Finally, the legality of third-party ownership of solar has a complicated history in Virginia, limiting some of the best financing options for customers who want solar but lack the capital required to purchase a system outright.



In 2015, legislation was passed that enabled utility-scale solar projects to move forward more easily by clarifying that up to 500 MW of solar is in the public interest. Since that legislation passed, utility-scale solar has increased from 28.6 MW⁴² to 261.2 MW installed, with more than 250 additional megawatts in the construction pipeline in 2017.⁴³

In 2016, Virginia passed legislation enabling Property Assessed Clean Energy (PACE) loans for commercial customers that allow building owners to finance energy upgrades over a set period of time by increasing the tax payment on the property. This program, still in its infancy, is moving forward with a loan in Arlington County that will serve as a model for other jurisdictions.

In 2017, legislation was passed in Virginia that established utility-administered community solar programs.⁴⁴ Under this program Dominion and APCO will offer customers the option to purchase a set amount of solar. This program will be serviced

Incentive	Description
Net metering	For electric customers who generate their own electricity, net metering allows for the flow of electricity both to and from the customer—typically through a single, bi-directional meter. When generation exceeds use, electricity from the customer flows back to the grid, offsetting electricity consumed at other times. The customer is credited for what they produce and only charged for use in exceedance of the customer’s electricity production. (Sutch, Simcoe, & Hansen, 2014) Net metering in Virginia is available to all electricity customers; however, there are system capacity limits: 20 kW for residential systems, 1 MW for non-residential systems, and 500 kW of aggregated capacity for agricultural applications. While systems cannot be sized to exceed an electricity customer’s annual consumption, the customer can roll over any excess generation or opt to receive payment from the utility at an avoided-cost rate.
Residential and Business Renewable Energy Federal Tax Credits	In December 2015, The Consolidated Appropriations Act was signed, delaying the sunset of the Solar PV Residential Renewable Energy Tax Credit. This tax credit covers up to 30% of expenditures related to residential and business solar PV installations. The maximum tax credit for solar PV installations set forth in the Consolidated Appropriations Act will decrease year-over-year beginning in 2019. Taxpayers may claim a credit of 30% for systems installed by December 31, 2019. In 2020, the maximum credit will decrease to 26%. Finally, in 2021, the incentive’s final year, the tax credit will decrease to 22% of qualified expenditures. (DSIRE, 2017)
Fannie Mae Green Rewards Program	The Federal National Mortgage Association offers green financing programs to owners of rental or cooperative properties with five or more units. This includes the Green Rewards Program, which offers fixed- and variable-rate loans to entities for capital improvements that target a 20% or greater energy consumption reduction.
Modified Accelerated Cost Recovery System	The Modified Accelerated Cost Recovery System (MACRS) is used by businesses to recover investments in certain types of property over a schedule of annual depreciation deductions. Most solar energy investments are eligible for an accelerated cost recovery schedule of five years; after this period, the total cost of the solar investment will be depreciated. If used in conjunction with the 30% investment tax credit (ITC), the business owner must reduce the project's depreciable value by half the value of the ITC. In other words, if a business owner received a 30% ITC, the depreciable value of the project would be 85% of the total cost.
USDA Rural Energy for America Loans and Grants	The United States Department of Agriculture (USDA) Rural Energy for America program provides guaranteed loan financing and grant funding for small businesses and agricultural producers in Southwest Virginia. Loan guarantees are available for up to 75% of total project cost, and grants are available for up to 25% of project costs. The grant and loan financing combined can only fund up to 75% of total project costs.
VirginiaSAVES Green Energy Program	Administered by CleanSource Capital, LLC under the guidance of the Virginia Department of Mines, Minerals, and Energy, the VirginiaSAVES Green Community Program is available to private commercial, non-profit, industrial, and local government entities. With funding from Qualified Energy Conservation Bonds, the program provides low-cost financing options for solar retrofits and new construction installations. Projects must demonstrate a projected 10-year or better payback period to qualify.
Commercial Solar Property Tax Exemption	Commercial facilities under 20 MW are exempt from state and local taxes in Virginia.
	Projects less than 20 MW that serve an institution of higher education or file an interconnection request before December 31, 2018, and projects 5 MW or less that file an interconnection request before January 1, 2019, qualify for a 100% property tax exemption for the assessed value of solar equipment and facilities. Projects greater than 20 MW that start construction before January 1, 2024 qualify for an 80% property tax exemption on the assessed value of the solar equipment and facilities. Additionally, projects greater than 5 MW that file an initial interconnection request form after January 1, 2019 will qualify for an 80% exemption. Land that a solar facility is located on does not qualify.
New Market Tax Credit	Private entities investing in renewable energy projects in Southwest Virginia may qualify for a dollar-for-dollar reduction in tax liability. A tax credit equal to 39 percent of the total investment cost may be recouped over a seven-year period, 5 percent each year for the first three years and 6 percent annually for the subsequent four years. (New Markets Tax Credit Coalition, 2017)

Source: Unless otherwise noted, information on solar incentives was obtained from DSIRE (2017b).

Figure 13: Existing policies and incentives applicable to solar in Virginia.

by new solar facilities built by third parties and managed by the utilities. Several details of this pilot program will be determined by the SCC.

Additionally, Virginia allows agricultural net metering, which gives customers with multiple electric meters on their property the ability to attribute solar generated by their system across all of their meters rather than just the meter attached to the system. In 2017, this program was amended to allow agricultural customers to begin selling electricity back to their utility. The program had previously limited the system size to prevent excess energy from being produced, whereas the new legislation creates an opportunity for farmers to build larger systems on their land so they can reap the benefits of an income stream from generating and selling renewable energy.

Figure 13 outlines existing policies and incentives applicable to solar in Virginia.

Policy Recommendations

The following policy recommendations were developed by Solar Workgroup members in 2017.

1. Remove Restrictions on Net Metering

Net metering has been instrumental in making solar financially and practically viable for residential and commercial customers in many states. Net metering allows customers to enter into an agreement with their utility to connect their solar arrays to the electricity grid. By having a grid connection customers do not have to rely solely on their renewable energy system for their electricity needs. Instead, customers can select a system size that meets their needs and their budget. When the solar is producing more energy than the customer is using, the customer receives credit for that excess power.



However, Virginia's Electric Utility Regulation Act contains many restrictions on net metering that limit the extent to which customers can save money on their electricity bills. Removing these restrictions would enable customers to

recover their investment costs more quickly, thus facilitating a more robust solar economy.

We recommend the five following improvements to Virginia's net metering law:

1. **Remove standby charges**, the fees that solar customers are charged by utilities for use of the grid that currently exist for residential renewable energy customers.⁴⁵
2. **Increase the maximum size of residential renewable generators eligible for net metering** from 20 kW to 1,000 kW, as in North Carolina.⁴⁶
3. **Allow all customers with multiple meters to aggregate their meters** for the purpose of net metering.
4. **Lift the program cap on net metering.** Current law limits net metering to an aggregate of 1 percent of a utility's adjusted peak load from the previous year.
5. **Provide fair compensation to customers** for the energy they produce by crediting at the retail rate. Current law does not require utilities to compensate customers for 100 percent of the retail value of the excess solar they produce.⁴⁷

2. Expand Community Solar

Community solar is the development of solar energy facilities whose output is shared by multiple customers. These arrangements allow customers to “go solar” without having solar on their property, which is important for many who may be interested in solar but face barriers to installing solar on their own property. These programs are especially important for individuals who rent their homes or live in multifamily apartments. In addition, community solar maximizes economies of scale to reduce individual costs to customers.

Community solar can be structured in a variety of ways; it can be utility-owned, customer-owned, or third-party sponsored. As mentioned above,

Dominion and APCO recently launched a pilot program that allows customers to purchase solar at a fixed rate through a contract term. There are several disadvantages to this approach because the local community does not reap as many of the economic benefits of the solar installation and the rate may be set at a premium, making it less economical for the individual as well.

Customer-owned and third party-sponsored community solar are not currently allowed under Virginia law. Under these arrangements, commonly referred to as community net metering, shared solar, or solar gardens, multiple people work together to develop a solar project that is usually located nearby. Each partial owner receives a proportionate amount of the electricity produced by the installation. People for whom upfront costs are prohibitive can participate in community solar projects that are owned by a third party. In this arrangement, people can buy a yearly share or subscription of the array, receiving the proportional share of electricity produced. These models of community solar can be designed specifically to bring solar energy to low-income residents, which could be particularly useful in Southwest Virginia.

Enabling legislation for community-owned solar would make the benefits of solar energy available to more people in our region. In addition to legalizing customer-owned and third party-sponsored community solar, Virginia should expand existing laws to allow for community net metering programs. A good model for Virginia to consider can be found in Colorado's Community Solar Gardens Act.⁴⁸

3. Expand Access to Power Purchase Agreements for Net Metering

PPAs have the potential to make solar accessible to many more people, but Virginia utilities have pushed to limit the number of PPAs allowed in the state. Under a PPA, a property owner enters a long-term contract with a third party, which owns the solar installation on the property. The third party sells the electricity generated by the solar installation to the property owner. Because they contract for a competitive fixed rate over a long period, the property owner

is likely to save money as their utility company rates increase over time. PPAs allow customers to purchase solar without the upfront costs needed to install a system or the long-term costs to maintain the system. PPAs are especially useful for making solar affordable to nonprofit and government organizations. Because these organizations are tax-exempt, they do not qualify for the Solar Investment Tax Credit.⁴⁹ However, a third party can receive the credit and pass the savings on to the nonprofit group through a PPA.

Virginia's net metering law implies that PPAs are legal, stating that an eligible customer for net metering is one that "owns and operates, or contracts with other persons to own, operate, or both," a renewable energy facility on that customer's property.⁵⁰ However, utilities could argue that the 2013 legislation creating a PPA pilot in Dominion's territory and the 2017 expansion of that program to private, nonprofit colleges in APCO territory imply that PPAs are restricted to just the candidates that qualify for the pilot programs. To give solar businesses certainty, the Workgroup recommends that the SCC issue a declaratory ruling clarifying that PPAs are a legal financing tool for all net metering customers.

4. Fund the Virginia Solar Energy Development and Energy Storage Authority

The Virginia Solar Energy Development Authority was authorized by Governor Terry McAuliffe in 2015 "for the purposes of facilitating, coordinating, and supporting the development, either by the Authority or by other qualified entities, of the solar energy industry and solar energy projects."⁵¹ Renamed the Virginia Solar Energy Development and Energy Storage Authority in the 2017 General Assembly, the authority's goal is to "facilitate partnerships between Virginia's electric utilities, government, and private generation developers to install 15 MW of solar energy generation at state and local government facilities" and to facilitate "15 MW of solar energy generation at commercial, industrial, and residential facilities."⁵² Despite efforts by the governor, the authority has not been funded by the General Assembly, so its work has been significantly limited.

5. Increase Access to Tax Incentives

State and local government can promote investment in solar in the form of tax incentives. While Virginia law allows local governments this option, municipalities and counties that do not have the resources to provide programs or tax deductions have a disadvantage in attracting solar businesses and corporate customers compared to those that do. More funding and tax incentives at the state level would help lower upfront costs across the commonwealth.

Specifically, Virginia exempts all commercial-scale solar facilities (but not the land on which they are sited) from 80–100 percent of state and local property taxes.⁵³ Virginia law also provides the option for any county, city, or town to exempt or partially exempt residential solar energy equipment from local property taxes.⁵⁴ Wise County is the only county in Southwest Virginia that currently offers this exemption.

Virginia established a separate tax category for machinery and tools used for solar power and other renewable energy from the traditional machinery and tools tax. Localities may tax this new category at a lower, but not higher rate as regular-use machinery.⁵⁵ Each of these tax incentives has been instrumental in lowering the cost of solar and making it more accessible to customers.

6. Utilize Pump Storage for Increased Solar in Southwest Virginia

Lawmakers in several states have passed mandates to incentivize energy storage in the form of batteries or other methods.⁵⁶ Pump storage uses two water reservoirs at different elevations to store excess electricity. When electricity is abundant, it is used to pump water from the lower reservoir to the higher reservoir. When extra electricity is needed, the water can be released from the higher reservoir to flow through a generator as it goes to the lower reservoir.

Retrofitting former coal mines into pump storage facilities could be an effective way to turn solar energy into a reliable “dispatchable” energy source.

By coupling pump storage with on-site solar, a battery is created for the solar energy that can be used at any time.

In 2017, the General Assembly passed a law authorizing utilities to seek a rate adjustment for pumped storage facilities built in the coalfield region of the commonwealth.⁵⁷ The law requires that some portion of the energy used to run the facility be renewable energy, but it does not specify how much energy or what type. Dominion is actively exploring possible sites within the coalfield region to build a pump storage facility; however, the details of these plans are still unknown. If designed correctly and sited appropriately, pumped storage offers a significant opportunity for solar in the region.

Next Steps for the Solar Workgroup

The Solar Workgroup will continue working to implement priority goals and actions in 2017 and beyond. For additional information about the Workgroup or to become involved, please visit www.swvasolar.org.

APPENDIX A

Full Downstream Strategies Economic Analysis Report:

[https://drive.google.com/file/d/0B0K1EnSRSrzuazFwVnNCUHRoYnc/
view?usp=sharing](https://drive.google.com/file/d/0B0K1EnSRSrzuazFwVnNCUHRoYnc/view?usp=sharing)

APPENDIX B

Site Profiles with Finance Charts:

<https://drive.google.com/open?id=0BwPIUBwnUMxyVU5wRWdPSG0teUU>

ENDNOTES

- [1] <https://www.thesolarfoundation.org/workforce-development/solar-training-network/>
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- [34] Brian Coppock of Powell Valley Electric Co-op. Personal communication 8/4/2017

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- [43] <https://lis.virginia.gov/cgi-bin/legp604.exe?ses=171&typ=bil&val=sb1393>
- [44] For example, California law prohibits additional fees or charges for net-metering customers. <http://freeingthegrid.org/#state-grades/california>
- [45] <https://www.dominionenergy.com/home-and-small-business/ways-to-save/renewable-energy-programs/net-metering>
- [46] <https://law.lis.virginia.gov/vacode/title56/chapter23/section56-594/>
- [47] Colorado's community solar garden project is a good model. <https://gridalternatives.org/regions/colorado/get-solar/community-solar>
- [48] The ITC is scheduled to be phased out beginning in 2019. It will decrease incrementally from its current rate of 30% of the cost of the installation down to 10% in 2022.

[49] See VA Code § 56-594 (B) (emphasis added).

[50] Virginia Solar Energy Development Authority Annual Report, Nov 18, 2016
https://www.dmme.virginia.gov/de/LinkDocuments/VSEDA/VSEDA_2016_Annual_Report.pdf

[51] Virginia Solar Energy Development Authority Annual Report, Nov 18, 2016
https://www.dmme.virginia.gov/de/LinkDocuments/VSEDA/VSEDA_2016_Annual_Report.pdf

[52] <http://lis.virginia.gov/cgi-bin/legp604.exe?171+sum+SB1258>

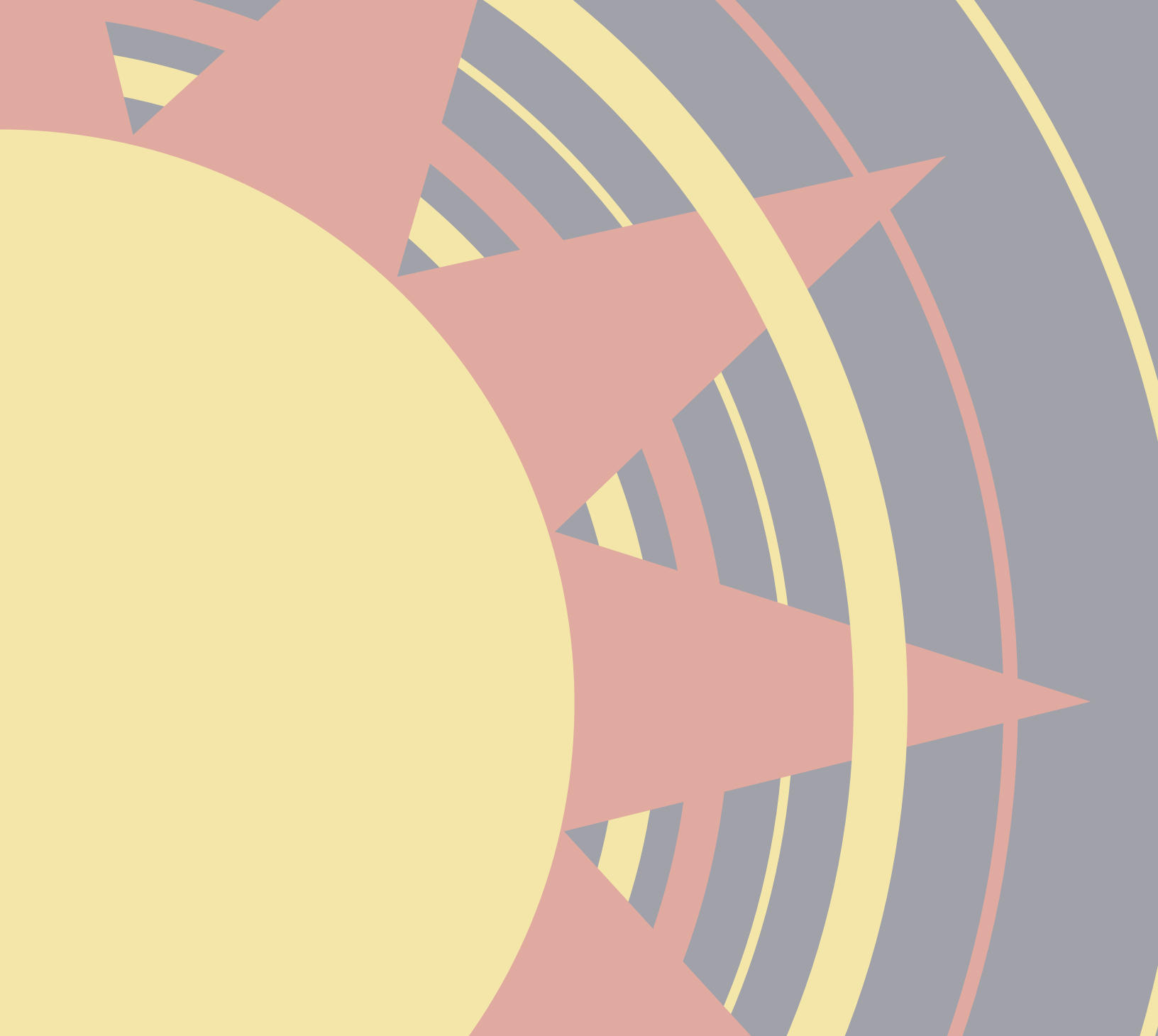
[52] <https://lis.virginia.gov/cgi-bin/legp604.exe?161+ful+CHAP0346>

[54] <http://lis.virginia.gov/cgi-bin/legp604.exe?141+ful+CHAP0737>

[55] <http://lis.virginia.gov/cgi-bin/legp604.exe?151+ful+CHAP0230>

[56] California, Oregon, and Massachusetts have mandates for electricity storage. New York, Nevada, and Maryland have recently passed bills incentivizing energy storage.
http://www.climatecentral.org/news/states-batteries-cut-carbon-21573?utm_content=buffer0ff74&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

[57] <https://lis.virginia.gov/cgi-bin/legp604.exe?171+ful+CHAP0246>; § 56-585.1.A.6
Approved April 4, 2017



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