Clean Energy Works in West Virginia

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COVER IMAGES: Top Solar Panels: Mountain View Solar Upper Left Solar Installer: Lydian Miles-Monaghan, Mountain View Solar Bottom Right Electrician: MJ Electric

VANDALIA
ENERGY SERVICES

INTRODUCTION

One of the most exciting emerging markets in West Virginia today is the clean energy sector. Not only does this industry create good jobs, it makes West Virginia residents more energy independent and more resilient in the face of natural disasters. Clean energy investments save consumers, businesses and non-profits real money every year — money they can reinvest back into the local economy. However, West Virginia lags behind neighboring states for growth in this arena, and is at risk of falling further behind. With simple policy shifts to support industry growth, West Virginia can capitalize on the early success of clean energy to become a key player in the future of America's energy independence.

> *"WV has always been an energy state — we've been powering the nation for over a century. As our energy system changes for the 21st century, we can remain an energy state, but we have to adapt. Renewables are becoming the centerpiece of energy generation in the US and in the world. I am from West Virginia; I don't want to see it left behind."*
>
> **—Autumn Long,** Solar United Neighbors

Clean Energy is Working for West Virginia

West Virginia has deployed significant clean energy projects and has the potential to greatly expand the economic impact of clean energy in the mountain state. This includes everything from the weatherization of low-income homes to commercial solar projects on up to industrial scale wind facilities with battery energy storage. Clean energy is working in West Virginia on a limited but growing scale. Solar and wind currently generate approximately 2.5% of West Virginia's electricity, combined, and between May 2018 to May 2019, alone, West Virginia renewable energy generation grew by 10.2%.

> *"Frankly, I'm in the solar industry because I wanted to own my own business in a field that's growing in West Virginia. I doubt there are many other industries growing as fast as the solar industry. It's a great place to be, where my biggest concern is hiring and training enough workers to fulfill my contracts."*
>
> **—Doyle Tenney,** DT Solar

With the success of energy efficiency and renewable energy on a limited scale statewide, there is significant opportunity to expand the benefit of clean energy to all West Virginians. The state and federal government have the power to enact positive policies that encourage the growth of job creating and money saving West Virginia clean energy projects.

This handbook is written to showcase the real world presence of positive clean energy projects in our state and share key policies that would support the growth of this globally important emerging energy sector.

SECTIONS OF THIS HANDBOOK

WEST VIRGINIA CLEAN ENERGY

SOLAR PROFILE[1]

8.53 **MEGAWATTS INSTALLED**

0.01% **OF WEST VIRGINIA'S ELECTRICITY FROM SOLAR GENERATION**

837 **INSTALLATIONS STATEWIDE**

LARGEST SOLAR FACILITY

Tecnocap

MARSHALL COUNTY, WV

Ballasted Roof-Mounted Solar on the Manufacturing Facility

623.0 **KILOWATTS**

1,709 **SOLAR PANELS**

ENERGY EFFICIENCY PROFILE[2]

6,523 **TOTAL WV JOBS**

652 **ENERGY EFFICIENT SMALL BUSINESSES**

EXAMPLE SUCCESS STORY:

Lincoln County Schools

$1.28 **MILLION SAVED THROUGH ENERGY EFFICIENCY OVER 5 YEARS**

WIND PROFILE[3]

686 **MEGAWATTS INSTALLED**

2.6% **OF WEST VIRGINIA'S ELECTRICITY FROM SOLAR GENERATION**

6 **INSTALLATIONS STATEWIDE**

LARGEST WIND FACILITY

Mount Storm

GRANT COUNTY, WV

264 **MEGAWATTS**

132 **WIND TURBINES**

UTILITY-LEVEL BATTERY ENERGY STORAGE PROFILE[4]

65.5 **MEGAWATTS INSTALLED PROVIDING GRID SERVICES**

3 **INSTALLATIONS STATEWIDE**

LARGEST BATTERY FACILITY:[5]

Laurel Mountain Wind Farm

BARBOUR COUNTY, WV

32 **MEGAWATT / 8 MEGAWATT-HOUR**

Providing Frequency Regulation Grid Service for Grid Reliability

POLICY SECTION A: SETTING CLEAN ENERGY GOALS

Private markets work best when the government acts to protect the public interest and guide markets to socially responsible solutions. The West Virginia state government and the federal government both have the power and responsibility to guide energy markets.

Setting the Standard

Nationwide examples show that setting clean energy goals through energy efficiency resource standards and renewable energy portfolio standards can significantly expand the benefits of clean energy in every state they are enacted. These policies allow the public to set a goal for energy efficiency savings or renewable energy generation that utilities must meet. As these policies simply set a goal that is often aided by additional clean energy policy changes, they allow the utilities the freedom to develop their own path to meet these goals.

West Virginia currently has no energy efficiency resource standard or renewable portfolio standard. This represents a significant growth opportunity to our emerging in-state clean energy industries.

Renewable Portfolio Standards

Renewable Portfolio Standards are policies where the state or federal government, acting as a tool of the general public, set a renewable energy target for electric utilities. These policies are set using incrementally increasing and attainable annual targets. In order to comply with these policies, utilities must procure a percentage of the electricity sold to their ratepayers from eligible renewable energy generation. Achieving these targets often looks like electric utilities constructing large-scale renewable energy projects, creating renewable energy incentives so ratepayers deploy renewables themselves, altering electric rate structures to encourage the adoption of renewable energy, and/or purchasing renewable energy credits.

Often state-level policy will contain a requirement that renewable energy credits must be produced from in-state generation to ensure the benefits of renewable energy generation are developed in-state. These policies may also contain a solar carve-out to require a percentage of the clean energy target is developed from solar photovoltaic generation.

Lost Revenue for Small Scale Solar

West Virginia solar photovoltaic system owners recently lost a source of income for the sale of their Solar Renewable Energy Credits (SREC). One SREC is developed for every 1,000 kilowatt-hours generated by a solar array and is paid to the owner of the solar array. These credits are worth approximately $200 for the owner of an average sized 6-kilowatt solar array.[6] As West Virginia does not have a renewable portfolio standard, solar owners previously sold their SRECs into Pennsylvania and Ohio. The Pennsylvania Governor, though, signed a law in 2017 to require that all Pennsylvania SRECs be bought from in-state generation in order to develop the value of solar in Pennsylvania. When the Ohio Governor signed a law in July 2019 that eliminated the value of Ohio SRECs, West Virginia solar owners lost another venue for SRECs.[7] This is lost revenue, not only for solar owners, but also for the economy surrounding solar owners as this money is, anecdotally, recycled into the local economy.

Through the enactment of a state or national level renewable portfolio standard, new revenue can be generated for West Virginia solar owners.

SOLAR PROJECT EXAMPLE[8]

BAVARIAN INN

Shepherdstown, WV

Installed in 2016
105 Solar Panels
31.5-kilowatt system
4 Electric Car Charging Stations

SOLAR AT THE BAVARIAN INN, SHEPHERDSTOWN, WV
IMAGE CREDIT: MOUNTAIN VIEW SOLAR

SOLAR PROJECT EXAMPLE[9]

CROSS HAIRS INDOORS SHOOTING RANGE

Fort Ashby, WV

Installed in 2017

24.375-kilowatt system

CROSS HAIRS SOLAR ARRAY, IMAGE CREDIT: BIG D ELECTRIC

SOLAR PROJECT EXAMPLE[10]

WASHINGTON HOMEOPATHIC PRODUCTS

Berkeley Springs, WV

Installed in 2014

48.6-kilowatt system

WASHINGTON HOMEOPATHIC PRODUCTS ARRAY, IMAGE CREDIT: MOUNTAIN VIEW SOLAR

SETTING CLEAN ENERGY GOALS

Neighboring State Policy Profile:

In April 2019, The Maryland Clean Energy Jobs Act was passed. This important policy aims to transform and modernize the energy industry in the state. It includes measures to:

- Update and extend Maryland's Clean Energy Requirement to 2030
- Set the target of 50% Clean Energy by 2030
- Include a 14.5% Solar Carve Out by 2028 and an increase to 1,200 MW of offshore wind by 2030
- Requires Maryland to plan to reach 100% Renewables by 2040

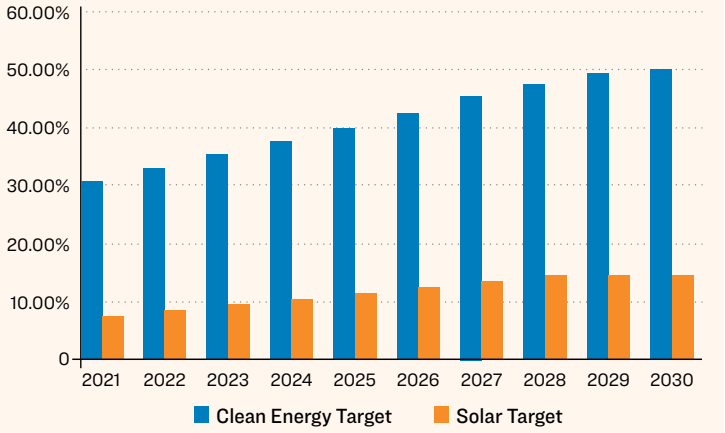
If targets are met, this policy could support and retain nearly 20,000 jobs in the solar industry by 2030. The wind industry is also beginning to thrive in Maryland — a typical 250 MW wind farm creates about 1,079 jobs over the lifetime of the project — by this metric, the policy could create well over 5,000 jobs in the wind industry.

Energy Bill Relief for Low Income Residents

One key aspect of this bill is to provide energy efficiency and renewable energy grants to low-income communities that need energy bill relief the most. The funding for this vital program comes in part from failures to comply with renewable energy annual targets.

Maryland's Clean Energy Jobs Act shows a pathway to develop in-state renewable energy, though it should be noted that the law includes some false solutions, including outdated and dirty technology such as trash incineration.

Figure 1 Annual Targets of the Maryland Clean Energy Jobs Act



Clean Energy Works in Appalachia: How policy affects neighboring counties

Garrett County, Maryland and Preston County, West Virginia are two similar counties in terms of economy, geography, and history. These two counties border each other, but Garrett County is seeing growth of renewable energy projects while Preston County is, so far, largely missing the opportunity. This difference is a direct result of Maryland's state clean energy policies. This shows the significant opportunity for renewable energy development in Preston County and other West Virginia counties.

	Garrett County, MD[11]	Preston County, WV[12]
Population	29,233	33,760
Poverty Rate	11.4%	15.2%
Largest Town	1,838	2,929
Median Age	45.4	52.6
Median Household Income	$48,176	$46,673
Pro-Renewable Policies	Clean Energy Jobs Act Community Solar Energy Storage Tax Credit	Solar Net Metering Positive Wind Tax Policies
Pro-Energy Efficiency Policies	Public Funding for Efficiency Energy Efficiency Resource Standard	Performance Contracts
Large Solar Projects	(3) Utility-Scale Community Solar Projects in the Potomac Edison Interconnection Queue[13]	None

A SOLAR RACE THAT EVERYONE WINS

From 2011 to 2019, the American Public University System financial center could claim the title of owning the largest solar array in West Virginia, with a 407-kW carport solar array which also provides shade for parking.

In January 2019, Grant County schools became the owners of the largest system, with a 500-kW ground mounted solar array installed in open land next to the school projecting over $1,000,000 of energy savings to the school district over a 15-year period.

SOLAR PANELS INSTALLED AT THE PETERSBURG ELEMENTARY SCHOOL
IMAGE CREDIT: GRANT COUNTY SCHOOLS

However, they were not able to enjoy their crown for long: in August 2019, Yeager Airport began installation of a 606-kW carport solar array that was the largest solar facility in the state for a short while, until a new project eclipsed them. The current biggest solar array is the 623-kW array on the roof of the Tecnocap facility, a manufacturer of metal packaging based in Glen Dale, WV.

Solar in West Virginia is growing exponentially for many reasons, but chief among them is that solar is a sound investment that pays dividends in electricity savings. Unfortunately, the majority of entities that could benefit from the financial freedom solar installations provide, lack access to the upfront resources required to install solar. With common sense policies to support further growth, we could see many more businesses, government entities, and nonprofits become winners.

POLICY SECTION B: **USING PUBLIC MONEY**

Many of the groups that could most benefit from energy efficiency and small scale solar have the least amount of access to these cost saving measures. Using public funding is a key piece in deploying energy efficiency and renewable energy in West Virginia. Public funding is particularly important in the sectors which have difficulty accessing money (low-income people for example) or that do not benefit from tax incentives (non-profit organizations for example). Both the state and the federal government can direct public funding to grow clean energy projects in West Virginia.

Weatherization Assistance Program Helps Families

West Virginia's Weatherization Assistance Program (WAP) is a prime example of public funding being leveraged to deploy energy efficiency in low-income households. The WAP is a federally funded program that is administered by the West Virginia state government with funding provided to regional Community Action Agencies. These agencies accept applications from low-income people in their region to perform deep energy upgrades for long term energy savings.

Supporting Small Businesses through Renewable Energy Deployment

The United States Department of Agriculture (USDA) offers a model for how public funding can be leveraged to help deploy clean energy in an identified demographic. The USDA operates the Rural Energy for America Program (REAP) which offers rural business owners grant funding for installing solar and making energy efficiency upgrades; these grants can cover up to one-quarter of their cost. This significant incentive has helped deploy solar on farms and on rooftops of businesses across West Virginia. REAP grants are significant drivers of solar projects which help rural business owners commit to generating their own local electricity, saving small businesses money that is often reinvested into their business or the local economy.

To date, USDA REAP have assisted 53 projects in 21 different West Virginia counties install solar since 2003.[14] REAP grants leverage public resources to incentivize rural solar generation without covering the entire cost of an installation, funding a maximum of one-quarter of the energy upgrade.

This funding model could be followed by the Department of Energy or another federal agency to assist residents, non-profits, and business owners in counties impacted by coal mining layoffs or layoffs from the closure of coal-fired power plants. The success of the USDA REAP Program in reducing the cost of installing solar in rural areas can be repeated with a targeted program to coal-heavy counties to contribute to economic diversification.

> *"I expected low energy bills, because my business is in an efficient new building. But I was shocked to see my first electric bill, which was larger due to high demand charges. I wanted the freedom to control my electric bill, so I went to solar. REAP was essential to funding that independence."*
>
> **—Alissa Harris,** owner of Harpers Ferry Chiropractic and Physical Therapy Center

Enormous Potential for Post Mining Land Use

Clean energy installations can be a useful part of post-mining land use planning to add commercial and utility scale solar to West Virginia's electricity mix. Large scale solar power plants have the capacity to produce a megawatt per approximately five acres developed with solar panels. Every megawatt of solar has the potential to provide enough electricity to power approximately 85 average sized West Virginia homes[15]. The federal government has powerful public funding tools in POWER grants and Abandoned Mine Lands (AML) Pilot funding that can be used towards expanding clean energy projects on post-mine lands.

This strategy is being used in both Virginia and Kentucky with success. In Virginia, the AML Pilot Program is providing $500,000 in funding to assist in the development of a former surface mine site into a 3.5-megawatt solar facility. Once constructed, this facility will supply electricity to the Mineral Gap Data Center. In Kentucky, the RH Group, which has been involved in the coal industry and is the owner of 700 acres of post-surface mined land in Eastern Kentucky, is pushing to develop a utility-scale 100-megawatt facility. This facility is estimated to supply enough electricity for 18,000 average sized homes and create 200 construction

"Installing solar on abandoned mine lands could give these areas new life with clean energy technology, spurring job growth and giving our region new hope for a bright future in the 21st century."

—**Chelsea Barnes,** New Economy Program Manager
Appalachian Voices

jobs and up to 50 full time jobs. The RH Group has a long term power purchase agreement in place with Toyota to sell this solar electricity to Toyota.

USING PUBLIC MONEY POLICY PROFILE: WEATHERIZATION ASSISTANCE

The West Virginia Weatherization Assistance Program (WV WAP) is a key program to deploy clean energy through energy savings in low-income households. The WAP covers the complete cost of energy auditing and major energy upgrades in households where energy bills are a real burden on day-to-day life. Much of our state's housing stock has significant energy loss, and therefore significant energy savings potential. The major funding of low-income weatherization programs is a baseline, necessary part of deploying clean energy.

The West Virginia Office of Economic Opportunity (WV OEO) has included significant goals in their 2019-2020 plan, which could be expanded upon with the commitment of additional public funding. This WV OEO's plan calls for:[16]

- 381 low-income homes (up to 200% of the federal poverty limit) to be weatherized
- $6,513 per household to be spent on weatherization.
- $2,481,412 to be spent directly on weatherizing homes with an additional $1.1 million to be spent on program monitoring and auditing to ensure public money is spent appropriately.
- This public funding will provide much needed service within low-income households including energy auditing, air sealing, heating & cooling upgrade, insulation, health and safety check, and more.

Transparency Creates a More Effective Energy Efficiency Program

Nationally, the Department of Energy estimates that weatherization saves the average household approximately $283 annually and supports approximately 8,500 jobs.[17]

POLICY PROFILE

KERMIT AQUAPONICS FACILITY SOLAR

Location: Mingo County, WV
Size: 150-kilowatts

Funding Source
Abandoned Mine Lands Pilot Program

Facility Description
20,000 square foot facility is anticipated to create 12 jobs[20] and provide job training to local residents through the production of fresh vegetables and tilapia

Solar Description
Solar array will provide nearly all the anticipated electricity usage for this facility

Energy Efficiency Description
Will use geothermal heating and cooling to reduce energy usage

Partners
Coalfield Development Authority, Mingo County Redevelopment Authority, Refresh Appalachia, Sprouting Farms[21]

Project Status
Facility is currently under construction[22]

POLICY PROFILE

YEAGER AIRPORT SOLAR PROJECT

Location: Kanawha County, WV
Size: 606-kilowatts[23]

Funding Source
Federal Aviation Administration

Facility Description
Carport structures have been added to one of Yeager Airport's parking garages

Solar Description
Solar array provides nearly all the anticipated electricity usage for the Airport's parking garages to reduce the Airport's electric bills and demonstrate sustainability[24]

Partners
Federal Aviation Administration, Yeager Airport

Project Status
Solar construction has been completed, expected to begin operation in January 2020

SOLAR POWERS FAMILY BUSINESSES

"Kilowatt hours don't care what partisan side you're on. You plug it in, you use it, you save money."

—Timothy Reese

Over the past decade, Timothy Reese has built a small-town solar dynasty in and around Capon Bridge, WV. "My granddad was a mining engineer in Mingo and McDowell County, and my mom grew up in a coal camp, so my family has deep roots in the West Virginia energy industry. When I learned about the West Virginia Residential Solar Energy tax credit, which ended in 2013, as well as the federal solar investment tax credit, I decided to put solar on my carport near my house. We got enrolled to create green energy credits using SREC's, and my solar system paid for itself within 6 years through tax credits, SREC's and money saved on our bill. Now I'm looking at 15–20 years of free energy."

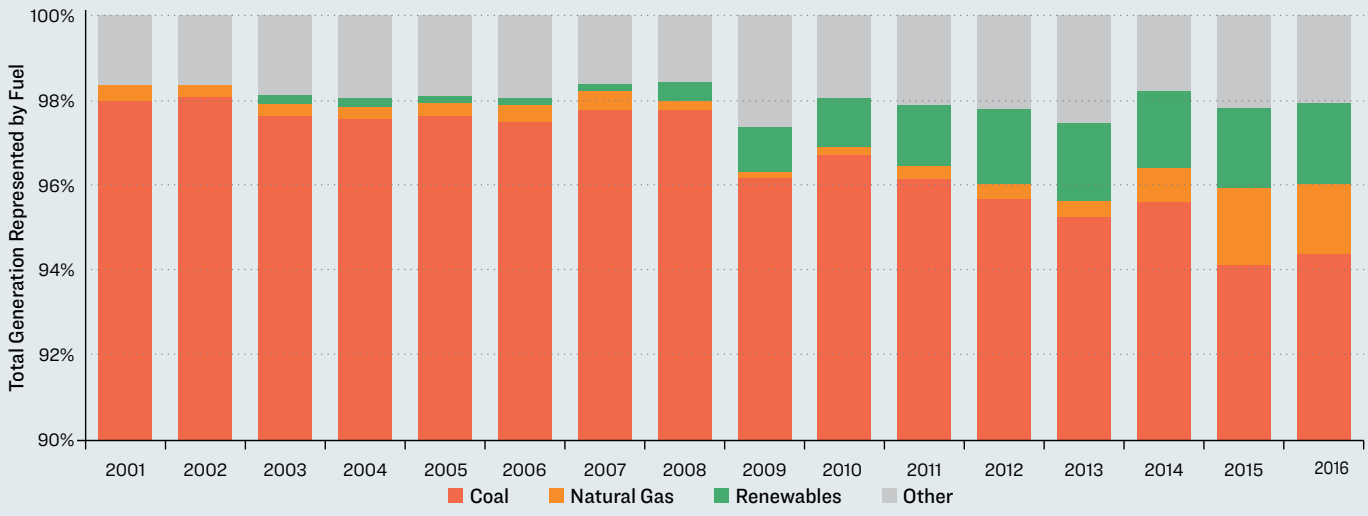
SOLAR INSTALLATION ON THE REESE BARN, IMAGE CREDIT: TIM REESE

After the success of the initial solar project to pay for the power use at his home, Reese added an installation to his barn, reducing his agricultural bills to around $5 a month. His daughter and son in law own the popular local butcher and grocery, The Farmer's Daughter. Their business faces crippling utility bills of nearly $1000 some months. Using a REAP grant through the USDA, they are working with Mountain View Solar to install a system that could save them up to $500 a month, paying for itself in as little as 3 years.

Reese also worked with the Mountain View Solar Community Giveback Program to place solar on a local arts venue, The River House. Inspired by the positive results of these projects, Reese's son sought training and now has a career in industrial scale solar installations.

Reese sees major potential for policies like Power Purchase Agreements to benefit small farmers like himself. "There is a lot of marginal farmland in West Virginia. We need policies that allow small farmers to take some of our acreage and install solar that would help the agricultural community generate income from their land. Solar energy is the perfect fit for a rural state."

Figure 2 Share of WV Electric Power Generation from Non-Coal Fuels Rising



Source: US Energy Information Administration

"There are many opportunities for diversifying the state's economy through energy efficiency. One key area for growth is improvements to public buildings. These make employees and students more comfortable, improve health and safety, and save taxpayers huge amounts of money."

—Emmett Pepper, Energy Efficient West Virginia

The 2009 American Reinvestment and Recovery Act (ARRA) served as a major vehicle to deploy public funding to weatherize low-income homes to provide economic stimulus in West Virginia. The ARRA funding allowed for regional Community Action Agencies to weatherize 3,710 homes, or 0.5% of West Virginia homes, by the end of 2011.[18]

The reduction of onerous energy bills in low-income households frees scarce money to be spent in each person's local economy and to the benefit of each person. Public funding has a key role to play as the federal government is the sole entity that can provide money at the scale needed to weatherize low-income households.

The ARRA funding, in addition to being a boost to low-income energy savings in state, revealed valuable lessons that have been incorporated by Community Action Agencies and government organizations. The weatherization programs implemented in West Virginia did have shortcomings in program oversight and rushed work, partially due to the short-term burst of available funding and rapid deployment. These shortcomings included consultants not responsibly tracking work, homes requiring follow up visits, and preferential work for Community Action Agency employees. These shortcomings were shown by the United States Department of Energy's 2011 "Friedman Audit"[19], which exposed problems with program implementation. At the conclusion of the 2011 audit report, though, it showed the lessons of implementing this large program were learned by the state government and Community Action Agencies. These lessons now inform the implementation of weatherization funding within West Virginia.

USING PUBLIC MONEY: POLICY HIGHLIGHT

West Virginia Senator Manchin's is a co-sponsor of the Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act of 2019. This is a positive step and all West Virginia public officials have the opportunity support the expansion of weatherization funding and programs. If passed, this weatherization bill would:

- Reauthorize and extend the Weatherization Assistance Program through 2024.
- Facilitate the use of renewable energy technologies in weatherization projects.
- Allow the Department of Energy to take health and safety benefits into account when carrying out the program.
- Ensure best practices and training among weatherization contractors.
- Create a competitive innovation grant program for non-profits that have a track record of success to access the program.
- Allow homes to be re-weatherized once 15 years have elapsed since the last weatherization and clarify that related services, such as education, installation evaluations, or non-Federally funded services, may be provided at any time.
- Encourage the Department of Energy to provide maximum flexibility when weatherization funding is being used to leverage additional private sector funding.

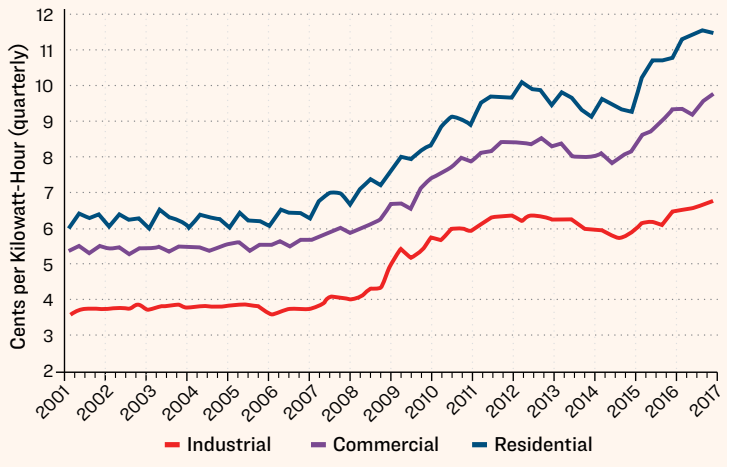
There are a number of common-sense policies that would increase the freedom of homeowners, small businesses and larger scale operations to invest and profit from the emerging solar industry. These policies would both increase self-sufficiency as well as allow West Virginians to compete in the global renewable energy race.

Top Priority: Legalize Power Purchase Agreements

Power Purchase Agreements (PPAs) are the key legal mechanism that allows individuals, families, schools, businesses, governments, and other agencies to reduce their electricity bills by deploying solar power. PPA's are agreements where a third party, often a local or large financier, owns the entire solar system and sells electricity generated by this system to the host (or offtaker). This agreement allows the host to make use of vacant land or roof space for positive economic development. PPA's are long term agreements, often fifteen, twenty or twenty-five years, which allow the host to purchase their electricity from on-site or off-site solar. These PPA's are typically set at a rate *lower* than the host is currently paying for their electricity so the host can both install solar and save on electricity costs.

Perhaps the best example of PPA's, and where they are commonly deployed around the country, is to service large public energy users like schools. In the case of a high school, for example, a PPA could be used to invite a third party to install solar on the roof of the high school. The high school would then buy electricity from the on-site solar facility at a lower rate than their current electric rate to save money immediately, implement predictable electricity budgeting, and deploy an on-site renewable energy generation that can have an energy education element. PPA's offer a unique opportunity for schools and other entities to commit to long-term energy savings and to deploy renewable energy on their buildings.

Figure 3 Average Electricity Price by Consumer Category



FROM 2008-2017, WEST VIRGINIA RATES GREW BY MORE THAN 6 PERCENT PER YEAR. RISING RATES CAN AFFECT ECONOMIC DEVELOPMENT. PPA'S ALLOW ENTITIES TO LOCK IN COMPETITIVE PRICING TO AVOID FUTURE RATE INCREASES.[25]
SOURCE: US ENERGY INFORMATION ADMINISTRATION

Power Purchase Agreements are, unfortunately, barred in West Virginia. The in-state solar industry is pushing the WV Legislature to change this legal structure to allow more groups to save on their electricity bills through solar. In the 2019 WV Legislative Session, a Republican-sponsored bill (SB409) to legalize PPA's was introduced to the WV Senate but did not make it out of committee.

The 2020 WV Legislative Session could see this bill's passage through the WV House and Senate to receive the Governor's signature. Once legalized, PPA's can be immediately used by the solar industry to deploy solar and save money for schools and other entities in the state.

Allowing Large Scale Solar Development on Former Surface Mines

The 2019 WV legislative session saw the introduction of a bill that would allow development of large-scale solar facilities on former surface mines. Currently, there is no feasible way for utility-scale solar facilities to be installed on former surface mine sites since the project owner cannot sell the electricity generated by the solar farm to an offtaker. As there is typically no large energy user on former surface mine sites, large solar facilities cannot reasonably be installed on these sites. The bi-partisan Modern Jobs Act, HB2589, which was introduced in the 2019 West Virginia Legislature, would allow projects of at least one-megawatt in size to sell their electricity to large energy users within the same utility territory as the solar facility. This would not only allow for large scale solar installations on former surface mines, but would provide a legal mechanism for large energy users who have sustainability goals to open facilities in West Virginia.

Legalizing Property Assessed Clean Energy (PACE) Financing

PACE is a financing mechanism that allows local governments to provide long-term financing for energy upgrades to local property owners. If West Virginia legalizes PACE financing, then local governments would have the option to start a PACE Program. The local government could then issue a bond to provide financing for energy upgrades. Local property owners who use this financing can make energy savings upgrades, including efficiency and renewable energy, and pay back this financing through an assessment on their property.

Each of West Virginia's surrounding states (Kentucky, Ohio, Pennsylvania, Maryland, and Virginia) have all authorized local governments to provide PACE financing. Our state government should open the option for local governments to use this financing to provide another method for property owners to implement clean energy in our state.

EXPANDING ENERGY FREEDOM: POLICY HIGHLIGHT

The Modern Energy Jobs Act would provide:

- Electricity savings for West Virginia's large energy users.
- A pathway to attract companies with renewable energy targets.
- Reliable electricity prices through long-term power purchase agreements.
- Local construction jobs.
- Local operations and maintenance jobs.
- Economic diversification in coal heavy communities.

The Modern Energy Jobs Act, HB 2589, which was introduced into the West Virginia House of Delegates in 2019 is likely to be re-introduced in 2020 for another opportunity to enact sound energy policy. This bill would allow for large scale, ground-mounted facilities, like the large facility that is currently in operation adjacent to the Petersburg Elementary School, to expand in the state.

EXPANDING ENERGY FREEDOM SUCCESS STORY: PERFORMANCE CONTRACTING

Guaranteed Energy Savings Performance Contracting (performance contracts) were legalized by the West Virginia legislature in 2011. Once this means of debt-financing for public entities — including the state government, county governments, universities, and school systems — was legalized, projects began happening almost immediately.

A performance contract is a fifteen-year contract signed with an Energy Services Company (ESCO) where the ESCO guarantees energy savings through efficiency and/or renewables. The ESCO is paid annually by the public body out of the dollars saved through energy *upgrades only if a certain amount of energy is saved.* This form of agreement required a policy change to be enabled, as it is debt incurred by a public body. Once legalized, it has been vital statewide to create tremendous cost savings that would not have been possible otherwise.

CITY OF HUNTINGTON[26]

Summary
15-Year Energy Performance Contract between the City and Honeywell

Current Phase
Implementing the third phase of the fifteen-year agreement

Current Phase Savings
$112,000 annual savings to the City

Overall Agreement Savings
$4.8 million in operating cost savings to the City

Technology Deployed
Comprehensive LED lighting system, HVAC system controls

BERKELEY COUNTY SCHOOLS[27]

Summary
15-Year Energy Performance Contract between the Board of Education and CMTA

Current Phase
Implementing the first phase of the fifteen-year agreement

Current Phase Savings
$8 million in energy saving improvements at Martinsburg High School

Overall Agreement Savings
Martinsburg High School is one part of a county-wide agreement that is guaranteed to save the school system $1.7 million annually

Technology Deployed
Geothermal heating and cooling system, new ceilings, forty-eight solar panels

ROANE COUNTY SCHOOLS[28]

Summary

15-Year Energy Performance Contract between the Board of Education and Wendel

Current Phase

Work completed; school system is saving energy and paying off the project from savings

Overall Agreement Savings

$122,272 in guaranteed annual energy savings to the school system

Technology Deployed

Lighting upgrades, energy management system deployed, HVAC replacement

OHIO COUNTY SCHOOLS[29]

Summary

15-Year Energy Performance Contract between the Board of Education and CMTA

Current Phase

Upgrades began in 2018

Overall Agreement Savings

$260,000 in guaranteed annual energy savings to the school system

Technology Deployed

Geothermal heating and cooling, LED lighting upgrades, HVAC upgrades

EXPANDING ENERGY FREEDOM NEIGHBORING STATE SUCCESS STORY: VIRGINIA

Virginia is currently conducting a Power Purchase Agreement Pilot Program in the Dominion and Appalachian Power territories. Third parties can own any system between 50 kilowatts — 1,000 kilowatts to exclusively sell the electricity generated to the on-site customer-generator.

This Pilot Program is limited to 50 megawatts of solar in Dominion's territory and 7 megawatts of solar in Appalachian Power's territory. This Pilot Program was authorized through an act of the Virginia legislature in 2013 to run in Dominion's territory, and was expanded by an act of the legislature in 2017 to run in Appalachian Power's territory.

This Pilot Program is so successful that the Fairfax County Government has issued a Request for Proposals (RFP) for 30 – 50 megawatts of on-site solar through a power purchase agreement. The success of this RFP would not only triple the amount of solar installed in Northern Virginia but would also exceed the limits of the Pilot Program. Local governments in Virginia are going above and beyond with power purchase agreements for on-site renewable energy development.

In addition, Virginia solar developer Secure Futures submitted a letter to the Virginia State Corporation Commission (SCC) asking the SCC to raise the limit for solar power purchase agreements.[30]

This example shows that once local governments, schools, and non-profits have the freedom to sign solar power purchase agreements, they do.

Clean Energy Works in Appalachia: How policy affects neighboring counties

Wise County, VA and Logan County, WV are two similar counties in terms of economy, geography, and history. West Virginia has the opportunity to create the legal structures so our businesses, governments, schools, non-profits, manufacturing facilities, and more have the freedom to save money and choose where they source their electricity from. Our state needs only look across the border to Virginia to see that once the framework is enacted, solar projects begin creating jobs.

	Wise County, VA	Logan County, WV
Population	39,539	34,428
Poverty Rate	19.9%	22.5%
Coal Mining History	Yes	Yes
Median Age	40.3	43
Median Household Income	$38,555	$37,859
Pro-Renewable Policies	Power Purchase Agreements Voluntary Renewable Energy Goal	Solar Net Metering Positive Wind Tax Policies
Pro-Energy Efficiency Policies	PACE Financing Legalized	Performance Contracts
Large Solar Projects	3.5-megawatt solar farm on a former surface mine to serve a local data center	None

POLICY SECTION D: TAX INCENTIVES

The state and federal government can use our tax code to aid in the development of clean energy within West Virginia. The most significant national renewable energy incentives in recent memory have been the Production Tax Credit (PTC) for wind and the Investment Tax Credit (ITC) for solar.

A wide variety of tax incentives benefit traditional energy industries such as coal and gas. West Virginia has much to gain from growing the future of renewable industries in the state by using the same policies for this emerging sector.

Wind Tax Incentives Create Results

Wind power plants in West Virginia are our state's most significant source of renewable energy. More than 2.5% of WV's electricity comes from wind. In-state wind facilities benefit from three primary tax incentives including:

- **Federal:** Production Tax Credit: A tax credit of $0.023 per kilowatt-hour generated
- **State:** Reduced Business & Occupancy Tax
- **State:** Reduced Property Tax to Salvage

These tax credits have assisted in the development of 686 megawatts of wind facilities in six utility-scale facilities. The American Wind Energy Association (AWEA) estimates that West Virginia has incredible potential for adding wind generation. The AWEA estimates that the state has the total potential for approximately 69,000-megawatts of wind at the 80-meter hub height. While no one is suggesting this scale of wind development, there is significant potential to expand successful wind installations appropriately in state.

Solar Incentives Increase Installations

Solar installations in West Virginia have been incentivized by two tax credits. The federal Investment Tax Credit has been a major driver of solar installations in state due to the scale of the tax credit. Currently, this is a tax credit of 30% of the entire solar system cost including battery energy storage systems. Unfortunately, this tax credit is set to decline to 26% for systems installed in 2020 and 22% for systems installed in 2021, before it declines to zero for residential solar owners and ten percent for commercial solar owners. Extending the full thirty percent federal tax credit would be a significant incentive to continue the growth of the West Virginia solar industry.

In addition to the ITC, West Virginia had an effective state-level tax credit that helped spur investment in solar power systems. West Virginia provided a 30% state tax credit up to $2,000 total that helped West Virginia's early adopters of solar. This tax credit unfortunately expired in July 2013. The adoption of a similar tax credit would help West Virginia residents and businesses install solar.

There is currently an act in the United States Senate, the Renewable Energy Extension Act, which would authorize a five-year extension the thirty percent tax credit. This act is an opportunity to continue to use effective national tax policy to encourage the development of solar energy in West Virginia.

WIND PROJECT PROFILE

LAUREL MOUNTAIN WIND FARM

Randolph and Barbour County, WV

Wind Electricity Generation + Battery Energy Storage

97.6-megawatt capacity

61 1.6-megawatt wind turbines

Supplies electricity to the PJM electric grid

Provides enough electricity for 14,000 homes

32 MW / 8 MWh Lithium-ion battery energy storage system[31]

Batteries used to provide frequency regulation service to help stabilize the PJM electric grid

LAUREL MOUNTAIN WIND FARM, 97.6 MW, BARBOUR COUNTY, IMAGE CREDIT: AES

WIND PROJECT PROFILE

BLACK ROCK WIND FARM[34]

Grant and Mineral Counties, WV

Wind Electricity Generation

(planned) 170-megawatt capacity

Has filed plans with the WV Public Service Commission, PSC Decision expected in March 2020

Project Completion expected in 2021

290 Construction jobs + additional long-term operation staff and contractor jobs

$4.8 million in state & local taxes during construction

$12 million additional state & local taxes during its first 25 years in operation

WIND PROJECT PROFILE

BEECH RIDGE WIND FARM

Greenbrier County, WV

Wind Electricity Generation

100.5-megawatt capacity

67 1.5-megawatt wind turbines

Supplies electricity to Appalachian Power through a power purchase agreement (legal as it is with the utility)[32]

31.5 MW batteries (18 1.75 lithium-ion batteries)[33]

Batteries to regulate the 'ramp rate' of the wind generation and to provide automatic generation control to help integrate wind into the electric grid

BEECH RIDGE WIND FARM, 100.5 MW, GREENBRIER COUNTY, IMAGE CREDIT: MJ ELECTRIC

SOLAR PROJECT PROFILE[35]

HARPERS FERRY CLARION HOTEL

Jefferson County, WV

82.365-kilowatt capacity

289 285-watt USA-Made solar panels

Supplies electricity to reduce the hotel's electric bills

Received a USDA REAP Grant covering part of the system cost

HARPERS FERRY CLARION SOLAR ARRAY, IMAGE CREDIT: MOUNTAIN VIEW SOLAR

SOLAR PROJECT PROFILE[36]

EDWARD TUCKER ARCHITECTS

Cabell County, WV

51 solar panels

Leasing Agreement with a third party to pay for the solar system with monthly payments

Received a USDA REAP Grant covering part of the system cost

EDWARD TUCKER INSPECTING HIS ARRAY, IMAGE CREDIT: WV PUBLIC BROADCASTING AND COALFIELD DEVELOPMENT

SOLAR PROJECT PROFILE[37]

GAT CREEK FURNITURE

Morgan County, WV

64.4-kilowatt capacity

Installed in 2016

IMAGE CREDIT: WV PUBLIC BROADCAST AND JEAN SNEDEGAR

TAX INCENTIVES: NEIGHBORING STATE POLICY PROFILE: LOWER TAXES TO INCREASE SELF-SUFFICIENCY

West Virginia can incentivize self-sufficiency by adapting the successful Energy Storage Tax Credit that the state legislature of Maryland has enacted. Battery energy storage systems must be a part of a solar photovoltaic system for a solar owner to have electricity when the power is out. Once a battery is incorporated, the solar owner has a rechargeable back-up power source sized to meet their needs.

To reduce the cost of adding batteries to a solar array, Maryland has enacted a tax credit that is equal to 30% of the cost of a battery system, capped at $5,000. In total, Maryland caps this program at $750,000 annually. Through this tax credit, the state of Maryland has provided a way for individuals to reduce their taxes and increase their self-sufficiency.

The state of West Virginia could enact a similar tax credit to incentivize homeowners to power their critical needs in the event of a power outage. West Virginians could install solar with batteries to power their well pumps for water, refrigeration for insulin and food, and even entertainment systems to ride out a storm.

"We believe in the importance of distributed renewable power and going solar has allowed us to support the clean energy economy, all while saving money on our monthly bill and hedging our bets against rising utility costs."

—Gat Creek Furniture

NON-PROFITS INVEST SOLAR SAVINGS BACK INTO THE COMMUNITY

An anonymous donor was inspired to give the gift of free energy to the Huntington WV Area Habitat for Humanity's ReStore which was paired with a USDA REAP grant in a leasing agreement. Thanks to a 54-kW roof-mounted solar energy system installed by Solar Holler, they will save approximately $500 per month, with an expected savings of nearly $150,000 over the estimated 25 year lifetime of the system.

"Anytime we can save money on the administrative side of operations is a good thing," says Habitat's CEO and Executive Director David Michael. "That becomes money that we can put directly back into our construction program and better meet the needs of our future homebuyers. Our building is located in the perfect spot for maximizing the sun's solar energy so installing solar panels on our building was a no-brainer!"

Michael points out that this project, "would have never happened if not for our donor." Policies like PPA's would allow more non-profits to finance solar to lower their operating costs.

SOLAR HELPS CAPON BRIDGE, WV NON-PROFIT THE RIVER HOUSE BRING MORE PEOPLE TOGETHER THROUGH ART AND MUSIC, IMAGE CREDIT TIMOTHY REESE

POLICY SECTION E: WEST VIRGINIA MANUFACTURING POTENTIAL

Manufacturing components for clean energy is another exciting area for job growth — which West Virginia is unfortunately not yet taking full advantage of. Over 500 factories across 43 states manufacture wind turbine components; nationally these facilities supported more than 25,000 manufacturing jobs in 2016. Neighboring state Ohio has more than 60 plants employing workers to make these parts.[38]

West Virginia also has the potential to join with states from Alabama to Maryland to Minnesota in manufacturing solar panels. There are currently twenty-four facilities in the United States which are currently in the development or operational stage of manufacturing solar panels. This total includes facilities in the adjacent states of Maryland, Ohio, and Virginia. Solar panel manufacturing offers West Virginia an opportunity to create high-paying, long-term manufacturing jobs in the state.

SOLAR MANUFACTURING:
ADJACENT STATE FACILITY PROFILE

MARYLAND[40]

Total Plants
One Solar Manufacturing Plant in Development

Total Annual Panel Production Capacity
125 Megawatts

Total Jobs
Not Yet Available

Panel Type Being Built
High Efficiency & Bi-Facial Solar Panels

Manufacturing Location
Baltimore

Manufacturing Company
GreenBrilliance

SOLAR MANUFACTURING:

UNION JOBS PROFILE[43]

United Steelworkers and the International Brotherhood of Electrical Workers are organizing to unionize the Tesla solar panel manufacturing plant in Buffalo, NY

Tesla built their manufacturing plant by retooling an old steel mill and it now employs 400 workers

The plant is a relevant example to West Virginia's old steel mills, which have the potential to be retooled. The union organizing drive could set an example for union jobs in solar manufacturing

SOLAR MANUFACTURING:
ADJACENT STATE FACILITY PROFILE

OHIO[39]

Total Plants
One Existing Manufacturing Plant, One Manufacturing Plant in Development

Total Annual Panel Production Capacity
400 Megawatts Existing, 1,200 Megawatts in Development

Total Jobs
500 new jobs expected with the new manufacturing plant

Panel Type Being Built
Thin Film Panels for Large Scale Solar Farms

Manufacturing Location
Toledo Metropolitan Area

Manufacturing Company
First Solar

SOLAR MANUFACTURING:
ADJACENT STATE FACILITY PROFILE

VIRGINIA

Total Plants
One Existing Manufacturing Plant[41],
One Manufacturing Plant in Development[42]

Total Annual Panel Production Capacity
Unknown

Total Jobs
Not Yet Available

Panel Type Being Built
Small solar panel kits are currently being built, High efficiency solar panels are in development

Manufacturing Location
Both Plants near Richmond

Manufacturing Companies
Solar Electric America is currently operating and SolSunTech is developing a larger manufacturing facility

NABCEP CERTIFIED SOLAR PROFESSIONALS IN WV AND ADJACENT STATES[44]

The North American Board of Certified Energy Professionals (NABCEP) is the leading solar professional certification program in the nation, and is an important way to ensure the safety and quality of installations.

West Virginia currently has knowledgeable solar professionals in multiple categories working to spread quality solar projects in the state. West Virginia, though, trails each of our adjacent states in the total number of NABCEP professionals. This shows the significant opportunity to train a professional workforce in state. The states with the strongest solar policies, Maryland and Virginia, have the highest number of NABCEP certified solar professionals:

West Virginia
- Installation Professionals: **7**
- System Inspectors: **2**
- Technical Sales Professionals: **3**
- Associates: **21**

Kentucky
- Installation Professionals: **11**
- System Inspectors: **1**
- Associates: **20**

Maryland
- Installation Professionals: **69**
- System Inspectors: **1**
- Technical Sales Professionals: **7**
- Associates: **105**

Ohio
- Installation Professionals: **44**
- System Inspectors: **2**
- Technical Sales Professionals: **6**
- Associates: **28**

Virginia
- Design Specialist: **1**
- Installation Professionals: **48**
- System Inspectors: **1**
- Technical Sales Professionals: **4**
- Associates: **124**

WIND ECONOMIC IMPACT SUMMARY[45]

Utility-scale wind farms offer significant tax benefits to every county with a major wind footprint. As shown in the below excerpts from a 2017 Marshall University Study, even the existing level of wind development can account for as much as 5% of the total property taxes collected by the counties they operate in.

- **$27** million direct spending annually
- **164** jobs
- **$7.3** in employee compensation ($44,512 average)
- **$2.7** million in property taxes
- **$1.6** million in business and occupancy taxes
- **$2** million in lease payments
- **$13.3** million in operating costs

County	2016 Property Tax	2017 Property Tax	% of Total County Taxes
Barbour	$430,000	$430,000	5%
Grant	$700,000	$1,160,000	5%
Greenbrier	$660,000	$400,000	2%
Mineral	$520,000	$320,000	3%
Preston	$20,000	$20,000	0%
Randolph	$190,000	$190,000	1%
Tucker	$160,000	$160,000	2%
Total	$2,670,000	$2,670,000	n/a

MORE JOBS THAN WORKERS

"I'm looking for workers left and right. We have a major job shortage issue in this industry. In fact, you can put my phone number out there, and people looking to start in this industry can give me a call. Anybody who's not afraid to get on a roof, who's ready to show up and work, is going to see a good paycheck in the solar industry in West Virginia right now."

—**Doyle Tenney,** DT Solar

"Solar installation is essentially about DC energy. Underground miners are very familiar with DC energy. We have the workforce, and they have the foundation, they just need the next level of training and they'll be ready to join the solar industry."

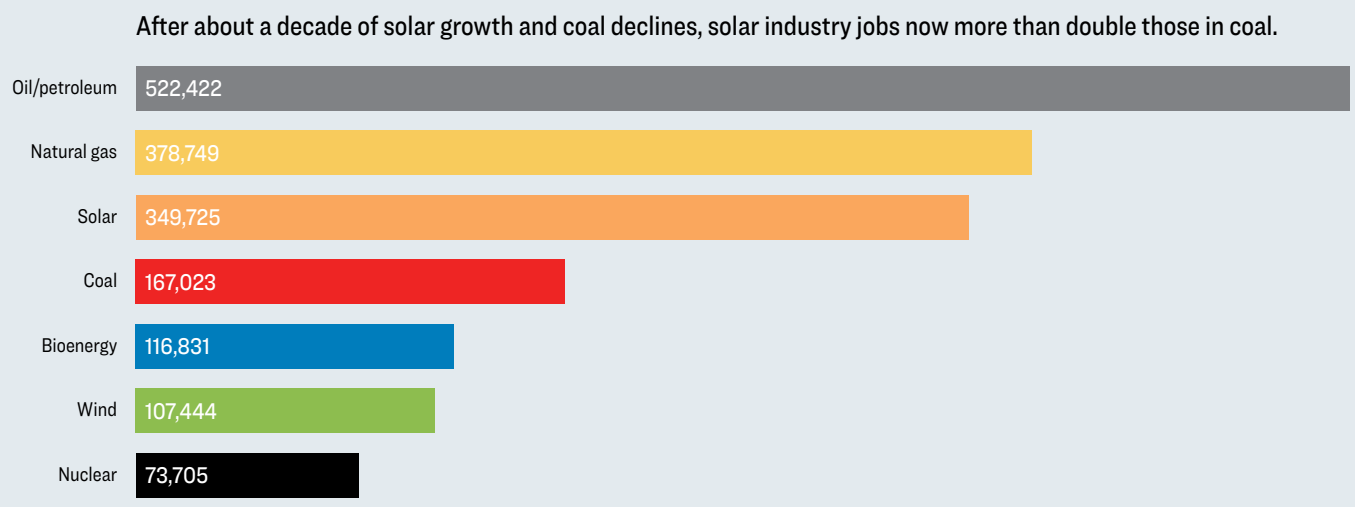
—**Mike McKechnie,** Mountainview Solar

Unlike many sectors in the state, solar installation companies in West Virginia are actually facing a shortage of employees. Solar installation is an electrical trade requiring specialty electrician certifications, but there are many entry level positions that provide pathways to high powered work.

Recent layoffs in the mining industry have solar installers making connections between the energy experience miners can bring into the solar field. A 2018 study found that after retraining, most technical workers could make more money in the solar industry than they do in the coal industry, and there are many jobs in the mining industry with parallel skillset needs in the solar sector[46].

As lawmakers consider policies that would grow the solar sector, they must also consider training programs for solar workers that are competitive to training that neighboring states provide for the renewable energy sector. Rigorous training programs and certifications, such as those provided by NABCEP, are less common in West Virginia than other states, yet very important to ensure the safety and longevity of solar installations. High quality training and regulation of appropriate certifications are a key part of expanding the industry in the state — otherwise West Virginia could see a rash of substandard installations, while top quality solar installers are forced to hire out of state workers to fuel the growing interest in solar.

Figure 4 US Energy Jobs



Some categories not shown. Data include all employees who spend some portion of their time on a specific technoloty.
Chart credit: The Conversation, CC-BY-ND.
Source: 2018 U.S. Energy and Employment Report

RENEWABLE AND ENERGY EFFICIENCY POLICY SUMMARY

Below are some of the key policies covered in this document that Sierra Club recommends for policy makers at the local, state and federal level. These commonsense policies would enable West Virginia to grow our emerging renewable energy sector and maintain our state's historic place as a key provider of homegrown energy solutions for America:

Modern Energy Jobs (MOJO) Act

This bill, HB 2589, which was introduced into the West Virginia House of Delegates in 2019, would allow for large scale, ground-mounted facilities, like the large facility that is currently in operation adjacent to the Petersburg Elementary School, to expand in the state.

Renewable Portfolio Standard

A renewable portfolio standard, similar to the Maryland Clean Energy Jobs Act, would create incentives for utilities to increase investment in renewables, reward small scale solar owners for generating electricity, and support West Virginia's most vulnerable to save money on their electric bills.

Increase Funding for the Weatherization Assistance Program

This would allow West Virginia's Weatherization Assistance Program (WAP) to support more low-income people in the region to perform deep energy upgrades for long term energy savings.

Increase Federal Funding for Small Businesses to Employ Solar

Programs such as the USDA Rural Energy for America Program (REAP) program help rural business owners commit to generating their own local electricity, reducing costs and increasing self-sufficiency.

Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act

The Sierra Club applauds Senator Manchin's co-sponsorship of this bill, which would ensure best practices for weatherization programs.

Legalize Power Purchase Agreements

A diverse, statewide coalition is pushing in the West Virginia Legislature to change this legal structure to allow more groups to save on their electricity bills through solar.

Legalizing Property Assessed Clean Energy (PACE) Financing

The Property Assessed Clean Energy (PACE) mechanism would allow local governments the option to provide long term financing for energy upgrades – including efficiency and renewable energy to local property owners.

Extend the Federal Investment Tax Credit for Solar Installations

The Renewable Energy Extension Act would authorize a five-year extension of the thirty percent tax credit. Currently, this tax credit is set to decline to zero for residential solar owners and ten percent for commercial solar owners.

Renew a State Level Solar Tax Credit

West Virginia provided a 30% state tax credit, up to $2,000 total, that helped West Virginia's early adopters of solar. This tax credit unfortunately expired in July 2013. The Sierra Club encourages the adoption of a similar tax credit to help West Virginia residents and businesses install solar.

Create Tax Incentives for Battery Energy Storage Systems

This tax credit would incentivize homeowners to power their critical needs in the event of a power outage. West Virginians could install solar with batteries to power their well pumps for water, refrigeration for insulin and food in the event of natural disaster.

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