

A Roadmap for Solar on Mine Lands in West Virginia

EMERGING OPPORTUNITY TO GROW THE WEST VIRGINIA ECONOMY, ATTRACT NEW EMPLOYERS, INCREASE INVESTMENT AND CREATE JOBS



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INTRODUCTION

This report lays out a roadmap for West Virginia to build upon its legacy as a domestic energy provider by capitalizing upon the vast land base of former surface coal mines as sites for new solar generation facilities.

Preliminary analysis suggests there are up to 400,000 acres of former mine lands and other brownfields that could meet minimum site suitability requirements for large-scale solar across central Appalachia. If this land area was harnessed for solar development, it could double the total solar capacity that has been installed in the United States to date. Solar developers are scrambling to find suitable sites across the region. If West Virginia were to implement a fair and predictable policy framework, the state has a unique and timely opportunity to become a global leader as the broader market transitions to a new energy economy.

A variety of stakeholders would benefit from advancing this market opportunity and could all play important roles in facilitating solar development in West Virginia. They include government leaders, mine land owners, mining companies, electric utilities, large electricity consumers, nonprofit organizations and local solar industry advocates, among others. These stakeholders could be involved in advancing specific projects or broad policies. An alliance of diverse stakeholders working together would make it possible for more solar development to occur, and quicker. This report describes each type of stakeholder and provides specific steps that each stakeholder group can take to move toward the implementation of solar on former mine lands in West Virginia.

DEVELOPING SOLAR ON FORMER SURFACE MINE LANDS WOULD UNLOCK ECONOMIC OPPORTUNITIES TO:

- **create new jobs and retrain laid-off coal industry workers** and others to apply transferable skills such as heavy equipment operation for site preparation and electrical wiring;
- **attract new manufacturers and employers to the region** as large companies are increasingly choosing to locate their facilities where they have access to renewable energy to lock in the financial benefits of long-term, fixed-priced power while furthering their corporate social responsibility and environmental goals;
- **replenish the much-needed tax base for local communities and state budgets** that have dwindled with the decline in coal markets;
- **create new revenue streams for mine land owners** by turning unproductive liabilities into potentially profitable assets; and
- **minimize land use conflicts from all forms of energy exploitation, thus making it a win-win-win for nature, economy and climate by avoiding conversion of forests and farms**, allowing them to continue to provide myriad resources including, clean water, clean air and carbon sequestration.

ROADMAP

This report provides recommendations and explores two interrelated ways to spur new investment in solar arrays on former surface mines in West Virginia: (1) pilot projects and (2) new policies. Successful pilot projects will help demonstrate feasibility and provide a roadmap for new policies, and new policies will help accelerate the development of additional projects.

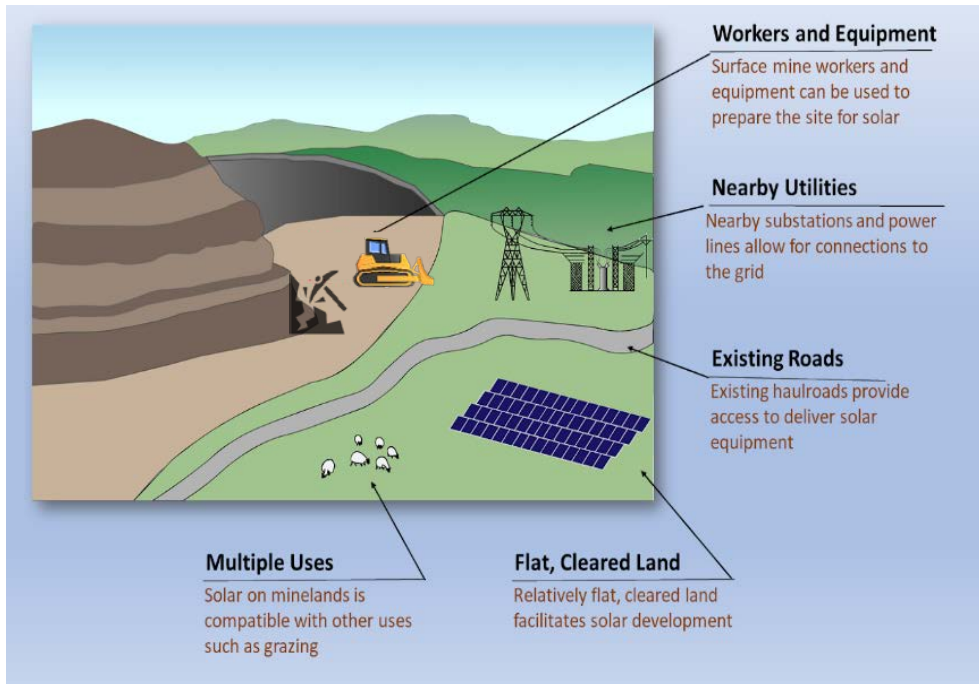


FIGURE 1 – ADVANTAGES OF FORMER SURFACE MINE LANDS FOR SOLAR

Pilot projects and new policies are both important to implementing the roadmap

Pilot projects

- Nonprofit organizations and other local solar industry advocates involve nontraditional partners and bring grant and corporate funds to the project
- Government leaders and regulators and surface and mineral property owners see a successful project and study a West Virginia financial model
- Corporate off-takers benefit immediately from low-cost, fixed-price solar electricity
- Local communities are rewarded with new jobs, revitalized tax base and cleaner air and water

New policies

- As barriers to solar development in West Virginia are addressed, solar becomes more profitable to mine land property owners and mining companies
- Corporate off-takers have more options for purchasing or self-generating solar electricity
- Government leaders and regulators support existing manufacturing jobs and attract new jobs at companies with corporate sustainability and renewable energy goals

STAKEHOLDER PLAYBOOK

Growing the solar energy industry on West Virginia mine lands requires leadership and action from six key stakeholder groups within the state:

- government leaders and regulators
- surface and mineral property owners
- mining companies
- corporate off-takers
- electric utilities
- nonprofit organizations and local solar industry advocates

Independently, these players could make some headway toward developing pilot projects or amending key policies; collectively, they can maximize their impact and have the greatest likelihood of success to see West Virginia capture new investments, new jobs and new revenue from solar energy developments.

Here we present a playbook of actions that each stakeholder group may choose to take to facilitate redevelopment of former mine lands for large-scale solar. The identified actions are intended to build understanding of the options and of the current obstacles and inform collaborative action to overcome these obstacles.

Key stakeholders involved in developing solar on mine lands

- **Government leaders and regulators.** Policymakers can change policy to facilitate solar projects and can support pilot projects to create jobs, replenish the tax base and diversify the economy.
- **Surface and mineral property owners.** Many large landowners are looking for replacement revenue due to the downturn of mining in the region.
- **Mining companies.** Preparation of former mine lands for solar during reclamation or construction may reduce costs.
- **Corporate off-takers.** Many existing manufacturers have high electricity demand, and more and more corporations have renewable energy goals.
- **Electric utilities.** Utilities may diversify their fuel mix to hedge against future increases in wholesale electricity costs and to reduce emissions and expand their portfolio of rate-based assets. As the economy grows, overall electrical demand may also increase.
- **Nonprofit organizations and local solar industry advocates.** These groups can focus resources, including time and funding, to achieve policy changes and build pilot projects.



GOVERNMENT LEADERS AND REGULATORS

West Virginia generates almost all of its power from coal, and despite enjoying historically low electricity rates for decades, industrial electricity costs have risen by seven percent per year over the last two years.¹ A diversified fuel mix could help stabilize prices to the benefit of the broader economy, though would require that legislative and non-legislative actions be taken by government leaders and regulators. Several state government agencies are particularly relevant for efforts to implement solar pilot projects or new solar-friendly policies.

The Public Service Commission (PSC) has substantial authority over West Virginia's electric utilities and how they provide power to their retail customers. Several policies discussed in this report hinge on PSC action. The Commission is made up of three commissioners appointed by the governor. Commission staff, including the Consumer Advocate Division, typically intervene in cases and play important roles in the proceedings.

The Department of Commerce (DOC) works to retain and expand existing industry and to attract new industry. It would not be uncommon for potential corporate off-takers with renewable energy goals or solar developers to contact the DOC to investigate options in West Virginia. It can therefore play a key role in facilitating pilot projects and communicating the benefits of solar-friendly policies to both the public and legislators. Various economic development entities within DOC, such as the Business and Industry Division (BID) Office of Energy and the Small Business Development Center (SBDC), play important roles in identifying and connecting interested parties.

Within the **Department of Environmental Protection (DEP)**, several offices could potentially play a role in the development of solar projects on mine lands. For example, the Office of Abandoned Mine Lands and

Reclamation oversees work on coal mines abandoned before 1977. The Office of Special Reclamation reclaims mines for which bonds were forfeited since 1977. And the Division of Mining and Reclamation regulates active coal mines. Also within the DEP, the Brownfields Section of the Office of Environmental Remediation oversees the repurposing of former industrial sites, including former mine lands, where future use is affected by real or perceived environmental contamination.

Many, but not all, policy changes must go through the **West Virginia State Senate and House of Delegates** and must be signed by the **governor**. Like the governor, legislative leaders can facilitate pilot projects or spearhead legislative changes that would help diversify the state energy economy and attract new businesses and manufacturers to the state.

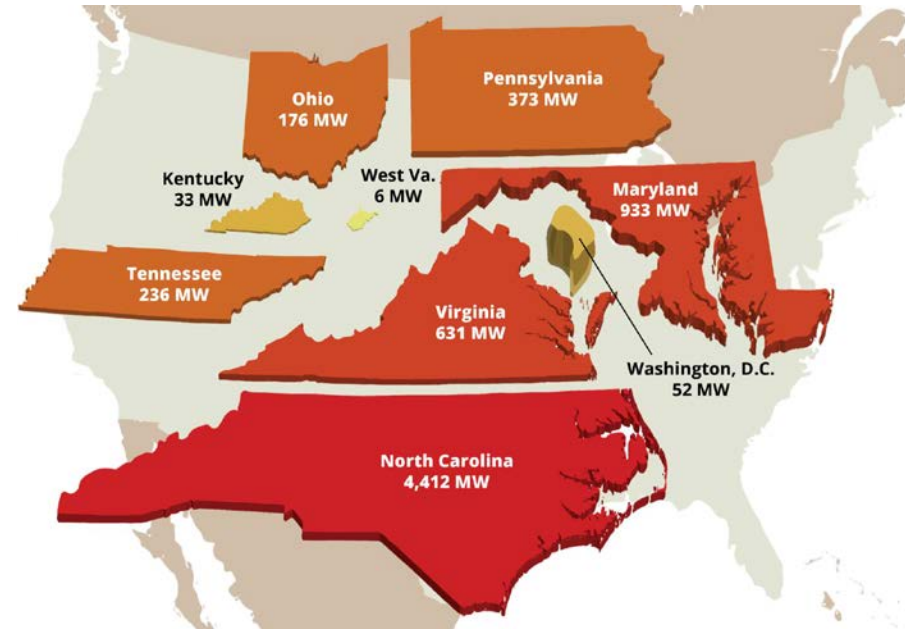


FIGURE 2 – WEST VIRGINIA'S SOLAR MARKET COMPARED WITH SURROUNDING STATES' THAT ARE BOOMING BECAUSE OF FAIRER & MORE PREDICTABLE POLICY FRAMEWORKS. SOURCE: SEIA, 2018

¹ West Virginia Forward. Undated. West Virginia Forward Strategy for Economic Development and Growth. West Virginia University, Marshall University, and the State of West Virginia.

ACTIONS

Government leaders and regulators can take numerous actions to implement solar pilot projects or new solar-friendly policies.

Site certification and marketing

Identifying mine sites that are reasonably prepared and viable for solar ahead of potential development opportunities could direct interest to those sites when development opportunities arise. A “Solar-Ready Mine Lands” certification could foster large solar investments in West Virginia. Further, advertising the availability of these sites through a targeted marketing campaign could attract developers and new businesses into the West Virginia market that may have otherwise not come.

This endeavor could be a collaborative effort between the DEP and DOC, with support from non-profits and land and mineral owners. The DEP could identify and certify shovel-ready sites, and the DOC could market the Solar-Ready Mine Lands to potential buyers or lessees. (See *Appendix A – Racer Trust Case Study*)

Although specific details would need to be worked out, a Solar-Ready Mine Land would have its liabilities minimized and would be close to an electrical substation. Valley fills and outfalls would likely be delineated, and a Phase 1 Environmental Site Assessment would likely be completed. A Good Samaritan law might also be passed by the Legislature to further minimize liabilities associated with developing minelands with solar arrays. Leasing from willing landowners, rather than purchasing land, would provide another opportunity to shield solar developers from previous environmental responsibilities.

Onsite third-party electricity sales

One of the primary opportunities to expand the distributed solar market in West Virginia is to enable third-party electricity sales, a common financing mechanism that is legal in the majority of states in the United States. Currently, a retail customer in West Virginia must own a solar array to use the electricity it produces. Many states have built robust solar markets based on third-party sales. In these states, a project developer can pay to build the array on a customer’s site, own and operate the asset and sell the electricity it produces to the onsite customer. This business arrangement eliminates the need for the customer to pay a large upfront cost to access solar electricity, effectively making solar more accessible.

Limited open market access

The electricity “market” is largely determined by the state laws and regulations that govern the way the utilities provide power to customers within their service territories . If West Virginia wishes to prioritize redevelopment of underutilized former minelands, legislative action could open up competitive access to portions of the grid for the limited purpose of allowing the output from solar arrays sited on mine lands to be sold to third parties, and wheeled over the network of the electric utilities, at a fair and reasonable rate approved by the PSC. This is a simple alternative to a broad restructuring of the electricity market and would both incentivize growth of an emerging renewable energy market and valuable economic activity on underutilized degraded areas.

Net-metering reform

Net-metering has been a primary driver for solar installation on hundreds of homes, businesses, schools and churches across West Virginia. Net-metering currently is allowed under: (1) the “two-mile rule,” which allows virtual meter aggregation for a customer to another property owned by the customer within two miles of a solar installation, and (2) installed capacity limits by customer class—25 kW for residential, 500 kW for commercial and 2 MW for industrial customers. Expanding or even eliminating the two-mile rule and increasing the customer class limits would make it easier for consumers to install more solar and would be the subject of a rulemaking proceeding at the PSC.

Green tariff

Green tariff programs enable utility customers to purchase electricity generated by renewable energy sources directly from their electric utility by voluntarily opting into a special service arrangement with no rate impact to other customers. Green tariff programs have been essential to the growth of many solar markets by increasing the demand for solar projects as customers elect to purchase power with solar and wind energy. The PSC has the necessary statutory authority to enable a utility to develop green tariff options, pursuant to its broad authority to set “just and reasonable rates.”

Amend existing PURPA rules

In response to the energy crisis of the 1970s, the Public Utility Regulatory Policies Act (PURPA) of 1978 created a market for non-utility power producers by requiring utilities to purchase power from all eligible power producers as long as the cost of the electricity was below the utility’s avoided cost. Across the nation, PURPA contracts have resulted in gigawatts of solar development; and today, PURPA is viewed as one of the driving forces behind a rapidly growing solar market, especially so in nearby states such as North Carolina. However, the implementation of PURPA varies across states and utility markets. In West Virginia the PSC has the statutory authority to evaluate and determine how the utilities calculate their avoided costs to create a level playing field and send consistent price signals to the market to spur solar development in West Virginia.

Renewable portfolio standard

Twenty-nine states, Washington D.C. and three territories have adopted renewable portfolio standards to promote local economic development and a diversified, less carbon-intensive energy portfolio. West Virginia’s former Alternative and Renewable Energy Portfolio Standard (AREPS) established a voluntary goal which allowed the state’s utilities to meet renewable energy targets with projects developed both inside and outside the state. If West Virginia were to adopt to enact a Renewable Portfolio Standard (RPS), a provision could be included that would require RPS requirements to be met with in-state renewable energy projects. Further, extra credit could be provided for renewable energy projects that are sited on former mine lands, similar to what was included in the former AREPS. Enacting an RPS in West Virginia would require legislative action.



SURFACE AND MINERAL OWNERS

Much of West Virginia's land and minerals are owned by large landholding companies. Many of these companies have collected lease and royalty payments from coal mining companies and a variety of other enterprises sited on their land, such as timber operations or natural gas wells. For many generations, coal mining has generated most of the revenue for landholding companies. Today, large landowners are looking for new or replacement revenue streams due to the downturn of mining in the region. Also, some landowners' holdings are completely mined out or otherwise uneconomic. Solar could provide a viable long-term land use option and provide revenue to landholding companies in the form of lease payments during the typical lease term of 20-30 years.

ACTIONS

Advocate for pilot projects and new policies

Landowners are key stakeholders with potentially much to gain from bringing large-scale solar development opportunities to their mine sites in West Virginia. Around the region, landowners are increasingly looking at innovative approaches to diversify their revenue streams and enhance profitability. A pilot project would allow for a West Virginia-specific financial model to be implemented, tested and evaluated.

Seek out solar opportunities on abandoned mine lands and bond forfeiture sites

Thousands of abandoned mine lands and bond forfeiture sites are scattered across West Virginia. The availability of funding, both from the traditional Abandoned Mine Reclamation Fund, Abandoned Mine Land Pilot Program grants and the Special Reclamation Fund, could potentially help offset costs associated with making these sites ready for solar.

Engage private developers

Solar development, especially at large scales, is highly competitive. Solar developers would likely be more than willing to engage landholding companies on specific projects or parcels, even before being under formal contract. West Virginia currently has 10 solar installation firms with thousands more scattered across the United States.

If and when suitable sites are identified, there must be formal arrangements with surface owners that are sufficient to satisfy investors' due diligence requirements for development to successfully occur. Engaging with developers early in the process will allow landowners to determine how to most effectively and economically proceed on issues such as making appropriate arrangements with mineral owners of severed estates.

Publicize opportunities and market properties

For people outside the coal mining industry, landholding companies and their land assets are difficult to track. This has contributed to the challenges faced by developers looking to explore siting solar on former minelands. Landholding companies could consider solar as an opportunity to make use of underutilized land assets. Advertising their openness to enter into long-term lease arrangements or property sales—and potentially marketing specific opportunities—could facilitate a successful pilot project and could also help build momentum for new policies to enable additional projects.



MINING COMPANIES

Siting income-generating solar arrays on former mine lands can help offset reclamation costs while making productive use of existing infrastructure, such as transmission lines, substations and access roads that previously served the coal mine. There is precedent for this idea in Nevada, where the State Environmental Commission added “renewable energy development and storage” to the list of acceptable post-production uses for mines in 2018. Mining companies could also potentially generate new revenues for performing site preparation on previously reclaimed mines that may be suitable for solar.

ACTIONS

Seek out solar development partners, and get the proper permits/modifications in place to save money and time

Mining companies may reasonably view solar as an opportunity to save money and time on reclamation. By seeking out a solar development partner as early in the permitting process as possible, mining companies are more likely to save additional money or time. The process will depend on the stage of the permitting and mining process.

- **New mines.** For a new mine that has not been permitted yet, mining companies can identify solar as a post-mine land use.
- **Active mines for which bond release has not started.** If permits have already been secured, mining companies could apply for a permit modification to allow them to leave areas ready for solar. Modifying a mining permit in this manner would be accomplished by opening a 30-day comment period and payment of a \$2,000 fee. permit modification to allow them to leave areas ready for solar. Modifying a mining permit in this manner would be accomplished by opening a 30-day comment period and payment of a \$2,000 fee.

- **Active mines for which the Phase 1 bond has been released.** A mine’s Phase 1 bond is released when grading is completed. Even at this stage, there may be opportunities for mining companies to save money if revegetation compatible with solar development is cheaper than what was originally proposed, and if such a plan were approved by the DEP.

Advocate for pilot projects and new policies

Mining companies can play an important role in bringing large-scale solar to former mine sites in West Virginia as an economic development opportunity. It may help their bottom line by reducing reclamation costs and serve as positive public relations. Also, to the extent that pilot projects and new policies attract new businesses to West Virginia with corporate sustainability goals and support existing large electricity users by stabilizing and potentially reducing their electricity rates, advocating for solar could paradoxically expand the rate base and increase overall electricity sales by existing utilities as the West Virginia economy and population increases.



CORPORATE OFF-TAKERS

Nationwide, large businesses are making vigorous commitments to sustainability and renewable energy.

Google, for example, powers 100% of its operations, including many data centers, with renewable energy through power purchase agreements in which they are often a direct “off-taker” of electricity from a specific project. Amazon, one of Appalachia’s largest employers, is committed to achieving 100% renewable energy usage across its global infrastructure and is currently constructing new wind and solar farms in Ohio, Virginia, Indiana and North Carolina. West Virginia is already home to numerous manufacturing operations with significant electric bills. Corporate off-takers wishing to utilize solar in West Virginia can use the state’s existing net metering rules; however, those installations are limited in size and are often not enough to cover the entire demand of the largest electricity users, nor those with 100% renewable energy goals. Powering sites like those with solar on West Virginia’s former mine lands will require new policies.

ACTIONS

Net-meter using solar on mine lands

Under the current net-metering rules, solar capacity is limited to 25 kW for residential customers, 500 kW for commercial customers, and 2 MW for industrial customers. Still the largest array in the state is just over 400 kW—five times smaller than the industrial limit. Corporate off-takers can view net-metered solar on mine sites as an immediate opportunity to promote the development of solar in West Virginia. By taking advantage of current net-metering provisions, businesses new to solar, like Google, or existing manufacturing businesses can lock in competitive electricity rates for decades, even as the cost of the utility’s coal-based electricity continues to rise. At the same time, these businesses will demonstrate the value of solar, connecting the bottom-line of traditional job-creators with solar energy on historically underutilized, degraded land.

Advocate for pilot projects and new policies

Corporate off-takers can play an important role in bringing large-scale solar to mine sites in West Virginia and may advocate for this economic development opportunity. More and more businesses are implementing ambitious sustainability goals and installing solar. These commitments not only support the creation of local solar jobs, but they also help businesses reduce their operating costs which may allow them to continue to grow. Corporations that could benefit from the energy produced on large-scale solar on mine lands are key to bringing this idea to fruition and could benefit greatly from the positive public relations. With the participation and advocacy of corporate off-takers, pilot projects and new policies would be more likely to be adopted.



ELECTRIC UTILITIES

A broadening view of electric utilities' long-term goals to provide affordable electricity and reduce greenhouse gas emissions has led an increasing number of utilities across the country to embrace solar. West Virginia utilities stand to benefit from solar-friendly policies, which would allow them to hedge against future increases in wholesale electricity costs, expand and diversify their portfolio of rate-based assets and reduce risks associated with their current emissions profile that could potentially lead to stock price volatility. Also, if pilot projects and new policies attract businesses and sustain existing businesses that require solar electricity, this could create economic activity that might help to reverse the current trend of rate-base erosion in West Virginia.

ACTIONS

Add site preference language to future requests for proposals that identifies mine lands as the preferred locations for solar generation

In 2017, Appalachian Power released a request for proposal for up to 25 MW of ground-mounted solar within its Virginia or West Virginia service territory. To date, it is the only RFP of its type in West Virginia. While the specifics of the winning project have not been released, it is understood that the development will take place in Virginia. If and when West Virginia's utilities release RFPs for additional solar capacity, they could consider adding preference language for projects located on mine lands. This language would not necessarily preclude the selection of projects at other locations; instead, it would just state a preference for cost-competitive projects located on those sites.

Advocate for pilot projects and new policies

Electric utilities are key stakeholders in any debate about policies that impact their core business of generating and selling electricity. To the extent that pilot projects and new policies attract new businesses to West Virginia with corporate sustainability goals and support existing large electricity users by stabilizing and potentially reducing their electricity rates, advocating for solar could paradoxically expand the rate base and increase electricity sales by existing utilities as the West Virginia economy and population increases.



NON-PROFITS AND LOCAL SOLAR INDUSTRY ADVOCATES

Non-profit organizations, local solar industry representatives and other advocates are leading the advancement of solar in West Virginia. Promoting large-scale solar development on former mine lands will require working within these established networks to focus resources—both human and capital—on achieving necessary changes.

ACTIONS

Identify existing mines where reclamation costs could be reduced through changes in mining permits

Modifying mining permits to accommodate solar may reduce overall reclamation costs and expedite the bond release process. Non-profit organizations could work with mining companies to identify active mines that could benefit from such a change in its post-mine land use. Identifying these sites and quantifying potential reclamation savings could encourage mining companies to embrace solar on mine lands.

Landscape mapping. Large-scale solar development is highly competitive

Because existing policies have held back the development of solar in West Virginia, there is a large unmet demand. Growth of the solar industry is almost certain over time. Identifying and mapping mine sites that are viable for solar development could help expedite investment from developers on projects on these sites, to ensure local benefits are maximized and impacts to greenfields are minimized. (See *Appendix A – Racer Trust Case Study*)

Identify funding streams

Additionally, identifying available funding streams, such as the Abandoned Mine Land Pilot Program, could help make potential projects pencil for developers. Non-profits and other advocates may also have access to certain corporate donors and private foundations that would participate in pilot projects, increasing the likelihood and viability of these demonstration projects in the near term.

Facilitate pilot projects

Non-profits and other advocates can play a key role in convening a variety of stakeholders to facilitate pilot projects—including surface and mineral property owners, mining companies, corporate off-takers, electric utilities and government leaders and regulators to coordinate strategies and expand a coalition of stakeholders.

Advocate for pilot projects and new policies

Non-profits and other advocates are the natural leaders to advocate for the actions and policy changes necessary to bring solar to mine lands in West Virginia, and they have already done a considerable amount of work in this arena. They could continue to act as the convener, bringing together all the stakeholders described in this report with the goal of immediately building pilot projects and, eventually, changing policies that will allow solar to thrive in West Virginia.

CONCLUSION

Six key stakeholder groups are identified in this report that could greatly advance the siting of solar on former mine lands and benefit from the results. They include surface and mineral property owners, mining companies, corporate off-takers, electric utilities, nonprofits and local solar industry advocates and government leaders and regulators.

If this broad group of stakeholders worked together to advocate for pilot projects and sensible new policies, the amount of solar installed in West Virginia on mine lands will quickly increase—along with jobs and significant economic benefits.

Some of the actions recommended in this report can be implemented with relative ease, requiring no legislative or regulatory changes, while others may require building a broader coalition to support the development of a robust solar market over the years to come.

This report provides a roadmap, with a wide range of suggested actions that a variety of key stakeholders can choose to take individually or together to facilitate siting solar arrays on mine lands in West Virginia. This historic opportunity will capitalize on the extensive land base, minimize impacts from energy development across the region and maximize local benefits for West Virginia.



Downstream Strategies

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



The Nature Conservancy

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



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

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The authors acknowledge insights from various staff at The Nature Conservancy and research by Brightfields Development & ECSI. Cover photo: Dave Lauridsen.